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**Developing a Genre Concept Inventory**

**A New Method for Measuring Genre Understanding and Learning**

***WRAB 2023: International Writing Workshop***

Gwen and Carol would like to begin by saying that this document is *not* a draft of an article about a nearly-complete research project. Instead, our research team is at the very beginning stages of developing a new research instrument for measuring college writers’ genre awareness. This new instrument--a genre concept inventory (GCI)--will (we hope) provide writing studies with a new methodological tool, adapted from STEM disciplines, for measuring student genre understanding.

Our hope for the WRAB pre-conference workshop is to seek WRAB colleagues’ feedback on that new instrument. The goal of this document, then, is to provide a frame for that February discussion. This document includes the following sections:

* Why a new research instrument for measuring student genre awareness?
* A short introduction to concept inventories
* Why genre?
* Why metacognition?
* What are we hoping to gain by developing a Genre Concept Inventory?
* Where are we in the process of developing the GCI? (including next steps)

***Why a new research instrument for measuring student genre awareness?***

College-level writing instruction in the U.S. is nearly ubiquitous. First-year writing (FYW) is taught on nearly every campus, from two-year colleges to the most prestigious private research universities. Further, nearly every student is required to complete FYW. Yet, the range of curricula and instructional approaches used is notable. From literature-based curricula to courses based in popular culture, the writing process, student self-expression, the stases of classical rhetoric, service learning, rhetorical genre theory, and other models, FYW instruction varies substantially across campuses and sometimes even across course sections on a single campus.

While science, technology, engineering, and mathematics (STEM) disciplines have well-established broad agreement about what key concepts, information, and skills the curricula of foundational courses should include, writing studies is distinctive for its lack of consensus on these matters. In addition to consensus regarding the material to be covered in foundational courses, STEM fields increasingly rely on empirical research showing that some pedagogies and course designs improve students’ grasp of this material. For instance, there is a growing literature on active learning (see especially Freeman et al., 2014) and related approaches (Alzen, Langdon, & Otero, 2018; Barasso & Spilios, 2021; Indort et al., 2019; Rodenbusch et al., 2016). This literature is gaining influence: Freeman et al.’s (2014) meta-analysis of research on active learning has been cited 8,263 times. Based on this body of research, leading U.S. STEM organizations, such as the National Research Council, the American Association for the Advancement of Science, and the National Science Teaching Association, advocate the use of such course designs and pedagogies across educational levels, including postsecondary instruction. As a result, STEM instruction in U.S. colleges and universities, particularly at the foundational level, has begun to shift from traditional lecture pedagogies to evidence-based alternatives, typically some form of active learning.

Yet, foundational courses in the humanities, and particularly FYW, lack a comparable body of empirical research to use as a guide in shaping curricula and instruction. While writing studies as a field of inquiry has a robust body of scholarship and research, much of this work entails textual analyses, theoretical arguments, and small-scale qualitative studies. Although Haswell (2005) called for more “RAD” research in writing studies: research that is replicable, aggregable, and data-driven, that call has proven challenging. There are three reasons for the paucity of large-scale quantitative studies of writing development and writing instruction. First, many U.S. writing studies scholars have been trained in the humanities, a field that doesn’t generally engage in empirical research, which means that for many writing studies scholars, engaging in RAD research is likely to require learning entirely new research methodologies. Second, the sheer complexity of writing--where “writing” can mean anything from the syntax of individual sentences to issues of structure, use of sources, audience, purpose, nuances of the social context to which an individual piece of writing responds, and more--makes it extraordinarily challenging to research writing development and writing instruction. Third, due to the broad range of approaches to teaching writing across U.S. colleges and universities the few existing empirical assessments and studies of writing development typically focus on a specific context rather than examining writers’ development across contexts. This focus on local contexts has made it almost impossible to replicate any given study in a new context; it has also made aggregating data across contexts impossible.

Due to these circumstances, writing studies instructors lack evidence regarding which of the varied course designs and pedagogical approaches in use correlate with stronger writing development and the capacity to apply FYW knowledge in subsequent contexts. In particular, the field lacks methods and instruments for 1. gauging writing development and 2. investigating the impact of new course designs and pedagogies. Researchers investigating such questions often adapt methods typically used in small-scale, intensive qualitative research designs. However, such methods do not translate well to large-scale quantitative investigations. These methods are usually labor-intensive, time-consuming, and expensive. We’ll offer our own experiences to illustrate. The Writing Transfer Project, which in 2011 and 2012 collected data from three universities, drew upon the labor of eight different researchers and spent over $55,000 during a two-year period to pay two groups of approximately twenty-five graduate students to rate and code the collected data. While this work led to initial insights, it raised as many questions as it answered (Driscoll et al., 2020; Hayes, Jones, Driscoll, & Gorzelsky, 2018); Gorzelsky, Hayes, Jones, & Driscoll, 2017). In Phase II of the Writing Transfer Project, in summer 2019, we spent another $20,000 to hire four student raters/coders over the course of ten weeks, working 30 hours per week, to analyze a single semester’s worth of collected writing from two institutions. Despite this investment of time, money, and effort, our study included too few participants for our statistical analyses to achieve anything but broad-strokes results, and scaling our methods to a sufficiently large participant group demanded more resources than we could make available.

Our example illustrates a challenge for other investigations of writing development and instruction: many research methods commonly used by writing studies researchers, due to their roots in qualitative work, are so time- and labor-intensive that they ultimately limit research studies’ scale and thus the generalizability and implications of such studies’ findings. . Yet, determining which course designs and pedagogies have the highest positive impact is essential to equipping students with skills that will help them succeed when writing in post-FYW contexts and to assessing the efficacy of individual writing programs. We believe that the field’s avoidance of quantitative methods and instruments that make it possible to generalize findings across contexts and to measure the impact of instructional approaches f contributes to a tendency in writing studies scholarship to focus too strongly on the development of new theoretical models and not sufficiently on building aggregable knowledge about students’ growth in understanding and applying genre awareness and related concepts. This tendency promotes a circular problem, as each new theoretical model tends to generate yet another curricular and/or pedagogical approach, adding to the range in use without providing any clarity as to which may be more effective.

For the field to develop robust knowledge about writing growth and instruction, it is essential to incorporate thoughtful use of social scientific research methods, adapting these methods as needed to our discipline so we can create effective, efficient instruments that can be administered and scored at scale across contexts. Among a range of social scientific methods used in research on postsecondary STEM education, we argue that one instrument holds noteworthy promise for measuring writers’ development of genre awareness, a construct that prior research suggests may be important for writing development more broadly (Driscoll et al., 2020). Many studies showing the efficacy of active learning and related pedagogies in introductory STEM courses used concept inventories, instruments designed to measure understanding of, and misconceptions related to, foundational STEM concepts. The Force Concept Inventory (FCI), developed by Hestenes, Wells, & Swackhamer (1992**)** was validated as an accurate measure and tested for reliability across contexts. It is now widely used to study interventions designed to improve introductory physics instruction. Since then, additional concept inventories in physics, chemistry, genetics, biology, engineering, and other STEM disciplines have been developed and come into widespread use. Because they can be administered and scored efficiently and used across institutional (and other) contexts, concept inventories offer writing studies a tool the field now lacks: a measure that can be used in pre-/post-FYW administrations to measure change over time in students’ grasp of foundational writing concepts. In addition to enabling writing programs to conduct more efficient, targeted assessments, writing concept inventories will assist researchers, writing program administrators, and others in measuring the impact of new curricular and pedagogical interventions.

Our project will contribute to the field’s capacity to measure writing growth and instructional approaches by designing, testing, and refining a concept inventory that will measure students’ understanding of a set of linked concepts widely believed to be important in writing growth, namely the threshold concept of genre awareness.

***A short introduction to concept inventories***

“Concept inventories” are multiple-choice measures of student understanding of foundational, complex disciplinary concepts in STEM fields. Often used in introductory STEM courses as pre-/post-course measures of students’ grasp of foundational concepts, they are criterion-referenced tests that provide an effective, efficient means of assessing student understanding, and they are often used to assess the impact of new curricula and instructional approaches.

The first concept inventory to be developed and validated was the Force Concept Inventory (FCI) in physics (Hestenes, Wells, & Swackhamer, 1992). The FCI presented students with a series of multiple-choice questions about the Netwonian concept of force; the multiple choice options for each question included one correct Newtonian response and a series of common sense misconceptions. All response options were worded to replace disciplinary terms with terms familiar to beginning college students and to focus on the Newtonian concepts, rather than on specific scenarios requiring formulas or calculations. For instance, the first question on the FCI is as follows:

Two metal balls are the same size, but one weighs twice as much as the other. The balls are dropped from the top of a two story building at the same instant of time. The time it takes the balls to reach the ground below will be:

1. about half as long for the heavier ball.
2. about half as long for the lighter ball.
3. about the same time for both balls.
4. considerably less for the heavier ball, but not necessarily half as long.
5. considerably less for the lighter ball, but not necessarily half as long. (Hestenes, Wells, & Swackhamer, 1992, p. 154)

The correct answer (C) expresses the Newtonian concept that acceleration is independent of weight. The other responses all represent common misconceptions of how this force functions. When the questionnaire was first developed, many of the physics instructors asked to give it to their students initially believed the questions asked were too simple. Once the questionnaire was given, however, the researchers / developers found that only students who understood Newtonian concepts were able to produce in their responses “a consistent pattern of Newtonian choices” (Hestenes, Wells, & Swackhamer, 1992, p. 142).

The use of concept inventories has led to substantive changes in higher education in a number of STEM disciplines. Within physics, Hake (1998) used the Force Concept Inventory (FCI) to show that interactive engagement effectively promotes deeper learning of physics. In the two decades since, instruction in college-level physics has been substantially revised based on Hake’s influential findings. Meanwhile, physics developed additional inventories, and many other STEM disciplines constructed inventories to measure foundational knowledge in their fields (Sands et al., 2018). Although concept inventories do not measure the ability to apply knowledge, they can be very effective in helping to identify where course materials and/or instructional approaches must be refined to help students replace misconceptions with accurate understanding (Klymkowsky & Garvin-Doxas, 2020).

While humanities scholars may tend to be understandably skeptical of the value of multiple choice assessments of learning, concept inventories are explicitly designed to measure understanding, rather than to test recall or computational skill, and they are constructed iteratively and validated via a rigorous process (Sands et al, 2018; Klymkowsky and Garvin-Doxas, 2020).

***Why genre?***

Research on writing transfer—the ability of students to apply the writing skills and knowledge learned in one context in a new writing context—demonstrates that most students entering post-secondary education have substantial difficulty in transferring writing skills from high school to college, between college courses, and from college to the workplace (Beaufort, 2007; Bergmann & Zepernick, 2007).

Both theoretical and empirical studies of genre suggest that genre may be a vehicle for supporting writers moving from one writing context to another. Since the publication of Miller’s (1984) seminal work on genre, writing studies scholars have extensively studied how writers learn new genres. One influential strand of this scholarship suggests that explicit genre instruction in FYW is needed to help students develop college-level writing skills and transfer those skills into disciplinary courses. Beaufort’s (2007) longitudinal analysis of one college student’s writing development identified genre knowledge as a key component supporting his growth. Nowacek’s (2011) study identified genre as a possible cue that can help students recontextualize FYW knowledge as they write in disciplinary courses. Prior studies have shown the importance of genre knowledge as more valuable than other writing knowledge, e.g., understanding a generalized writing process (Driscoll et al., 2020; Gorzelsky et al., 2016); the importance of cueing FYW genre knowledge in disciplinary courses (Gorzelsky et al., 2017); and that college-level writers must learn to analyze new genres and develop related metacognitive skills to recognize which aspects of familiar genres to use or adapt, and which to exclude (Lindenman, 2015; Nowacek, 2011; Reiff & Bawarshi, 2011; Rounsaville, Goldberg, & Bawarshi, 2008).

Recent work on genre by Tardy, Sommer-Farias, and Gevers (2020) has focused on synthesizing and refining five genre-related constructs from both writing studies and second language acquisition for future researchers to draw upon. Those genre-related constructs included (1) genre-specific knowledge, that is, knowledge writers have of specific genres, including knowledge of the formal genre features, subject-matter knowledge, rhetorical knowledge of the discourse community, and process knowledge related to that specific genre (or genre set). (2) Another construct, genre awareness, refers to the broader genre knowledge a writer has abstracted from knowledge of multiple specific genres: “Genre awareness is a conscious knowledge of how genres work, allowing writers to use strategies (like genre analysis) to learn more about genres" (Tardy, Sommer-Farias, & Gevers, 2020, p. 297). (3) Metacognition is "a writer's ability to consider and regulate cognitive processes while planning or writing" (p. 298). In other words, metacognition can help writers move from genre-specific knowledge to broader genre awareness when attempting to write in a new genre and its social context. (4) Recontextualization is the process of writing transfer: taking what one knows about writing in one genre and adapting it for a new writing context (Tardy, Sommer-Farias, & Gevers, 2020). Finally, (5) social context includes what some scholars call discourse community (Swales, 1990), activity systems (Russell, 1997), or rhetorical situation (Miller, 1984). In addition to theorizing these five genre-related constructs, Tardy, Sommer-Farias, and Gevers also described the different empirical research methods that have most commonly been used to research each construct.

Our team plans to draw upon Tardy, Sommer-Farias, and Gevers’ work as the basis of the genre construct our Genre Concept Inventory will attempt to measure.

***Why metacognition?***

Research on learning suggests that metacognition plays an important role in acquiring new knowledge and building expertise (*How People Learn II*). Defined broadly as awareness of one’s own cognition, metacognition includes various components and subcomponents. Cultivating these (sub)components can help learners to better recognize and manage their cognitive strategies for analyzing, understanding, applying, and thinking critically about new conceptual and skills knowledge. Scott and Levy’s (2013) factor analysis showed that two components, knowledge of cognition and regulation of cognition, encompass several other subcomponents. In particular, regulation of cognition includes both monitoring of one’s own thinking strategies and control of those strategies. To illustrate, a writer primarily familiar with the MLA citation style, in which publication date is listed at the end of the bibliographic entry, may find herself struggling to recall that the date is listed just after the author(s) in APA style if she focuses on memorizing the order of components. However, if she considers the reason for the differences – namely, the greater importance of publication dates in scientific research – recalling the date’s placement may be easier. By monitoring her initial strategy, memorization, this writer recognizes its inefficiency and shifts her strategy to considering why her audience might want the date to be listed near the beginning of the entry, which better supports her learning.

Metacognition has been integrated into some concept inventories since Tan, Goh, Chia, and Treagust’s (2002) development of a two-tiered inventory designed to measure students’ understanding of qualitative chemistry analyses, with the first tier focusing on content and the second tier on possible reasons for the students’ responses to the content questions The addition of the second tier addressed concerns that students were completing the questions in rote fashion, rather than engaging with the concepts represented via the questions. By using actual student misconceptions as distractor answers in the tier two questions, the authors created an inventory that measures understanding of foundational qualitative chemistry concepts and achieved a Cronbach’s alpha of .68. Thus, concept inventories that measure metacognitive thinking probe more deeply into students’ understanding and cognitive strategies.

Prior research on genre awareness has suggested that students often develop a superficial understanding that focuses on formal features without a grasp of how those features are shaped by a genre’s audience and purpose and by the specific rhetorical situation the writer must address (Driscoll et al., 2020; Tardy, 2009; Thaiss & Zawacki, 2006). This tendency implies that it could be beneficial for a Genre Concept Inventory to include a tier of questions that address metacognition. For example, students may be able to identify which of four short writing samples best achieves a given purpose without accurately determining which features of the sample enable it to do so. A second-tier question on metacognition will provide insight into students’ cognitive strategies, and such information will substantially enrich our knowledge regarding the depth of students’ grasp of genre and related concepts.

***What are we hoping to gain by developing a Genre Concept Inventory?***

Genre is a challenging concept both to understand and to teach. Currently, the field has no broadly accepted measure of students’ understanding of genre and its component concepts. This lack creates three significant problems: 1. difficulty in assessing students’ level of knowledge and readiness to learn disciplinary genres; 2. difficulty in evaluating the impact of new curricular and pedagogical interventions; and 3. barriers to engaging the instructors most involved in FYW in research on their courses’ efficacy. Developing an accessible, efficient, scalable measure of students’ conceptions/misconceptions related to genre knowledge will support more effective, efficient assessments of student learning; make possible efficient, accurate evaluations of new curricula and pedagogies; and enable far greater numbers of teacher-scholars to contribute to efforts within writing studies to develop effective pedagogical tools for teaching genre. By using such an instrument, genre-focused writing instructors could crowdsource the development, testing, and revision of pedagogical tools, rather than working in localized silos where teaching practices are often based on anecdotal experience.

Given the challenges (intensive labor, cost, and level of research experience needed) involved in empirical writing studies research, we hope there will be interest in learning about this possible new research instrument for studying genre awareness. In addition to seeking feedback from International Writing Workshop colleagues in February, we invite any researchers interested in this new tool to join us in its development, or to receive email updates from us on our progress in developing the tool. Ultimately, we anticipate crowd-sourcing the piloting and refinement of the GCI and sharing it as an open research instrument with anyone interested in using it.

***Where are we in the process of developing the GCI?***

Our team is still in the process of creating a draft of the Genre Concept Inventory. The current draft is too nascent to share, given that it is still changing substantively on a weekly basis at our team meetings. Carol and Gwen will, however, share a draft with folks at the WRAB International Writing Workshop.

Once the concept inventory is created, our team will also need to test its validity and reliability. We share notes on our plans for that process below and would particularly welcome feedback in that area from the WRAB IWW.

To create a concept inventory, Sands et al. (2018) suggested three steps:

1. surveying the literature,
2. drawing on essay responses and other student work and responses that reveal common misconceptions, and
3. consulting concept experts.

*GCI STEP 1*: In terms of surveying the literature, our research team has focused on two areas: genre awareness and metacognition. Related to genre, we are enormously grateful for the intellectual work that Tardy, Sommer-Farias, and Gevers (2020) did in reviewing scholarship in both writing studies and second language studies to theorize the genre-related constructs of genre-specific knowledge, genre awareness, metacognition, recontextualization, and social context. We are basing the genre awareness construct that the GCI attempts to measure on their work.

Related to metacognition, we have drawn on Flavell (1985) and Scott & Levy (2013); writing studies researchers/scholars who address metacognition Karlen (2017), Lindenman (2015), Lindenmann et al. (2018), and Nowacek (2011); and studies suggesting the role of metacognition for university students (e.g., Amzil, 2014; Bauer, 2014; Korotaeva, 2014; and Mathabathe and Potgieter, 2014).

*GCI STEP 2:* In terms of drawing on student understanding of genre, our research team has already collected a rich repository of student genre reflections, based on two past data collections and studies.

*GCI STEP 3:* The February WRAB International Writing Workshop will be our first consultation with concept experts (all of you!).

*RELIABILITY AND VALIDITY:*

Per Lambert and Newman (2022), “construct validity” is “the extent to which we are measuring what we believe we are measuring” (p. 2). In other words, does the instrument measure what it was designed to measure?

The reliability of an instrument is whether the instrument is *consistent* in its measurements within contexts, and across contexts and participant populations.

To establish construct validity (i.e., does our GCI questionnaire measure what we think it measures?), our team will draw upon a number of validation techniques suggested by Lambert & Newman (2022), following the timeline below:

SPRING 2023:

* Ask subject-matter experts to classify each survey item according to the genre-related construct to which they see it as belonging (Lambert & Newman, 2022)
* Ask students to engage in think-aloud protocols when reading/completing the GCI, where they report what they are thinking as they respond to the questions (Lambert & Newman, 2022). Use these meetings as an opportunity to continue developing/refining possible further distractors.
* Ask students to provide short-answer reflections after each survey question; the reflections will ask them to summarize what they think the question is asking (Newcomer, 2015). Follow up with small focus-groups to review these short-answer reflections. Use these strategies as opportunities to continue refining distractors, as well as question wording.

FALL 2023 - SPRING 2024:

* Conduct the GCI in multiple first-year writing sections, hopefully at at least two institutions (GWU and University of Detroit Mercy)
* Follow up Fall 2023 student surveys with student focus groups, asking students to describe what they see each question as asking. If those focus groups show student understanding of the questions as matching what our team intended each question to ask, continue with the Spring 2024 data collection.
* Combine student responses from 2023-2024 into a large enough data set (at least 200 students per university) to run a factor analysis on the GCI responses, to test whether student responses cluster around genre concepts in the ways our team anticipates (Jackson, 2001).

2023-2025:

* To establish reliability, our team will need to conduct the GCI at the same institution over at least two years (2023-2025) and, in the longer term, in other institutions and institutional types to see if there is internal consistency across survey items (Cronbach’s alpha). (Lambert & Newman, 2022)

AFTER SPRING 2025:

* In STEM fields, concept inventories are frequently used to predict how students will do in more advanced disciplinary courses. Our team is seeking a way to test whether the GCI (once it is past the initial validation stages) predicts more successful adaptation to new writing contexts--perhaps by finding a way to collect grades on papers students write in new contexts, once they leave first-year writing? We’re not sure what mechanism would permit such data collections, however, so we would welcome any brainstorming ideas the WRAB IWW participants might have!

**Supporting Information: Institutional Description**

We’re developing a Genre Concept Inventory (GCI) intended to be useful in writing programs across U.S. postsecondary institutions. U.S. institutions vary widely, including

* two-year colleges that teach teach technical, general education, and foundational disciplinary courses
* four-year colleges that focus on providing undergraduate students a traditional liberal arts education (baccalaureate degree)
* universities that offer a wide range of baccalaureate, master’s degrees, and doctoral degrees

In terms of writing instruction, the great majority of U.S. colleges and universities require at least one to two general education writing courses being taken by most students. Typically these courses are offered by writing programs whose primary purpose is to prepare students to write successfully in subsequent courses and beyond. However, the scholarly and research methods used in writing studies make it challenging to achieve this goal.

While the Science, Technology, Engineering, and Mathematics (STEM) disciplines have reached long-standing agreement on what concepts should be taught in foundational courses, such agreement does not exist in writing studies. As a result, theoretical frameworks, curricula, and pedagogical approaches proliferate at U.S. colleges. This challenge in knowledge building exists partly because the field has no validated, reliable instrument for large-scale testing of curricular or pedagogical interventions’ efficacy. Currently, assessments and studies of writing development in the U.S. are typically designed by each individual writing program or research team and are usually time- and labor-intensive. This variation precludes aggregating data across contexts, scaling a single assessment for delivery across multiple institutions, and/or providing a broadly accepted measure of writing development.

U.S. colleges and universities include both public entities that receive state support and private institutions that do not and so rely on tuition and endowments for funding. Yet, as skepticism regarding the value of higher education grows and public funding and enrollments drop in the U.S. (demographic declines in college-age students are expected starting between 2025 and 2030), pressure is increasing for all academic programs to show that students are achieving learning outcomes. The field would benefit from a valid, reliable assessment instrument grounded in a widely used theoretical model and capable of efficient administration, scoring, and analysis.

**Supporting Information: Key Theorists**

[**Hestenes, D., Wells, M., and Swackhamer, G. (1992)**](https://aapt.scitation.org/doi/pdf/10.1119/1.2343497?casa_token=aET3WonswNsAAAAA:ObJNiwHG2UaCvFL64kUraQXKQOgi99dtZDSQ9q_-0mR8y0rdyZdU9OP1491otOLQpztQfxzvgAI)**. The force concept inventory. *The Physics Teacher, 30:* 141-58.** This article introduced the first-ever concept inventory, developed by a team of physics professors. In the article, Hestenes, Wells, & Swackhamer described designing and validating the Force Concept Inventory (FCI), a multiple choice instrument that asks students to choose between Newtonian and inaccurate – but widely held – concepts of force and motion. *The FCI remains broadly used in introductory post-secondary physics instruction and became the basis for the creation of similar inventories in chemistry, statistics, biology, engineering, and other disciplines. Concept inventories are often used pre-/post-instruction to test the efficacy of curricular and pedagogical interventions.*

[**Tan, K.C.D., Goh, N.K., Chia, L.S., and Treagust, D.F. (2002)**](https://onlinelibrary.wiley.com/doi/abs/10.1002/tea.10023?casa_token=syXb4Sft7y0AAAAA:c_JQa35ZKSbzipwAyEXmUdciW__6mCzY8dWOS_kQe63-g6qOBctck2YerXAyf_oX5r-OM9jVdoOO4nk)**. Development and application of a two-tier multiple choice diagnostic instrument to assess high school students’ understanding of inorganic chemistry qualitative analysis. *Journal of Research in Science Teaching, 39*(4): 283-301.** Chemistry qualitative analyses require conceptual thinking, but prior studies of student learning showed that students were completing such analyses in rote ways that didn’t engage with the concepts. To better measure conceptual understanding, the authors developed a concept inventory with two tiers of multiple choice questions: tier one on the concepts and tier two on possible reasons students answered as they did on the linked tier one question. *Our team plans to follow this two-tiered approach when developing our Genre Concept Inventory*.

[**Tardy, C.M., Sommer-Farias, B., and Gevers, J. (2020)**](https://journals.sagepub.com/doi/full/10.1177/0741088320916554?casa_token=yrPDAFH57_4AAAAA%3A4AiPA4VW8RjxCYA2_G0zYaulboKXyUWWRlAiqbzgjf8VEzu8RSeU1CVhY1P8QsLQK1kBbrXEQBNs)**. Teaching and researching genre knowledge: Toward an enhanced theoretical framework. *Written Communication, 37*(3): 287-321. DOI: 10.1177/0741088230916554**. Because the fields of writing studies and second language studies have used various terms to refer to genre-related concepts, this article defines a consistent set of concepts related to genre: genre-specific knowledge, genre awareness, metacognition, recontextualization, and social context. Their model situates knowledge of specific genres with broader genre awareness, linking the latter to metacognition, which they argue can help writers develop knowledge of specific genres even when writers lack access to the communities using these genres. *Our team draws heavily on this article’s definitions of genre-related constructs as a basis for the genre concepts our GCI will focus on.*

[**Scott, B.M. and Levy, M.G. (2013)**](https://dialnet.unirioja.es/servlet/articulo?codigo=4459208)**. Metacognition: Examining the components of a fuzzy concept. *Educational Research eJournal, 2*(2): 120-31. DOI: 10.5838/erej.2013.22.04**. Because the field has used varying definitions of metacognition and its components, the authors conducted an exploratory factor analysis to investigate various metacognitive models; their results showed the efficacy of the two-factor model of metacognition: metacognitive knowledge (Cronbach’s alpha=.85) and metacognitive regulation (Cronbach’s alpha = .87).

**Supporting Information: Glossary**

* **Threshold concepts:** A phrase initially introduced by Meyer & Land, threshold concepts are concepts that are crucial to understand for anyone wishing to participate in a discourse community as a full member (Adler-Kassner & Wardle, 2015). Threshold concepts are “troublesome” to learn--often counterintuitive --but once understood, they are transformative, changing how one understands the work of the discourse community (Adler-Kassner & Wardle, 2015, p. 2). They are called “threshold” concepts because learning them moves the learner over the threshold from being an outsider to a discourse community to being an insider.
* **Criterion-referenced tests:** Unlike a norm-referenced test, which focuses on ranking those who take a test in relation to each other, a criterion-referenced test focuses on the test-takers’ understanding of a particular “criterion” (i.e., a Newtonian understanding of force; a writing studies expert understanding of genre; understanding of a particular state/country’s driving laws). A cut-off point is established for criterion-referenced tests (e.g., 80% correct responses on the questionnaire), a point that is based on the research that went into developing the test and that predicts the future behavior of the test-takers: Are they likely to be a good driver? Are they likely to succeed in the next Physics class on Newtonian force? Are they likely to succeed in new writing contexts?
* **Concept Inventories:** A “concept inventory” is a questionnaire (usually multiple choice) that attempts to measure student understanding of a disciplinary threshold concept. It is a criterion-referenced test, which means it is not designed to give a grade that ranks students, but rather to help instructors assess the test-takers’ current understanding of a threshold concept. It can be used in a variety of ways, such as pre-/post-course assessments that measure changes (if any) in student understandings of the threshold concept, as placement tests for more advanced courses within a discipline (where understanding of a particular threshold concept is needed to succeed), etc. To develop the questionnaire, experts in the field break down and “inventory” the threshold concept for its key components. They also collect novice (student) misconceptions around those various components and provide those answers as “distractor” responses to each question. As is often the case with threshold concepts, to experts the responses to the questions seem obvious; for example, physics professors who first looked at the Force Concept Inventory complained that the questions seemed “trivial” and that giving the FCI would be a waste of time. They were shocked to see Physics majors struggle with the questionnaire. The questionnaire not only made visible how many students had not yet reached the cut-off point that demonstrated understanding of the threshold concept (regardless of what grade they were receiving in the class as a whole), but also made visible which distractors students gave as responses to the questionnaire, information that could help instructors better support students when teaching toward the threshold concept.
* **Metacognition:** Per Scott & Levy (2013), metacognition includes two factors: metacognitive knowledge and metacognitive regulation. Metacognitive knowledge includes knowledge of person (the cognitive strategies one already knows), task (recognition of the cognitive strategies needed to complete a specific task), and strategy (recognition of which cognitive strategies are relevant to a particular circumstance). Metacognitive regulation includes monitoring (tracking the cognitive strategies one is using to complete a task) and controlling (choosing or revising the cognitive strategies one is using). Two other subcomponents, planning (considering which cognitive strategies to use) and evaluation (evaluating the efficacy of cognitive strategies used based on the outcomes of a task), are split between metacognitive knowledge and metacognitive regulation.
* **Construct:** Per Lambert and Newman (2022), constructs are “conceptual phenomena that facilitate our understanding of the world and how it operates” (p. 2). Our research team is interested in genre as a construct, one that--if understood--can facilitate how writers engage with various writing contexts.
  + In terms of research, constructs are the thing you are attempting to measure.
  + When developing new measuring tools, researchers need “construct validity,” which is “the extent to which we are measuring what we believe we are measuring” (p. 2).
* **Genre:** Within writing studies, genre is seen as a threshold concept (Adler-Kassner & Wardle, 2015), one that is particularly challenging for students to understand (Hayes et al., 2018). For writing studies novices, genre is often invisible: writers often think about writing purely in terms of content and structural requirements. Tardy, Sommer-Faria, & Gevers (2020) theorize that there are five genre-related constructs: genre-specific knowledge, genre awareness, metacognition, recontextualization, and social context. Writers can learn genre-specific knowledge (e.g., how to write a policy brief) without learning broader genre awareness, that is, without developing an awareness of genre as a typified (for now) response to a recurring situation, one that does work for the discourse community that produces it. Further, Tardy, Sommer-Faria & Gevers defined metacognition in relation to genre as the capacity to regulate cognitive strategies used in drafting a text and argued that it helps writers recontextualize, or adapt existing genre knowledge to new writing contexts. Our team is building upon Tardy, Sommer-Faria, & Gevers’s theorized genre-related constructs to build our Genre Concept Inventory.

**References**

Adler-Kassner, L. & Wardle, E. (2015). *Naming what we know: Threshold concepts of writing studies.* Utah State University Proess.

Alzen, J.L., Langdon, L.S., & Otero, V.K. (2018). A logistic regression investigation of the relationship between the Learning Assistant model and failure rates in introductory STEM courses. *International Journal of STEM Education, 5*(56), 1-12. DOI: 10.1186/s40594-018-0152-1.

Barasso, A.P. & Spilios, K.E. (2021). A scoping review of literature assessing the impact of the learning assistant model. *International Journal of STEM Education, 8*(12), 1-18. https://doi.org/10.1186/s40594-020-00267-8.

Beaufort, A. (2007). *College writing and beyond: A new framework for university writing instruction*. Utah State University Press.

Bergmann, L, & Zepernick, J. (2007). Disciplinarity and transference: Students’ perceptions of learning to write.” *WPA Journal 31*(1/2), 124-49.

Driscoll, D.L., Paszek, J., Gorzelsky, G., Hayes, C. & Jones, E. (2020, January). Genre knowledge and writing development: Results from the Writing Transfer Project. *Written Communication*, *37*(1), 69-103.

Flavell, J.H. (1985). *Cognitive development.* Prentice Hall.

Freeman, S. et al. (2014). Active learning increases student performance in science, engineering, and mathematics. *PNAS, 111*(23): 8410-8415. DOI: 10.1073/pnas.1319030111

Gorzelsky, G., Driscoll, D.L., Paszek, J., Jones, E., & Hayes, C. (2016). Cultivating constructive metacognition: A new taxonomy for writing studies. In C.M. Anson and J. L. Moore (Eds.) *Critical transitions: Writing and the question of transfer* (pp. 215-246). University Press of Colorado.

Gorzelsky, G., Hayes, C., Jones, E., & Driscoll, D.L. (2017). Cueing and adapting first-year writing knowledge: Support for transfer into disciplinary writing. In J. L. Moore and R. Bass (Eds.)*, Understanding writing transfer: Implications for transformative student learning in higher education* (pp. 115-121). Stylus Publishing.

Hake, R.R. (1998). Interactive-engagement vs traditional methods: A six-thousand student survey of mechanics test data for introductory physics courses. *American Journal of Physics,* *66*, 64–74. DOI: 10.1119/1.18809

Haswell, R.M. (2005). NCTE/CCCC’s recent war on scholarship. *Written Communication* *22*(2), 198-223.

Hayes, C., Jones, E., Driscoll, D.L. & Gorzelsky, G. (2018, Spring). Adapting Writing About Writing: Curricular implications of cross-institutional data from the Writing Transfer Project. *WPA: Writing Program Administration*, *41*(2), 65-88.

Hestenes, D., Wells, M., & Swackhamer, G. (1992). Force Concept Inventory. *The Physics Teacher,* *30*, 141–158. DOI: 10.1119/1.2343497

Indorf, J.L., Weremijewicz, J., Janos, D.P., & Gaines, M.S. (2019). Adding authenticity to inquiry in a first-year, research-based biology laboratory course. *Life Sciences Education, 18*(3). DOI: 10.1187/cbe.18-07-0126.

Jackson, D. L. (2001). Sample size and number of parameter estimates in maximum likelihood confirmatory factor analysis: A Monte Carlo investigation. *Structural Equation Modeling*, *8*(2), 205–223. DOI:10.1207/ S15328007SEM0802

Karlen, Y. (2017). The development of a new instrument to assess metacognitive strategy knowledge about academic writing and its relation to self-regulated writing and writing performance. *Journal of Writing Research, 9*(1): 61-86. Doi: 10.17239/jowr-2017.09.01.03.

Klymkowsky, M.W. & Garvin-Doxas, K. (2020). Concept inventories: Design, application, uses, and next steps. In J. Mintzes & E.M. Walter (Eds.), *Active learning in college science* (pp. 775-590). Springer.

Korotaeva, I.V. (2014). Metacognitive strategies in reading comprehension of majors in education and psychology. *Psychology in Russia: State of the Art, 7*(2): 39-47. DOI: 10.11621/pir.2014.0204.

Lambert, L.S. & Newman, D.A. (2022). Construct development and validation in three practical steps: Recommendations for reviewers, editors, and authors. *Organizational Research Methods,* 1-34. DOI [10.1177/10944281221115374](https://doi-org.proxygw.wrlc.org/10.1177/10944281221115374).

Lindenman H. (2015). Inventing metagenres: How four college seniors connect writing across the domains. *Composition Forum*, *31*. <https://compositionforum.com/issue/31/inventing-metagenres.php>

Lindenman, H., Camper, M., Jacoby, L.D., & Enoch, J. (2018). Revision and reflection: A Study of (Dis)connections between writing practice and writing knowledge. *College Composition and Communication, 69*(4): 581-611.

Mathabathe, K. and Potgieter, M. (2014). Metacognitive monitoring and learning gain in foundational chemistry. *Chemistry Education Research and Practice, 15*(1): 1-12. DOI: 10.1039/C3RP00119A.

Miller, C. (1984). Genre as social action. *Quarterly Journal of Speech, 70*, 151-167.

### Newcomer, J.L. (2015). More than just right or wrong: Using concept questions to discern students' thinking in mechanics. *IEEE Frontiers in Education Conference (FIE)*, 1-7. https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7344352

Nowacek, R.S. (2011). *Agents of integration: Understanding transfer as a rhetorical act.* Southern Illinois UP.

Reiff, M.J., & Bawarshi, A. (2011). Tracing discursive resources: How students use prior genre knowledge to negotiate new writing contexts in first-year composition. *Written Communication* *28*(3), 312-337.

Rodenbusch, S.E., Hernandez, P.R., Simmons, S.L. and Dolan, E.L. (2016). Early engagement in course-based research increases graduation rates and completion of science, engineering, and mathematics degrees. *Life Science Education, 15*(2). DOI: 10.1187/cbe.16-03-0117.

Rounsaville, A., Goldberg, R. & Bawarshi, A. (2008). From incomes to outcomes: FYW students’ prior genre knowledge, metacognition, and the question of transfer. *WPA: Writing Program Administration 32*(1/2), 97-112.

Russell D. R. (1997). Rethinking genre in school and society: An activity theory analysis. *Written Communication*, 14(4), 504–554.

Sands, D., Parker, M., Hedgeland, H., Jordan, S., & Galloway, R. (2018). Using concept inventories to measure understanding.*Higher education pedagogies*, *3*(1), 173-182.

Scott, B.M., & Levy, M.G. (2013). Metacognition: Examining the components of a fuzzy concept. *Educational Research*, *2*(2), 120-131. DOI 10.5838/erej.2013.22.04

Swales, J. (1990). *Genre analysis: English in academic and research settings*. Cambridge UP.

Tan, K.C.D., Goh, N.K., Chia, L.S., & Treagust, D.F. (2002). Development and application of a two-tier multiple choice diagnostic instrument to assess high school students’ understanding of inorganic chemistry qualitative analysis. *Journal of Research in Science Teaching, 39*(4), 283-301.

Tardy, C.M. (2009). *Building genre knowledge.* Parlor Press.

Tardy, C.M., Sommer-Farias, B., & Gevers, J. (2020). Teaching and researching genre knowledge: Toward an enhanced theoretical framework. *Written Communication, 37*(3), 287-321.

Thaiss C. J., & Zawacki T. M. (2006). *Engaged writers and dynamic disciplines: Research on the academic writing life*. Boynton/Cook.