Are They There Yet? Determining Student Mastery of Learning Outcomes Based on the *ACRL Framework*

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The Association of College and Research Libraries (ACRL) made a fundamental change in the library instruction landscape when they replaced the *Information Literacy Competency Standards for Higher Education*[1] with the *Framework for Information Literacy for Higher Education* in 2016. They developed the *Framework*[2] in response to an ever-changing information ecosystem where our ability to make informed choices relies less on following prescribed rules and more on understanding big ideas that underpin the foundational concepts of information literacy. Information literacy is now recognized to be a collection of interconnected abilities that place the self-reflective and critical learner within an information community, able to recognize how information is created and evaluated and understand how new knowledge is built through conversation and participation within that community. In addition to the move to big ideas, the ACRL underpins the *Framework* with Meyer and Land's theory of threshold concepts.[3] Mastering a threshold concept "can be considered as akin to a portal, opening up a new and previously inaccessible way of thinking about something. It represents a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress."[4]

Threshold concepts are generally specific to a given disciplinary community and have meaning in the context of that community. Accordingly, the *Framework* identifies several abilities that constitute information literacy and deems them "knowledge practices" and "

Dispositions" to describe these threshold concepts. However, librarians who adopted the *Framework* have been left wondering how to determine whether students have crossed through this knowledge portal or remain in what Meyer and Land call a transitional "liminal space" where learners have not yet mastered a difficult concept.[5]

Librarians are divided on whether the theoretically abstract nature of the *Framework* is useful in the classroom. Some have criticized the ACRL for its lack of support in the transition from the *Standards* to the *Framework*.[6] In disciplines such as Business, uptake is slow; Guth and Sachs, for instance, report that 61 percent of librarians for these departments do not incorporate the *Framework* into instruction.[7] However, many other librarians believe that adopting the *Framework* was a good decision, and offer recommendations for understanding and implementing some of its core concepts.[8] Bauder and Rod provide some guidance on teaching the Frames in collaboration with course-specific goals, and Julie Edwards developed a one-credit online course, "Information Analysis in the Post-truth Age," informed by the *Framework*, particularly the Frame Authority Is Constructed and Contextual.[9]

While the ACRL has created a website that allows librarians to share their pedagogical resources on teaching the *Framework*,[10] literature is scarce on understanding what students have learned after receiving *Framework*-based information literacy instruction. Work on assessment methods has begun: for example, Rachel Scott shares extant student reflections on *Framework* concepts, then measures how they improved their understanding over the course of a term.[11] Generally speaking, we agree with Guth and Sacs, who report a lack of proven methods in implementing the *Framework*,[12] and much needs to be done to develop processes to assess students' mastery of the Frames.

The authors of this chapter believe wholeheartedly in the *Framework's* potential but realized the gap in assessment resources when they included it as part of the curriculum of a third-year Computing Science course. This chapter provides an account of our attempt to discover whether students had mastered some of the *Framework's* knowledge practices and dispositions. We developed and applied an assessment methodology to two Frames: Authority is Constructed and Contextual, and Scholarship as Conversation. We used a mixed methods approach to determine whether students met the assignment's learning objectives.[13] This first involved a qualitative analysis of student responses in light of the Frames' knowledge practices and dispositions. We then grouped the knowledge practices and dispositions into learning outcomes and tallied the occurrences. We discovered that students had a good grasp of the major markers of authority, but some had difficulties with the nuance of specialization and the concept of scholarship being cumulative rather than fixed. This process is a step forward in assessing mastery of learning outcomes based on the *Framework*, though it falls short of being able to definitively answer whether students have crossed a threshold.

Background

In 2017, Diana Cukierman, a Computing Science lecturer at Simon Fraser University (SFU), began developing a curriculum for a third-year course titled "Social Implications of a Computerized Society." The course expects students to reflect on societal issues that are influenced by the extensive and intensive usage of technology, computers, and networked communications. She contacted Holly Hendrigan, departmental librarian for Computing Science, to brainstorm ideas for a guest lecture and assignment on information literacy. Cukierman was open to hearing Hendrigan's ideas that related to themes she was teaching in the course; she was also amenable to co-developing an assignment and allowing Hendrigan access to

student responses. Hendrigan and Cukierman were excited at the prospect of collecting data on students' understanding of the Frames. The team expanded to include Keshav Mukunda, a colleague of Hendrigan's at SFU Library, in the fall of 2017.

The research team developed the course unit on information literacy months in advance of the workshop, scheduled in May 2018. We decided to focus on two Frames, Authority is Constructed and Contextual and Scholarship as Conversation, and secured approval from SFU's Research Ethics Board to ensure we could report widely on our findings. The course unit included several different components over the span of five weeks within a thirteen-week course. In week three, we asked students to read Jean Twenge's article "Have smartphones destroyed a generation?"[14] in *The Atlantic*. A written assignment due two weeks later required students to answer questions relating to Twenge's authority and to find scholarly responses to the article which both supported and disagreed with her findings and/or methodologies (the complete assignment is provided in the Appendix). In week four, as students were working on this assignment, Hendrigan provided an in-class lecture discussing the two Frames.

Librarians using the *Framework* have flexibility in designing their curricular materials and methods of assessment. We followed the advice of Alison Hosier and Megan Oakleaf, who recommend the creation of learning outcomes.[15] Our decision came after failed attempts to develop a sound methodology to assess the transformative nature of mastering threshold concepts. For this assignment, we wanted students to be attuned to an academic's professional qualifications, but to also realize that no author's authority is absolute or that any one article is the final word on a topic. We developed three learning outcomes:

1. The student will recognize markers and/or types of authority

2. The student will challenge the author, or acknowledge debate on the topic, or mentions the importance of skepticism

3. The student will recognize that a scholarly work is just one perspective on a topic

We also followed Megan Oakleaf's requirement that students represent their knowledge by taking a declarative approach, and Scott's lead in explicitly teaching the Framework rather than modifying the language of the Frames into simpler concepts. [16]

As the class was relatively large (eighty-six students), the responses needed to be in digital format to enable analysis. Students submitted the assignment on SFU's internal secure survey platform, which allowed us to download the responses into a spreadsheet. This chapter analyzes the results of four out of eighteen questions from the assignment; these four questions provided the best sources of qualitative data for analysis. Specifically, they were:

Q9. What are Twenge's credentials as an expert on the impact of smartphones on young people? Briefly explain in 1-2 sentences.

Q10. Do you think that Twenge is a credible expert on the impact of smartphones on young people? Why? Briefly explain in 1-2 sentences.

Q11. In your view, what are the characteristics of a credible expert on the impact of smartphones on young people? Briefly explain in 1-2 sentences.

Q18. Write a reflective paragraph on what you learned from this assignment about the Frame "Authority is constructed and contextual."

Sixty-seven of eighty-six students consented to share their responses to be analyzed for this research. They had completed an average of 5.25 semesters of post-secondary studies, although there was a wide range of semesters completed (from four to eight); some students, for example, were in their last semester before graduating. The majority of students in the class

(58%) were Computing Science majors, but other majors included Communications and Interactive Arts, and some had also declared a minor in disciplines such as Psychology and Business.

Coding and Assessment

We used a mixed methods approach in developing an assessment rubric for the assignment. One aspect involved qualitative analysis of the student responses; the other aspect involved quantifying the level of knowledge acquired using mastered learning outcomes as a measure. By design, the *Framework* does not prescribe how it should be implemented, or how to assess student understanding of the concepts it describes. In analyzing the responses to the questions, we maintained the *Framework's* emphasis on knowledge practices and dispositions, and created codes to reflect these attributes. These codes did not encompass *every* knowledge practice and disposition from the two Frames we discussed; we followed Oakleaf and Hosier's suggestions to focus on the few that were relevant to our desired learning outcomes.[17] Table 1.1 displays the codes we used in analyzing student responses, along with contextual information from the *Framework* document.

Table 1.1. Knowledge Practices and Dispositions with Associated Codes

Frame: Authority is Constructed and Contextual		
Attribute	Brief excerpt from *Framework* definition	Code
Challenge acknowledged authorities	"disciplines have acknowledged authorities … yet … some scholars would challenge [their] authority"	acc_kp1
Indicators of authority	"use … indicators of authority to determine the credibility of sources"	acc_kp2
Types of authority	"define different types of authority…"	acc_kp3
Open mind	"develop and maintain an open mind…"	acc_d1
Self-aware	"[assess] content … with a self-awareness of their own biases and worldview"	acc_d2
Skeptical	"[assess] content with a skeptical stance"	acc_d3
Frame: Scholarship as Conversation		
Attribute	Brief excerpt from *Framework* definition	Code
Evaluate contributions	"critically evaluate contributions made by others … "	sc_kp1
Scholarly work one perspective	"recognize that a given scholarly work may not represent the only … perspective"	sc_kp2
Ongoing conversation	"recognize they are often entering … an ongoing scholarly conversation"	sc_d1

Table 1.2 provides excerpts from the student responses that reflect the codes we applied. To ensure coding consistency, we used an approach from Davies and Mangan's work on assessing mastery of threshold concepts in Economics.[18] Two members of our research team initially coded twelve samples independently, then compared the coding assignments in order to

ensure consistent labels. The percent agreement for each of the individual codes varied from

63% to 100%, with a median of about 92%.

Table 1.2. Examples of coding applications

Code	Attribute	Excerpt from Student Responses
acc_kp1	challenge acknowledged authorities	"there are obviously people with other opinions that disagree with her"
acc_kp2	indicators of authority	"She is [a] professor in Psychology and has published several peer reviewed articles."
acc_kp3	types of authority	"She also speaks from experience because she has 3 daughters, all of which [*sic*] were born in the iGen generation and hence have been growing up with technology."
acc_d1	open mind	"Information and the truth are not always easily found and it is important to consider that an article may only represent the findings of a specific experiment or one possible conclusion. The takeaway is that open-mindedness is an essential virtue in the pursuit of knowledge."
acc_d2	self-aware	"Much of the time, I am guilty of believing the first thing that I read without asking whether that information is trustworthy, what biases the author might hold, etc."
acc_d3	skeptical	"However, her study should not be a single source of truth, and rather it should be just another source of study..."
sc_kp1	evaluate contributions	"It is best to examine different authorities for the same topic to form better understanding of the controversies and examine the information as the reader."
sc_kp2	scholarly work one perspective	"I would add the caveat that while she is an expert, if you are really looking for the complete picture on a topic it is wise to look at additional sources as well."
sc_d1	ongoing conversation	"Results are always changing too so one day the research by the authoritative person could be the absolute truth but the following day someone an all of a sudden disprove it with stronger research."

The quantitative aspect of this mixed methods approach was more straightforward. After coding students' responses for relevant knowledge practices and dispositions following Table 1.1, we grouped the knowledge practices and dispositions into broader learning outcomes as in Table 1.3.

Table 1.3. Learning Outcomes in Relation to Knowledge Practices and Dispositions

Learning Outcome Code	Description	Codes in evidence
lo1	Student recognizes markers and/or types of authority	acc_kp2 OR acc_kp3
lo2	Student challenges author, or acknowledges debate on the topic, or mentions the importance of skepticism	acc_kp1 OR acc_d3
lo3	Student recognizes that a scholarly work is just one perspective on a topic	sc_kp2 OR sc_kp1 OR sc_d1 OR acc_d1
lo4	Student demonstrates metacognition in their own search behaviour	acc_d2
mlo	Misunderstood learning outcome, or category error	--

Unexpectedly, analyzing and coding the responses helped us determine our final learning outcomes. Our initial learning outcomes required that students demonstrate an understanding of the major markers of authority, that all authors can be challenged, and that no single resource represents an absolute truth. Another attribute emerged from question 18 that we did not expect: we labelled it 'self-aware' and coded it as 'acc_d2.' This attribute could not be grouped with similar knowledge practices and dispositions that we had already incorporated into learning outcomes. We subsequently added the learning outcome lo4, that represented evidence of metacognition.

Developing the coding framework was not an easy task; there are no published accounts of similar *Framework* assessment schema that we could consult or adapt to our purposes. Coding qualitative data is time consuming, even though the assignment responses were generally short. Ultimately, we realized our data does not definitely determine whether or not students had crossed a 'portal' of understanding and had emerged through to the 'other side' of a threshold concept. In time, we trust that such a metric will be developed and tested.

<div align="center">Findings</div>

In analyzing student responses to assignment questions, we first looked for evidence of knowledge practices and dispositions on display in students' answers. This provided a deeper understanding of the variation across students' acquisition of different *Framework* concepts and made it straightforward to later assign acquired learning outcomes to each student.

In general, the knowledge practices and dispositions that appeared most often in student responses and for the largest number of students were from the Frame Authority is Constructed and Contextual, while fewer students demonstrated competencies from the Frame Scholarship as Conversation. Table 1.4 shows the occurrences of these competencies for both the Frames in students' answers to assignment questions 9-11 and question 18. Responses to question 9 through question 11 were combined for the purposes of our analysis, as they were all related to the characteristics of a person who could be an expert on the impact of smartphones on young people (Appendix).

Table 1.4. Occurrences of Codes in the Assignment Questions

Code	Attribute	Q9-Q11 combined	Q18	Total occurrences	Number of students	Percentage of students
acc_kp2	Indicators of authority	63	31	94	64	96
acc_d3	Skeptical	13	33	46	38	57

acc_kp1	Challenge acknowledged authorities	20	13	33	28	42
sc_kp1	Evaluate contributions	5	14	19	16	24
acc_kp3	Types of authority	10	5	15	14	21
acc_d2	Self-aware	0	12	12	12	18
sc_kp2	Scholarly work one perspective	6	6	12	10	15
sc_d1	Ongoing conversation	2	9	11	10	14
acc_d1	Open mind	2	6	8	7	10

Turning to the learning outcomes described in Table 1.3, 94% of the 67 students were able to recognize markers and/or types of authority, while only 18% demonstrated metacognition (Table 1.5).

Table 1.5. Learning Outcomes Acquired

Learning Outcomes	Number of students	Percentage of students
lo1: Student recognizes markers and/or types of authority	63	94
lo2: Student challenges author, or acknowledges debate on the topic, or mentions the importance of skepticism	47	70
lo3: Student recognizes that a scholarly work is just one perspective on a topic	25	37
lo4: Student demonstrates metacognition in their own search behaviour	12	18

We also noticed that some students had not generally understood fundamental concepts that formed the basis of certain questions. In these 14 instances, we coded the responses as MLO, or 'misunderstood learning outcomes'. However, we had enough data from the responses to recognize that most students assigned an MLO did also acquire other learning outcomes.

For example, we noticed misunderstandings of the phrase "Authority is Constructed and Contextual," and of the concept of bias: "From this assignment I learned that the Frame "authority is constructed and contextual" means we must look at the credentials of the author. For instance, if the person doesn't have any credentials, then their research and opinions may be biased or inaccurate." (Student 65) The suggestion here is that authors whose research is not biased must already have relevant credentials, which missed the nuance of our learning objectives. However, Student 65 had achieved lo1 and lo2, exhibiting knowledge of the author's markers and types of authority, and mentioned the importance of scrutinizing the author's field of expertise. In another example, a student applies the term "contextual" to the topic rather than the situation of the author: "Her work is also contextual as it addresses a need to recognize the adverse effects that our ever-changing technological society is having on teens now and could have in the future." (Student 26)

Discussion

The purpose of this research was to develop a methodology for assessing two Frames and to gauge students' understanding of these concepts. We developed an assessment schema based explicitly on the *Framework's* knowledge practices and dispositions and then applied this schema to student responses. Here we reflect on four themes that emerged from our analysis.

Students Demonstrate Proficiency in Types and Indicators of Authority, but Fewer Challenge

Authority and Understand Scholarship as Conversation.

Nearly all the students revealed proficiency in recognizing the markers of the author's

academic and experiential authority: she is a university professor and author of hundreds of peer-

reviewed articles, and also a parent witnessing the impact of smartphones on her two teenage

daughters.[19] In response to question 9, many students provided responses similar to this one:

"Her findings about the impact of smartphones are mostly published by reliable authorities such

as American Psychological Association. In addition, she has more than 100 scientific

publications." (Student 64)

We had wondered, however, how many students would also notice that Twenge's

primary research area was on generational differences rather than the impacts of technology on

its users. The Frame Authority is Constructed and Contextual explicitly mentions that experts

"recognize schools of thought or discipline-specific paradigms".[20] As the assignment required

students to find dissenting views on Twenge's conclusions within academic discourse (See Q17

in the Appendix), we expected this activity to stimulate some critical reflections on the

limitations of her authority. Some students noted this: "I believe that Twenge is a credible expert

on the attitudes/values/personalities/habits of this young generation (iGen) but not specifically on

the impact of smartphones on said generation," (Student 1) but our findings indicate that more

than half of the students have yet to understand this distinction. One student response illustrates

this conflation: "Twenge is a credible expert on the impact of smartphones on young people

since she has been studying generational differences for more than two decades." (Student 3)

Being able to recognize identifiers of authority generally did not mean students could

also challenge the author's authority or acknowledge challenges made by other scholars. We

confirmed Edwards' finding that some students confuse the authority of the author with the content of their argument.[21] One student response illustrates this point: "Yes I do think she is [a] credible expert […] the points she brought up are convincing plus they are peer reviewed. Smartphones (or screen activities) can cause depression [i]n people." (Student 57) This indicates an inability to acknowledge that a person who has expertise and authority might be wrong, or hold opinions different from the students'.

Some of the weaknesses in meeting the learning objectives might be attributed to disciplinary conventions in computing science and variances in the number of semesters students have been in university. Unlike typical assignments in computing science courses, our assignment asked students to examine the nuances of authority and the cumulative nature of scholarship. While computing science students are required to take courses outside their discipline, this assignment (indeed, this entire course) is a departure from the type of work they are normally assigned and are presumably more comfortable completing. We wonder how responses from students majoring in a social sciences or humanities discipline might differ.

Qualitative Data Informs Learning Outcomes

We asked open-ended questions because we were genuinely curious to read, in students' own words, their understanding of the two Frames we focused on. However, open ended questions present challenges for researchers to code and analyze. We do our best to structure and classify qualitative data by creating rubrics and other systems of sense-making, but surprises will still appear. As mentioned earlier, we found enough evidence of metacognition in student responses that we felt compelled to include it as a learning outcome, even though we did not specifically ask questions that tested for it. Thus the relatively low attainment of the learning outcome that measured metacognition (18%) may not reflect students' weakness in this

attribute. Instead, it represents a significant but unexpected finding after we collected the data. We will ask explicit questions in future assignments regarding students' propensity for metacognition, but acknowledge a need for a flexible approach to assessment when working with open ended questions.

Misunderstood Learning Outcomes and Nonnative Speakers of English

We attribute some of the misunderstood learning outcomes to challenges with the English language. While we do not have data on the percentage of students in the class for whom English is an additional language, the figure for all international students in the Faculty of Applied Science is just over 27%.[22] The vast majority of SFU's international students are visiting from China, followed by India, Hong Kong, and Korea,[23] where English is not the dominant language. Many responses revealed grammar and usage errors common to non-native English speakers, and as mentioned in our Findings, students struggled with the meaning of the phrase "Authority is Constructed and Contextual." These were similar to the challenges some of Scott's students had with the complex language of the Frames.[24] Understanding this clause requires a high proficiency in the English language, which indicates that responses to question 18 might not fully reflect students' grasp of threshold concepts in information literacy.

Rewarding Work, but Unsustainable

While we have focused on discussing the challenges students had in achieving the learning outcomes, the research team has much to celebrate as well. We saw signs of honest reflection and intellectual growth, for example "From this assignment, I learned there are lots of different ways to construct, or build, authority and how it relates to information. However, it is still hard for me to find "good" sources or choose the "right" data to use when I write about something." (Student 17) And:

[R]esearch is really more of an ongoing discussion then finding any one singular truth. For example, the article that I found disagreeing with Twenge discusses how we may not really be addicted to technology, but its increased use is a symptom of larger problems. These authors suggest that technology could, in fact, be used to form meaningful relationships. I think that the debate between these authors is great to read as it helps expose weaker points in the research on both sides. (Student 29)

Practicing librarians rarely have access to this level and depth of reflection.

However, where Oakleaf recommends that librarians promptly provide feedback to students on their grasp of the *Framework's* concepts, in this first iteration of our module we were unable to provide students with a timely response. As mentioned earlier, we were working with a large class, and developing the codes and assessing the responses took weeks of work amidst other duties. While the research team agrees with Oakleaf that a declarative approach is the best method to demonstrate understanding, this method is not scalable to practitioner librarians teaching large classes. Challenges remain to develop instruction in the *Framework* that allows for assessment for large classes.

Conclusion

This chapter extends the research of Scott, Edwards, and Hosier in offering suggestions to implement the *Framework* in the university classroom. We provide a coding system based on the *Framework's* knowledge practices and dispositions and reveal our assessment data on the assignment's learning outcomes. This approach might be tailored to other course-integrated information literacy instruction settings.

We realize, however, that research to this level and depth on implementing the *Framework* requires a special set of circumstances. In order for it to happen, practitioner librarians need to have a close collaborative relationship with faculty. It can be difficult to persuade instructors to move beyond a fifty-minute 'one-shot' workshop on teaching resources and search strategies for a research paper. For those of us who do not regularly conduct qualitative assessment of student learning, we are now aware of the extent of the labor required to provide meaningful feedback for such assignments. We need to work with faculty to develop scalable assessment methods.

This research has provided us with many ideas on future areas to be addressed. We would like to fine-tune the assignment and the workshop: we will spend more time defining the terms 'authority,' 'contextual,' and 'constructed.' We could spend more time examining the data from the questions we did not analyze for this chapter and look for patterns and associations in the learning outcomes achieved. Cross-referencing the achieved learning outcomes with student demographic data (including the number of semesters completed and their academic major) would also be an interesting analysis. Indeed, we have a lot of work to do in order to answer the question, "Are they there yet?" and further examine the reasons why students might be 'stuck' in a liminal space. This is but one method for determining where students are in their information literacy journey, and future studies will provide us with many more pathways to choose.

Appendix: Assignment Questions

Q1. Read Jean Twenge's article "Have Smartphones Destroyed a Generation?"
(https://www.theatlantic.com/magazine/archive/2017/09/has-the-smartphone-destroyed-a-generation/534198/). Twenge's article in *The Atlantic* magazine describes some of the same ideas from her recent book, *_iGen: Why Today's Super-Connected Kids are Growing up Less Rebellious, More Tolerant, Less Happy – and Completely Unprepared for Adulthood_*

Q2. Do you consent to sharing your answers with the research team for research purposes?

Q3. Dr. Jean Twenge is a faculty member of which academic department?

Q4. In the PsycINFO database, do an author search for Jean Twenge. Narrow the list of search results to academic journals, and list the first three of her articles using the APA citation style. Remember to keep your search page open for the questions that follow!

Q5. Were these articles that you selected for the previous question published in peer-reviewed journals?

[Multiple choice: Yes all three of them; Not all of them; None of the three; I am not sure]

Q6. What does "peer review" mean? Explain in your own words, in 1-2 sentences.

Q7. Scan the titles and abstracts from the first page of the list of author search results in PsycINFO. Summarize two or three major topics or themes of Twenge's academic articles.

Q8. Does Twenge appear to be authoritative within the academy (i.e., among other university professors)? How do you know this? Briefly explain in 1-2 sentences.

Q9. What are Twenge's credentials as an expert on the impact of smartphones on young people? Briefly explain in 1-2 sentences.

Q10. Do you think that Twenge is a credible expert on the impact of smartphones on young people? Why? Briefly explain in 1-2 sentences.

Q11. In your view, what are the characteristics of a credible expert on the impact of smartphones on young people? Briefly explain in 1-2 sentences.

Q12. Who is Twenge's audience in her academic papers?

Q13. Who is Twenge's audience in her article in *The Atlantic* magazine?

Q14. How do you think Twenge establishes her authority in the Atlantic article? Briefly explain in 1-2 sentences.

Q15. Why do you think Twenge chose to publish her ideas on smartphones and young people in both The Atlantic magazine and in peer-reviewed journals? Briefly explain in 1-2 sentences.

Q16. Find an article written by a university professor who builds on Twenge's findings and/or methodologies about the "iGen" generation. Cite the article in APA style. (Note: Twenge's article in *The Atlantic* magazine describes some of the same ideas from her recent book _iGen: Why Today's Super-Connected Kids are Growing up Less Rebellious, More Tolerant, Less Happy – and Completely Unprepared for Adulthood_)

Q17. Find an article written by a university professor who disagrees with Twenge's findings and/or methodologies about the "iGen" generation. Cite the article in APA style.

Q18. Write a reflective paragraph on what you learned from this assignment about the Frame "Authority is constructed and contextual."

Notes

[1] *Information Literacy Competency Standards for Higher Education*, American Library Association, 2000, http://hdl.handle.net/11213/7668.

[2] *Framework for Information Literacy for Higher Education*, American Library Association, 2015, http://www.ala.org/acrl/standards/ilFramework.

[3] Jan H. F. Meyer and Ray Land, "Threshold Concepts and Troublesome Knowledge: Linkages to Ways of Thinking and Practicing Within the Disciplines," in *Improving Student Learning: Improving Student Learning Theory and Practice–Ten Years On*, ed. Chris Rust (Oxford Centre for Staff & Learning Development: Oxford, 2003), 1-16.

[4] Meyer and Land, "Threshold Concepts," 1.

[5] Meyer and Land, "Threshold Concepts," 13.

[6] Christine Bombaro, "The Framework Is Elitist," *Reference Services Review* 44, no. 4 (2016): 552–63, https://doi.org/10.1108/RSR-08-2016-0052; Meredith G. Farkas, "Is the Framework Elitist? Is ACRL?," *Information Wants to be Free* (blog), October 18, 2016, https://meredith.wolfwater.com/wordpress/2016/10/18/is-the-Framework-elitist-is-acrl/; Leslin H. Charles, "Embracing Challenges in Times of Change: A Survey of the Readiness of Academic Librarians in New Jersey for Transition to the ACRL Framework," *Communications in Information Literacy* 11, no. 1 (2017): 221-45, http://www.comminfolit.org/index.php?journal=cil&page=article&op=view&path%5B%5D=v1 1i1p221.

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[8] For example, see Megan Oakleaf, "A Roadmap for Assessing Student Learning Using the New Framework for Information Literacy for Higher Education," *The Journal of Academic Librarianship* 40, no. 5 (2014): 510-14, https://doi.org/10.1016/j.acalib.2014.08.001; Carissa Tomlinson and Catherine Johnson, "Crafting the Perfect Blend: Student Cognitive Development Theory and Threshold Concepts for Student Success," *LOEX Quarterly* 41, no. 4 (2015): 12-14, https://commons.emich.edu/loexquarterly/vol41/iss4/5; David A. Hurley and Robin Potter, "Teaching with the Framework: a Cephalonian approach," *Reference Services Review* 45, no. 1 (2017): 117-30, https://doi.org/10.1108/RSR-07-2016-0044; Allison Hosier, "Creating Learning Outcomes from Threshold Concepts for Information Literacy Instruction." *College & Undergraduate Libraries* 24, no. 1 (January 2, 2017): 1–13, https://doi.org/10.1080/10691316.2017.1246396.

[9] Julia Bauder and Catherine Rod, "Crossing Thresholds: Critical Information Literacy Pedagogy and the ACRL Framework," *College & Undergraduate Libraries* 23, no. 3 (2016): 252–64, https://doi.org/10.1080/10691316.2015.1025323; Julie Biando Edwards, "Added Value or Essential Instruction?: Librarians in the Twenty-First-Century Classroom," *Reference & User Services Quarterly* 57, no. 4 (2018): 285–93, https://doi.org/10.5860/rusq.57.4.6706.

[10] "ACRL Framework for Information Literacy Sandbox | A Platform and Repository for Sharing Framework Materials," Association of College & Research Libraries, accessed February 22, 2019, http://sandbox.acrl.org/.

[11] Rachel E. Scott, "Part 1. If We Frame It, They Will Respond: Undergraduate Student Responses to the Framework for Information Literacy for Higher Education." *The Reference Librarian* 58, no. 1 (2017): 1–18, https://doi.org/10.1080/02763877.2016.1196470; Rachel E.

Scott, "Part 2. If We Frame It, They Will Respond: Student Responses to the Framework for Information Literacy for Higher Education." *The Reference Librarian* 58, no. 1 (2017): 19–32, https://doi.org/10.1080/02763877.2016.1196471.

[12] Guth and Sachs, "National Trends," 133.

[13] John W. Creswell, *Research Design: Qualitative, Quantitative and Mixed Methods Approaches, 4th ed*. (Thousand Oaks, California: Sage, 2014), 215-28.

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[15] Hosier, "Creating Learning Outcomes," 4; Oakleaf, "Roadmap," 511–12.

[16] Oakleaf, "Roadmap," 512; Scott, "Part 1. If We Frame It," .

[17] Hosier, "Creating Learning Outcomes," 4-7; Oakleaf, "Roadmap," 512.

[18] Peter Davies and Jean Mangan, "Assessing Progression in Students' Economic Understanding: The Role of Threshold Concepts," in *Threshold Concepts and Transformational Learning. Educational Futures: Rethinking Theory and Practice,* eds. Jan H.F. Meyer, Ray Land, and Caroline Baillie (Rotterdam: SensePublishers, 2010), 193-206.

[19] In the article that students were assigned to read, Twenge mentions her children when writing about the effects of smartphones on young people.

[20] Association of College & Research Libraries, "Framework."

[21] Edwards, "Added Value," 291.

[22] *International Student Headcount by Faculty*, Simon Fraser University Institutional Research and Planning, 2018, https://www.sfu.ca/content/dam/sfu/irp/students/documents/ST25.pdf.

[23] *Fall 2018 International Student Report*, Simon Fraser University Institutional Research and

Planning, 2018,

https://www.sfu.ca/content/dam/sfu/irp/students/visa_report/visa.report.1187.pdf.

[24] Scott, "Part 1. If We Frame It"