

The Box Under the Bed: How Learner Epistemologies Shape Writing Transfer¹

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Abstract: This article draws upon Bergmann and Zepernick’s (2007) metaphor of the box under the bed to investigate the relationship between students’ epistemologies and their learning transfer in diverse contexts over undergraduate years. We present a systemic analysis of 13 students’ interviews and writing samples over a five-year period, through which we explored students’ transfer-related epistemologies surrounding writing in diverse disciplines. We describe three primary types of students’ epistemologies, the factors that influence the development of these transfer-based epistemologies, and the relationship between students’ epistemologies and reported learning transfer and genre knowledge. This article concludes by discussing how understanding students’ learner epistemologies can improve pedagogical practices that help students engage with prior writing knowledge in disciplinary writing contexts and suggests new directions for transfer theory and research.

Introduction

A fundamental issue for learning to write in the disciplines is writing transfer, that is, how students can adapt knowledge, skills, and strategies across disciplinary writing contexts. In 2007, Bergmann and Zepernick discovered that undergraduate students felt they learned to write primarily in upper division disciplinary writing contexts and that the concept of transfer was challenging for those teaching first-year writing (FYW) courses. Bergmann and Zepernick (2007) used a metaphorical concept, the “Box under the Bed” (BUTB). This concept was presented to participants in a question as follows:

Teachers in math and the sciences see what they call the ‘box under the bed’ syndrome when they ask students to recall in one class information they’ve learned in a different class. They find that students metaphorically put what they’ve learned each semester in a box under the bed instead of trying to make connections and see how things learned in previous classes apply in other situations. We’re trying to find out if students ever have ‘box under the bed’ syndrome with skills or knowledge gained in writing classes. (p. 148)

While this concept was not explicitly discussed in their article, it was used as part of their interview protocol. We saw potential in using this same metaphor with participants for understanding underlying student epistemologies—that is, ways in which students theorize and understand the nature of knowledge and knowing—as an important aspect tied to students’ ability to transfer writing knowledge across the disciplines. Therefore, this study explores the “box under the bed” through longitudinal study of 13 students over five years, examining what epistemologies learners hold, the epistemic shifts students experience as they move into disciplinary courses, factors that shape learner epistemologies, and how these connect with reported transfer.

Across the Disciplines
A Journal of Language, Learning and Academic Writing

wac.colostate.edu/atd
ISSN 554-8244

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Background and Significance

Understanding Learning Transfer

One of the current models of learning transfer that has seen application to the study and practice of college level writing comes from Salomon and Perkins (1989). This model posits that transfer can occur either via the high road (where students must consciously attend to and engage in transfer) or the low road (where transfer activity is habituated and/or unconscious). That is, some transfer can occur for students automatically, without conscious effort, but more advanced tasks or distant contexts may require students to “mindfully abstract” and engage in conscious attention to successfully transfer. Recently, Perkins and Salomon (2012) have proposed an expansion to their model accounting for internal student qualities, or what is known as dispositions. Their expanded “Detect, Elect, Connect” model posits that transfer is fostered by three bridges: the ability to detect an opportunity to transfer learning, to elect to pursue that connection, and to connect their learning to new contexts. High road transfer is facilitated through these three bridges, and the bridges are supported by variety of aspects tied internally to learners. These theories posit that for certain transfer opportunities, learners have choice and agency in transferring or not transferring, and that choice is directly impacted by dispositional qualities. If we are seeking to facilitate writing transfer across the disciplines, understanding and attending to dispositional qualities that help shape transfer is of prime concern.

Within the field of writing studies, recent research has explored various dispositions and how those influence the ways in which students learn to write and transfer knowledge across time. Described by Driscoll and Wells (2012) and Wardle (2012), writerly dispositions influence learner development by being the “precursors and producers of later development” (Driscoll & Wells, 2012). Recent research in learning transfer has affirmed the role of student dispositions in student learning in a variety of contexts. Baird and Dilger (2017) examined the role of generative and disruptive dispositions for students enrolled in a disciplinary internship program. They discovered that expectancy-value, self-efficacy, ownership, and ease all impacted students’ success in transferring writing skills to disciplinary internship settings and that these dispositions shaped how writers engaged with new disciplinary tasks. Similarly, Reid (2017) explored the role of dispositions in four sections of introductory writing by asking students to critically reflect on aspects of the writing process (rhetoric, writing process, writing knowledge, and dispositions), learning that they focused on dispositional issues. While none of the above studies explored learner epistemology, we argue that epistemology is another disposition held by students, one which may have considerable impact on transfer. We see these dispositional issues as related; they are all internal qualities that students possess, qualities that may be hard to observe, but that certainly have potential to impact on writing development. We now turn to consider the role of epistemology in learning.

Student Epistemology and Disciplinary Writing

While epistemology has long been considered as a branch of philosophy (McDermott et al., 2013), there has been a growing body of research exploring the relationship between epistemologies and learning, including learning to write. Even as interest in student epistemology continued to grow in education-related disciplines, scholars note the lack of “clear and uncontested definitions” to describe student epistemology (Spray et al., 2013). Among many different terminologies (Briell et al., 2010), we are drawing on Pintrich’s (2002) definition of epistemology as “an individual’s cognitions about the nature of knowledge and the nature of knowing.”

Epistemological research in higher education has drawn substantially from Perry’s (1968) pioneering, but not uncontested, work in which he engaged in a longitudinal investigation of college students’ understanding of their intellectual development. After conducting annual interviews with students over four years, Perry built a developmental model to discuss the types and the shifts of student epistemology.

In his model, students' epistemologies evolved from the initial dualistic position where knowledge was considered either true or false to the more relativist stance where students viewed knowledge as contextualized. In the final stage of epistemology, students acknowledged their own role in constructing knowledge (Perry, 1968; Mcdermott et al., 2013). Perry's stage-related model of epistemology, while highly influential, has been criticized for being too linear and deterministic (Charney et al., 1995), thereby overlooking the potential permeability and fluidity of epistemological categories. As Charney et al (1995) pointed out, epistemological categories need not be understood as fixed attributes of a person, rather they are fluid, with the same person potentially holding different epistemologies simultaneously, depending on context. More recent studies looked into an extension of such fluidity of epistemology, such as students' navigation between multiple epistemologies (Bang & Medin, 2010; Medin & Bang, 2014) and participants' integration of and/or switching between multiple epistemologies (Gottlieb & Wineburg, 2012).

Schommer (1990, 1998, 2004) proposed to view epistemology as the interactions between different epistemological dimensions. Her proposal included the following: epistemological interaction with culture, beliefs about knowing, beliefs about knowledge, beliefs about learning, classroom performance, and self-regulated learning. She suggested that students' development would occur in each dimension of epistemology either concurrently or individually. These studies have helped affirm that epistemologies 1) deeply impact the learning environment; 2) are shaped over a period of time, and 3) integrable and interchangeable among themselves—something the present research explores and extends.

Studies on student epistemology in the context of college writing also appeared in recent decades, demonstrating a key connection between students' epistemology and learning to write. Specifically, researchers have described attributes of student epistemology and different epistemic beliefs about writing (Morton et al., 2015; White & Bruning, 2005); the connection of epistemology to students' writing performance (Baaijen et al., 2014; Neely, 2009; Sanders-Reio et al., 2014; White & Bruning, 2005); and the relationship between epistemic beliefs about writing and those about learning in general (Martínez-Fernández et al., 2016). One vein of research has explored how epistemologies shape writing products and performances, indicating the key link between writing epistemology and writing outcomes. White and Bruning (2005) compared educational psychology students' beliefs and writing performance and found that students' transmissional beliefs (where knowledge is conveyed by the author) were connected with limited cognitive and affective engagement, while their transactional beliefs (where knowledge is mediated between the reader, author and text) related to stronger engagement in writing tasks. Likewise, Baaijen, Galbraith and de Gloppe (2014) found that transactional and transmissional beliefs represented different levels of students' engagement in writing in art classes. Sanders-Reio et. al. (2014) found that undergraduate students' epistemic beliefs about writing were significantly correlated with grades on their writing assignments in an educational psychology class. Sanders-Reio et. al demonstrated four aspects: 1) writing as a medium of knowledge transmission, 2) writing as knowledge crafting with audience orientation, 3) writing as a recursive process of knowledge transforming, and 4) writing as affective and cognitive engagement. Finally, Martínez-Fernández et al. (2016) studied students' epistemic beliefs in a developmental psychology class to explore their connection to learning. They identified two types of student beliefs which were "deeper and positive motivational beliefs in writing" and "reproductive and negative motivational beliefs in writing" (p.108), which we can also tie to Driscoll and Wells' (2012) disposition of value. Each of the above studies have demonstrated that relationships exist between learner epistemologies in specific writing contexts; however, these studies have not explored the role of epistemology in transferring across disciplines nor offered multi-year investigations.

Further, limited work exists on the how epistemology may shape learners as they move across disciplinary writing contexts, much of which has been published in previous issues of *Across the Disciplines*. Examining the relationship between sociology and English courses, Afful (2006) discovered that different fields required students to take up unique rhetorical and epistemological dispositions. Driscoll (2011) described the connections between FYC students' perceptions of learning transfer and their attitudes

about writing as connected to disciplinary and career aspirations, emphasizing the importance of further research in students' attitudes, definitions, and beliefs surrounding writing. Shapiro (2015) reported an epistemic shift of a graduate student in terms of his writing, which was facilitated through teacher training. In her study on disciplinary writing of teaching assistants, Winzenried (2016) stated the need of continued research in meta-disciplinary awareness and disciplinary epistemologies of students. These studies, primarily exploratory in nature, call for a need for more research on disciplinary writing and student epistemology, including research that explores students' epistemologies in diverse disciplinary writing contexts and the connection between epistemology and writing transfer.

Student Epistemology, Writing Development, and Longitudinal Research

Connecting student epistemology with a longitudinal approach offers us much from a learning development and writing transfer perspective. Neely (2009, 2014) conducted a semester-long study on the relationship between freshman undergraduates' epistemological and writing beliefs and writing performance in first year writing. She reported a significant shift in students' epistemological beliefs across a semester, which included learning as an instant event, authority as the only and most knowledgeable, knowledge as unquestionable, and their impatience with ambiguous knowledge. Neely's study also was one of the first to address students' epistemic change about writing over time from a developmental perspective. Two other studies that are not specific to writing (Cano, 2005; Phan, 2008) were year-long studies to explore students' epistemic change over time. Cano (2005) explored Spanish secondary students' epistemological beliefs and approaches to learning and noted changes that directly influenced academic performance. Following Cano's study (2005), Phan (2008) tested two models of epistemological beliefs, learning approaches, reflective thinking and academic performance among secondary students over 12 months. The results indicated that both epistemological beliefs and learning approaches would predict reflective thinking and academic performance. In all three cases, epistemic change was tied to academic performance over a period of time. These studies open a range of questions about how epistemic change may influence writers over their undergraduate careers and how epistemic change influences writing transfer and long-term writing development. We consider these questions with the present study.

Methods

Purpose and Research Questions

The purpose of this study is to explore the nature and change of epistemologies tied to writing transfer (what we call "transfer epistemologies") for 13 students over a five-year period during their undergraduate education. Our study seeks to answer four questions using a longitudinal approach:

1. What epistemologies do students hold concerning writing transfer?
2. How do transfer epistemologies change over time?
3. How do transfer epistemologies connect with students' reported learning transfer and genre knowledge?
4. What factors influence the development of transfer epistemologies?

The Box Under the Bed

As a way of addressing our above research questions, we used the "box under the bed" metaphor with our student participants. As we described in the opening, this metaphor originated with Bergmann and Zepernick (2007) as part of their interview protocol. They offered student participants this metaphor and asked them to comment on it as a way of better understanding learning transfer. We chose to follow their

method and ask the same question to students each year of the study to understand transfer-based epistemologies. One of the more interesting things that occurred from year to year is that this metaphor proved to be very relatable to students; they often remembered the concept each year and in later years of the study, used the “box under the bed” framework before the interview question was asked in that year. It is certainly possible that this metaphor gave them a framework to think about their relationship to their knowledge. We return to this issue in our discussion section.

Participant Recruitment

This study occurred at a mid-sized, regional, doctoral-granting institution in a large Midwestern metropolitan area. After gaining IRB approval, a randomly selected group of faculty teaching in the first-year writing (FYW) program (~3,000 students per year) were asked to allow researchers to access their classes. Dana and two undergraduate research assistants visited twenty-five FYW courses once during the first and last two weeks of the semester to distribute surveys (not included in the present analysis). Students provided contact information if they were interested in follow-up interviews. The initial participant pool therefore included 468 students (29 Basic Writing, 342 Composition I, and 97 Composition II students). During the Spring 2011 semester, one participant per section was randomly selected and contacted; 70% of students contacted agreed to participate (N=20). Two students’ schedules prevented them from finding time for interviews, which left 18 participants for the first year of the study (Y1). Attrition and loss of life further reduced the participants to 13 for the remainder of the study; these 13 students are included in the present analysis.

Interviews

In order to understand writing development over time, interviews took place once a year (starting in participants’ second semester) while students were enrolled as undergraduates. For most students this was five years, for one of the 13 participants, this was three years. Dana conducted sixty-minute semi-structured interviews focused on learning to write, writing in the disciplines, and transfer of learning. Students brought two pieces of writing to each interview, one they felt was “easy” and one that was “challenging.” Using these pieces of writing, they described their individualized writing processes and experiences with writing. Students were compensated \$20 per interview. Follow-up interviews during subsequent years asked students repeated questions to allow for comparisons, including questions each year about the “box under the bed” (BUTB) as a way of discussing epistemology and learning transfer. Participants came from the following: ethnicities (Hispanic [1], second generation Finnish [1], generation 1.5 Russian [1], and Caucasian [9]) as well as a wide range of majors. Participant demographics are consistent with the larger campus population.

Analysis

In order to answer the first, second, and fourth research questions, both co-authors engaged in iterative, collaborative, multi-round coding surrounding students’ responses. Using a multi-round coding strategy described by Saldaña, (2015) and Smagorinsky’s (2007) collaborative coding strategy (which results in 100% coder agreement), we began by exploring the different epistemologies and how that influenced their learning to write. Our initial coding used three codes (positive, negative, neutral); these codes told us how epistemology was tied to learning, but not the underlying epistemologies themselves or their nuance. A second round of coding and refinement of our coding glossary revealed three primary transfer epistemologies presented in these results: omnidirectional, unidirectional, and fatalist, and two hybrids. A third round of coding explored factors that contributed to the shaping of students transfer-based epistemologies, also presented in the results.

In order to answer the third research question, two additional analyses were conducted. Dana and a graduate research assistant, Wenqi Cui, performed a separate analysis (Driscoll & Cui, under review) exploring student writing knowledge, skills, and strategies (referred hereafter as “writing knowledge”) and how students reported transferring those skills over time. For all 13 students, we tracked every instance students reported engaging with knowledge including initial learning, when writing knowledge was reinforced (taught again) or expanded (taught in a way that went beyond previous learning), and when they reported transferring writing knowledge to new circumstances. Transfer was either “explicit” in that the student could identify where they learned the knowledge and how they used it (drawing upon Perkins and Salomon’s 2011 detect, elect, connect model) or invisible (drawing upon Schieber, 2016). Invisible transfer happened frequently in the study—because we tracked students over a five-year period, even if students had forgotten three years before that they had learned a particular organizational skill in an earlier writing class, we had earlier interview data and writing samples and could track that over time. Finally, we explored the relationship between the categories of transfer epistemology and how often students reported transferring knowledge (explicitly or invisibly) to new writing situations and the role of genre.

Limitations

We acknowledge several limitations associated with this study. First, while we collected both interview data and writing samples, the writing samples were used primarily to contextualize the experiences as reported in the interviews; as such, this study relies on self-reported data and does not directly observe or measure transfer. Some of the self-reported data was in the moment, as students were engaged in writing each year during the interviews, and some were retrospective. As Tomlinson (1984) has noted, retrospective interview data has notable limitations. Second, because we interviewed students once per year, we were able to account for their epistemologies in that moment and track the change of epistemology over time. This leads to a representation of epistemologies as “stable” entities across the course of a years’ time. As noted in the literature review, epistemologies are fluid and frequently changing; it is possible that more frequent data collection across the five years may have demonstrated this fluidity. This is certainly an area that is worthy of more consideration by future research. Finally, as discussed elsewhere, we also note the repeated use of the “box under the bed” metaphor with students over time may have influenced their perceptions and epistemology.

Results

In this section, we answer our four research questions through a description of types of students’ transfer epistemologies, the factors that influence students’ transfer epistemologies, and the relationship between students’ epistemologies and reported transfer across five years.

Research Question 1: What Epistemologies Do Students Hold Concerning Writing Transfer?

Table 1 overviews three primary transfer epistemologies revealed by participants as well as two hybrid epistemologies. After Table 1, we describe each different learner epistemology with examples from the study.

Table 1: Types of Transfer Epistemologies

Transfer Epistemology	Definition	Example
Omnidirectional	<ul style="list-style-type: none"> • “Absorbs” all kinds of knowledge 	“Everything that I have learned has value.” (Alison)
Knowledge Builder	<ul style="list-style-type: none"> • Self-defines the meaning, value and purpose of 	

	<p>knowledge</p> <ul style="list-style-type: none"> • Tries to avoid the occurrence of the BUTB; sees it as detrimental to learning 	in year 2)
Unidirectional Knowledge Builder	<ul style="list-style-type: none"> • Attends to knowledge only relevant to their academic and career plans. • Adheres to their disciplinary identity in dealing with each knowledge. • Uses the BUTB as a strategy for keeping disciplinary knowledge and getting rid of the rest. 	“I need this knowledge because I will be in a professional school.” (Nora in year 4)
Fatalist	<ul style="list-style-type: none"> • Perceives learning as being controlled by outside forces rather than student being in control. • Demonstrates an external locus of control (Weiner, 2010). • Lacks agency; the BUTB just “happens” and student has no control in whether information is pulled out or stashed under the bed. 	“I don’t really decide.” (Penny in year 1)
Fatalist + Unidirectional Knowledge Builder	<ul style="list-style-type: none"> • Perceives learning as being controlled by outside forces (demonstrating a lack of agency) but feels that successive major courses may help prevent the BUTB (hybrid epistemology). 	“It [BUTB] just comes to me.. if you are working towards a major.. the box never goes under the bed.” (Karen in year 2)
Unidirectional + Omnidirectional Knowledge Builder	<ul style="list-style-type: none"> • Functions primarily as a unidirectional knowledge builder focusing on disciplinary knowledge; however, occasionally may recognize that non-disciplinary knowledge has value (hybrid epistemology). 	“I really don’t feel like this [class] applies to what I’m going to be doing. You can understand the purpose though.” (Bobby in year 2)

Nothing goes under the bed: The omnidirectional knowledge builder.

Students who are omnidirectional knowledge builders have an underlying epistemology that places a high value on all learning and, therefore, these students seek to keep all learning with them as they move through college coursework. Some students express this epistemology as a thirst for knowledge and they actively work to find meaning experiences. Since all knowledge is meaningful, their aspiration to keep knowledge intact was considerable and pervasive, even in the courses that did not pertain to their academic majors or disciplinary identity. For example, Allison demonstrated her aspiration to keep knowledge under her control throughout the years of the study:

Year 1: ... I retain most things. I may have to look back at my notes but I mean if I learned it, I learned it. I usually retain it.

Year 4: ... my Cinema class. I don’t think that will ever be something that will help me in my future. But I would still remember things that we talked about in that class. To me, those were some pretty cool facts so I don’t think I will ever forget that kind of stuff.

Year 5: I don’t think I’ve thrown anything under the bed yet because I care.

As Allison’s 5th year quote indicates, omnidirectional knowledge builders avoid the box under the bed and see it as undesirable in their college writing experiences. In Year 2, Allison describes a strategy she uses to make sure that her knowledge stays with her:

I kept that [writing knowledge] along with keeping my papers and assignments and stuff like that, my book. I didn't sell back my book. I keep it and that's actually one thing even a lot of my friends do, they sell back all their books, I seldomly sell back books just because I think you can always them as a reference. Like Writing 150 and 160 [Composition I and II], there are a lot of ways to cite papers which I reviewed again after seeing this because I thought I was doing that right. You can use it for review; you can use it if you don't remember things, like so I to keep it.

As students move through college, what may begin as a simple “love of learning” also can be tied to a growing sense of professional identity. Allison demonstrates this as she is working and preparing to enter graduate school in medicine and is working in real estate for a “gap year” while applying to graduate school. Allison describes her part time “on the job learning” concerning staging houses:

I feel like some of the stuff ... all the stuff that I learned about the houses, that's a lot of information. I could easily kind of just throw it under the bed. But once in a while, I still get questions pertaining to the stuff I learned. So, you really need to review and keep up with that. I just feel like the stuff that you learn in med school, it's for a reason, to be a better doctor. I would try my hardest to not just push that stuff under the bed. Because it's so important for boards and for life and for treating people. When you're a doctor, you really have somebody else's life in your hands.

What Allison describes here is an active engagement with all knowledge, even that which she only used for a part-time job experience prior to graduate school. We will also note that Allison was one of the few students in the study who consistently demonstrated the same transfer epistemology across all five years—the omnidirectional knowledge builder. She is also one of the most highly successful students in the study in terms of time to degree and grades.

The box under the bed is only for Gen Ed: The unidirectional knowledge builder.

Unidirectional knowledge builders also hold high value of knowledge, however, high value is tied only to what they see as directly relevant connected to their academic majors or career plans. For these students, disciplinary identity was one of the most salient factors that shaped their epistemology. We call these students “unidirectional” as they do hold epistemologies that facilitate transfer, but their epistemologies are shaped in one direction (that of the career). Shara offers a clear view of this perspective in Year 2:

Shara: To me, if it's a class or a course that I will use in my profession, I connect it to everything else but if it's something I'm not going to use then it is something that I will put under the bed because I don't need it. It's just depends on how useful it is going to be in my future.

Dana: Okay. How do you figure out how useful it is going to be?

Shara: I feel like if it is going to help me as a counselor. Like the dance, it was a fun class, it was required, a Gen Ed but I'm not going to use it as a counselor so that's under the bed. I don't care.

Dana: Okay, I got it. So if you can connect it directly to counseling then...

Shara: It's good, it's connected to something else.

Dana: It makes sense. So do you think that you threw your writing course under the bed or did you keep it? Or does that depend on the specific knowledge?

Shara: I think it depends. I think at first I put it under the bed but now I pull it back like wait, I need this the rest of my life with all the writing and stuff. I will change my mind after I put it under the bed.

Shara is clear that she has control over what goes under the bed, and it is directly tied to whether or not she sees that material being useful in her profession. If it is useful, she will keep it and try to apply it again (and we have examples of her doing this in the 3rd and 4th year of the study). We also note that the unidirectional knowledge builder sees the box under the bed as a strategy for knowledge management. We see Shara doing this with writing courses—although she first did not see the connection of writing to her major in Year 1, she does in Year 2 and can pull writing knowledge back out again to use it, indicating that the box under the bed is more of a storage mechanism than something that is irrevocably lost. As a second example of this strategic thinking present for unidirectional knowledge builders, we turn to Alice, a psychology major, describes her strategy as follows in Year 2:

We are only humans. We only have an attention span for so long. And we would kill ourselves to try to learn everything. You need to leave a little. So I think a lot of students, and I know me especially, I think okay I have this many days until I'm done with this class and first thing that I always find out is the final cumulative because it's like if I don't have to know this stuff at the beginning, I'm forgetting about it.... I just need to maximize my chances by just looking at this stuff you know then forget it.

At the end of the term, the BUTB “strategy” may become a permanent “forget about it,” as Alice describes above.

The box under the bed just happens: The fatalist.

Fatalist learners hold epistemologies that lack agency surrounding learning transfer. Fatalists know that the BUTB happens to them, but they see it inevitable and unavoidable—their learning and what happens to it is out of their hands. Some fatalists also may attribute agency to outsiders, like teachers who emphasize key material, rather than to their own ability to retain and transfer knowledge. In Year 2, Penny, a business major, describes this as follows:

Dana: What exactly do you decide to toss under the bed? Or do you actually decide to toss things under the bed?

Penny: I don't think I really decide to do it but it just happens. If I don't like something and I don't really find it valuable or if I don't think I'm ever going to use it, it likely will be under the bed.

As demonstrated in this segment, “it just happens” to Penny without a lot of agency or control. We will note that this lack of agency is a more general learning orientation that Penny demonstrates in the first two years of her studies. Penny demonstrates an external locus of control, attributing her success or failure to teachers and other external circumstances and rarely takes ownership of her learning (for more on ownership, see Baird & Dilger, 2017). Rather, learning is something that happens to her. As the years of the study pass, she eventually gains more agency and by Year 3, shifts to the unidirectional knowledge builder epistemology. As we'll demonstrate in the next section, the fatalist epistemology is strong for some learners in the first year of the study but is completely gone by Year three (with only Penny still demonstrating it in Year 2).

The box under the bed happens to me, but not in my major: The fatalist + The unidirectional knowledge builder.

We found hybrid epistemologies (Gottlieb & Wineburg, 2012), with students sitting between two or more of these transfer epistemologies or at a transition point between two epistemologies. One student in Year 1 and two students in Year 2 perceived learning as out of their control, which resembles the learning epistemology of the fatalist. However, they also showed a growing sense of disciplinarity, demonstrating aspects of the unidirectional knowledge builder. Karen in her second year is an example of this hybrid epistemology:

Karen: It [BUTB] just comes to me. If you are working towards a major... the box never goes under the bed. Somehow it sticks.

Again, we see the “fatalist” lack of agency surrounding the BUTB, but a recognizing that the major “somehow sticks” more so than non-major courses.

BUTB is situational and I control it: Unidirectional + omnidirectional knowledge builder.

The second hybrid epistemology features learners who are primarily unidirectional knowledge builders focusing on transferring and retaining disciplinary knowledge; however, occasionally they recognize that non-disciplinary knowledge is worth keeping. This likely represents a growing orientation towards omnidirectional knowledge building and a growing sense of the value of all learning. In the case of Bobby, we can see this shift happen between Year 1 and Year 2.

Bobby Year 1: I have a lot more passion for writing... stuff like math, I know I really don't want to do.

Bobby Year 2: For the math aspect of it, I really don't feel like this applies to what I'm going to be doing. You can understand the purpose though.

As these two hybrid epistemologies suggest, transfer epistemologies were not stable over the years for most students and may represent a fluidity as students move between courses, contexts, and disciplines.

Research Question 2: How Do Transfer Epistemologies Change Over Time?

Following the work of Perry (1968), students in our study had considerable shifts in epistemology over time, as described in Table 2. In Year 1, almost half the study sample (6 students) were either fatalists or had fatalist + unidirectional knowledge builder hybrid epistemologies. By Year 2, that number was reduced to three (with only one showing only a fully fatalist epistemology) and by the third year of the study and beyond, fatalism was no longer present. Students who were early fatalists, in later stages of the study, report gaining new agency. This is illustrated through Molly, who was a Fatalist in Year 1, but by Year 3, shows ownership of her learning transfer. She says in Year 5:

Molly: I think, if anything, I'm taking things out of the box at this point. So, that's kind of cool I guess. In the sense, I'm taking this Chem class and I need my Math now, stuff like that. Also, looking back and seeing what I didn't learn in that box, I guess, and trying to learn it now and make up for things. So, it seems like the box is out.

Table 2: Types of Learning Epistemology and Epistemic Change in Relation to the BUTB

Types of Learning Epistemology	Year 1	Year 2	Year 3	Year 4	Year 5	Total
The Omnidirectional Knowledge Builder	1	1	2	4	4	12
Unidirectional Knowledge Builder	6	8	9	6	7	36
Fatalist	5	1	0	0	0	6
Fatalist + Unidirectional Knowledge Builder	1	2	0	0	0	3
Unidirectional + Omnidirectional Knowledge Builder	0	1	2	2	1	6
Total	13	13	13	12	12	63

As Table 2 describes, unidirectional knowledge building, with an emphasis on retaining disciplinary and career knowledge, is the most dominant viewpoint in the study, representing emphasis on writing skills tied to future careers. However, as students continued their education, we saw students beginning to shift more towards omnidirectional ways of knowing and seeing all learning as having value.

Research Question 3: How Do Transfer Epistemologies Connect with Students' Reported Learning Transfer?

Uncovering transfer-oriented epistemologies is useful, but it doesn't answer the broader questions: Do these epistemologies matter? Why are they important to learners? This section explores some findings to indicate how transfer epistemologies are reflected in two critical aspects of learning to write in the disciplines: students' understanding of genre and their self-reported transfer.

We saw a direct connection between students' transfer epistemologies and how many times students reported transferring prior knowledge in a wide range of disciplinary courses, or what we call "visible transfer", where they can directly talk about using material from one course in new situations. As described in the methods section, in a separate analysis, we also tracked "invisible transfer", that is, we tracked each time students mentioned writing knowledge, skills, or strategies from the time they learned them (in any year of the study or prior to the study as reported by students) and each time they used writing knowledge in any course, regardless of whether or not they could attribute the original learning. We will also note that because the number of students in each category varied per year (with more unidirectional students), we used the "normalize" data feature in Dedoose Mixed Methods Software for equal comparison across these categories. Normalizing adjusts the total number of codes count for each group based on the ratio of students in that group, making the student groups of equal numbers for comparison purposes.

As Table 3 describes, students who held unidirectional or omnidirectional beliefs (or a combination of both) reported transferring their knowledge/skills/strategies far more times in the study than those who held fatalist beliefs. Unidirectional and omnidirectional students both reported high instances of learning transfer, with the hybrid epistemology unidirectional + omnidirectional reporting the most transfer.

Table 3: Instances of Self-Reported Transfer over Five Years

	Fatalist	Fatalist+Omnidirectional	Fatalist+Unidirectional	Omnidirectional	Unidirectional	Unidirectional+Omnidirectional
Explicit Transfer	43.2	0	72	61.2	65	87.43
Invisible Transfer	86.4	0	90	158.4	160	221.14
Total Transfer Moments	129.6	0	162	219.6	225	308.57

As scholars have identified the critical relationship between genre and learning transfer (Reiff & Bawarshi, 2011; Robertson, Taczak, & Yancey, 2012), we also explored the relationship of advanced genre knowledge and transfer epistemology. In a separate analysis, each time students discussed genre knowledge in the study, two researchers collaboratively coded and then did a second round of coding exploring whether or not students demonstrated genre knowledge and how deep or “nuanced” that genre knowledge was (Driscoll & Gorzelsky, in preparation). This led us to three categories:

Assignment Features: The student understands genre as tied only to the specific assignment criteria or grading criteria. Example: “The second paper was a visual argument... that was probably the hardest I would say to write because she made us we had to come up with, like I don’t know how to say it, like a sign saying. Like it had to be an image with no words kind of, mine did have words it couldn’t be blatant out stating what the purpose of it was.” (Bobby, Year 1)

Simple: The student has a basic understanding that different genres exist, including a sense of purpose or audience, but not both. Example: “Like lab reports maybe. I honestly think when you are doing pharmacy writing is just like data reports of a person like their history. I think that a good writer for that is making sure that person is allergic to this medicine. Write that down. Because you don’t want the person to get more sick.” (Nora, Year 2)

Nuanced: The student has a deep understanding of genre knowledge; this may include a discussion of genre conventions in relationship to purpose or audience and/or an understanding that multiple genres across disciplines exist. Example, “Bring these arguments alive and make the reader able to see them without losing your voice and synthesize...I was just in that kind of frame of mind, ok, I’m just going to like this, author 1 says this, author 2 says this, author 3 says this. I think it challenged me to get out of that bubble where I’m just going to write everything the same...But maybe no one ever challenged me to really think outside the box and do that really sophisticated journal-writing, like educated journal type of writing where you’re integrating sources and having conversations about sources, talking about how one interacts the other” (Allison, Year 4)

In comparing these three genre knowledge categories to our epistemological categories, as we see from Table 4 (also “normalized”) that students with the fatalist epistemology most often see genres as “assignment features” and report only a simple understanding of genre. The omnidirectional students (including those that are in the hybrid uni/omni category) demonstrate, by far, the most nuanced understanding of genre across the study.

Table 4: Genre and Transfer Epistemology

	Fatalist	Fatalist +Omnidirectional	Fatalist +Unidirectional	Omni directional	Uni directional	Unidirectional +Omnidirectional
Assignment Features	115.2	0	63	61.2	100	82.29
Simple	28.8	0	63	108	43	97.71
Nuanced	0	0	9	46.8	23	41.14

What these findings about transfer and genre suggest is that there may be a relationship between the transfer epistemologies that students hold and their behaviors and writing outcomes; this has considerable implications for teaching writing in a variety of disciplinary contexts, and we'll return to these implications in the discussion section.

Research Question 4: What Factors Influence the Development of Transfer Epistemologies?

In addition to understanding what transfer epistemologies are and how they have the potential to influence student writing and transfer across the disciplines, we now turn to our fourth research question that explores the factors that shape the development and change of transfer epistemologies. We found two categories of factors: context dependent and individual factors which we now describe.

Context-dependent factors.

Utility. Many students regarded a course's "utility," as an important criterion for transfer. Nora, a nursing student and fatalist (year 1) and unidirectional learner (years 2-5), describes how different courses have a different utility. In Year 4 of the study, she describes, "I can't do that in Nursing. They literally drill it in your head.... I had to practice over and over and over and make sure I don't miss one thing. And I can figure it out because that's one thing I have to do every day in Nursing." This utility, of course, directly relates to the key difference between unidirectional and omnidirectional knowledge builders.

Personal interest. How well a target class matches students' intellectual and personal interests is also a factor that shapes transfer epistemologies. Students whose target classes were not in alignment with their personal interests tended to have a perception of the BUTB as a tool to manage or dispose of unwanted knowledge. When students felt interested, they were more likely to see the BUTB as unnecessary and undesirable. For example, in Year 3, Bobby explains, "I've done it and I've been guilty of it. But it's usually in classes that don't interest me. In classes that do interest me, I really do try to hold on to that knowledge." For most students, "interest" mainly is tied to disciplinary and career knowledge (unidirectional), with some students later developing more broad interests in learning and shifting to omnidirectional epistemologies.

Teacher influence. Teacher influence was also a factor in shaping transfer epistemologies, particularly for more fatalistic students who did not feel they had agency. When these students found their teachers enthusiastic about course content, the BUTB was less likely. On the other hand, when students did not feel connected to teachers for various reasons students were much more likely to experience BUTB. Some of the reasons students included as a lack of connection were: a teacher's lack of energy in a class, a

teacher reading monotone from a textbook, a teacher's L2 speaker status, and a teacher not showing care of the material. For example, Penny in her 4th year described it as follows:

If I don't find it interesting, and I try like super hard to find something in it, but if I can't and there's no hope for it, I just put that under my bed... Some classes just gets my attention and I actually like it whether it'd be the professors being really cool or it makes me learn something about myself or the topics are really interesting. Whereas, other courses, the professors are super dull, or don't speak very good English, or I'm just not interested at all in the topic, then that's what I would consider bad.

This suggests that teachers can and do have an influence on how these broader transfer epistemologies may impact a single course.

Individual factors

Professionalism. As discussed above, students' growing sense of professional identity influenced their transfer epistemology. Four students demonstrated radical shifts from the fatalist epistemology to the omnidirectional or the unidirectional epistemology in the study; we can least partially see this as tied to their growing professionalism and disciplinary knowledge. James graduated with a degree in health sciences in year 4 and re-enrolled in a 1-year accelerated Bachelor of Science in Nursing degree in year 5. James described his professional responsibilities as a nursing student, which represents a much more professional perspective than he had as an unfocused health science student, "I took everything I've learned from lab. I still carry around my validation sheets. I still carry around all of my assessment data that I can collect in order to find out most information about my patient and to be very thorough with them and not miss anything...It's definitely not something I can shove under [the bed]."

Learner Agency. A second individual factor that helps shape transfer-specific epistemologies has to do with the learner agency, as described throughout this results section. In the course of the coding, we found that students held two types of learner agency as similarly described by White & Bruning (2005). The first has to do with seeing learning as a self-directed knowledge making activity. For example, Karen in her 4th year talked about how she selectively (and without difficulty) let the BUTB happen in certain classes, "There is just so much going on in everyone's life... a lot of it just gets stored under the bed because I'm already living it." Seeing learning as self-directed was present for both the omnidirectional and unidirectional learners (and the omni/uni hybrid).

In the second epistemological perspective, learning is regarded as a passive relocation of knowledge (from teacher to student, for example), which is tied with our fatalist category. Students' passive epistemology of learning seemed to lead students to feel as if they have no control over their learning. Molly in her 1st year, for example, expressed her belief about the BUTB as something constantly and inevitably happening in her learning; "I think it's very accurate because I do it all the time.... Especially history, I find. Not so much with writing, but like you ask me what year a war was, and I just had a test that I crammed for a year ago, and I can't recall it."

Discussion

Student Writing Transfer and the Nature of Epistemology

This study has explored the ways in which transfer epistemologies are shaped, change over time, and connect with transfer of learning factors—and therefore, have implications concerning how students learn and develop over time as writers. We now discuss our specific results and then step back and consider this study in the context of future research and teaching both first-year writing and disciplinary writing.

That learners hold epistemologies that shape writing transfer adds an important data point in the growing understanding the role that various dispositions have on learning to write across contexts and time. We found that for our students, these “invisible” epistemologies that learners hold shape not only how students engage with their learning in-the-moment, but also how they potentially transfer that knowledge across courses, disciplines, and contexts. In Perkins and Salmon’s (2011) terms, if learners hold epistemologies that are not “open” to transfer and that lack agency they will likely not be willing to detect, elect, or connect that learning to new circumstances because it is forgotten under the bed.

That half of the students in the study began with a fatalist epistemology is particularly notable—these students lacked agency concerning their learning and experienced their knowledge being “passively relocated” in White and Brunning’s (2005) terms. Since so much writing transfer involves students’ active engagement with their knowledge and choosing to detect, elect, and connect (Perkins & Salomon, 2012), this disempowerment may considerably hinder successful writing transfer. This issue was reflected throughout our study, where those holding fatalist epistemologies engaged in considerably less transfer than students holding other epistemologies. As fatalist students developed epistemologies where they had more agency later in the study, their learning transfer also increased. These findings about students with fatalist epistemologies illustrate several key issues: first, they help us have a better sense of the larger developmental processes at work for undergraduate learners with regards to their learning, in that they demonstrate a considerable shift in agency for many college students somewhere between their first and second year in higher education. But second, they make us question what kinds of instruction learners need in their first year of college to move beyond fatalist perspectives and into a place of self-directed learning (White & Brunning, 2005), eventually leading to a unidirectional or omnidirectional perspective. This may be instruction appropriate for first-year writing courses in preparation for disciplinary writing followed up with disciplinary writing instruction.

We’d also like to note that the difference between unidirectional and omnidirectional epistemologies has implications for the way that we teach writing in a variety of contexts. As time went on, fatalist students often moved into unidirectional knowledge building, while those that began as unidirectional knowledge builders sometimes moved into omnidirectional knowledge building, expanding their “value” of learning to include all learning (Driscoll & Wells, 2012). Timing mattered; in some cases, an epistemological shift was profound and meaningful for students and tied to a specific course experience. Developmentally, shifting to a new epistemology put them in a much better place to make the most of their many courses (elective or required) particularly in general education and allowed them to engage in “forward reaching transfer” (Perkins & Salomon, 1989). For others, we note that it was a connection to a growing sense of disciplinarity and coursework in their majors that helped account for the epistemological shift. This suggests, then, that cultivating omnidirectional perspectives in students is something worth striving for, but may be challenging given the current vocational drive in higher education.

Indeed, one way of viewing the split between omnidirectional and unidirectional learners can be viewed through the tension present in higher education between a traditional liberal arts education and vocationalism (Grubb & Lazerson, 2005; Symes & McIntyre, 2000). Liberal arts perspectives, rooted in valuing and teaching a broad range of knowledge, directly tie to our omnidirectional epistemology, where learners recognize the value and importance of all knowledge. This is often at odds with current vocational perspectives, which have risen in prominence in the late 19th and throughout the 20th centuries (Symes & McIntyre, 2000). Vocational arguments suggest that institutions of higher education should be preparing students only for particular professions or careers; this perspective is directly tied to our unidirectional epistemology where learners are focusing almost exclusively on what they perceive as useful professional and career-based knowledge. In fact, we might say that universities themselves have moved from positions rooted in omnidirectional knowledge building to unidirectional knowledge building and it isn’t surprising that students, likely, also hold these strong unidirectional epistemologies given the current climate in higher education.

And yet, transfer research in multiple disciplines suggests the importance of cultivating broad-based skills for transfer and certainly, an omnidirectional epistemology that would help students make good use of those broad skills. From workplace and professional writing studies, recent studies also suggest employers continue to want more adaptable and broad-minded employees with a range of “soft skills” including knowledge and adaptable skill sets (Robles, 2012), making the more narrow “unidirectional” focus potentially problematic for students, even those with the most vocational tendencies. From the learning transfer literature, Haskell (2000) demonstrates that a broad knowledge base is necessary for specific content area knowledge transfer, a topic explored further by Calais (2006). This research, combined with our findings in this study on transfer and nuanced genre knowledge, suggest that ultimately cultivating omnidirectional or hybrid omni/unidirectional epistemologies may serve students best, not only for vocational goals but potentially also civic and personal ones. For disciplinary transfer and transfer of knowledge to workplace contexts, unidirectional epistemologies still produce a positive outcome—but for students entering a workforce where they will change careers five or more times and one that demands access to flexible thinking and adaptability, omnidirectional learning may be more beneficial.

The hybrid epistemologies we found also illustrate dynamic nature of these epistemological categories (and epistemologies more generally, as discussed in the literature review). The existence of these hybrid epistemologies offer us insight into epistemology as developmental and also offer further evidence that learner epistemologies can change—sometimes radically so—over years in college. What this study was not able to do, beyond indicating specific factors that shape epistemology, is point to distinct moments when a student moved from a fatalist epistemology to a unidirectional one, or a unidirectional one to an omnidirectional one. That students can change, however, means that these epistemologies may be teachable and therefore, can be considered in cross-disciplinary writing curriculum. We hope that future researchers can further research these moments of epistemological change.

Another finding with considerable disciplinary writing implications was the “context-specific” nature of learner epistemologies. While we focused the interviews and analysis on students writing-related epistemologies, as demonstrated in some student quotes, they often also commented on other courses. We see this reflected in Molly’s comment at the end of our results section, where she distinguishes between her writing and history courses for the box under the bed. This was a consistent pattern for many students in the study; and suggests yet another way in which epistemologies are not static, unchanging qualities but dynamic and context driven, and may shift based on the course, teacher, or even day of the week.

The Box Under the Bed as a Metaphor for Teaching and Research

One outcome of this study’s exploration of the box under the bed with student participants is the potential of this metaphor for aiding students with articulation and creation of epistemological frameworks. The box under the bed metaphor offers us an accessible and memorable term for students to engage with and discuss learning transfer. We’ll now discuss both the promise and limitation this metaphor as a way of engaging students in direct discussions of transfer and epistemology in teaching and research.

One challenge of studying learner epistemologies—and other dispositional aspects—can be understood through the metaphor of the iceberg. Icebergs have three parts: visible tip of the iceberg coming out of the water, the water line itself where the iceberg plunges into the ocean and meets the waves, and the largest part of the iceberg that is contained in the cold, dark ocean water below. Epistemology, as an internally held disposition, is firmly under the water line. That is, epistemology may drive certain kinds of beliefs and behaviors that we can observe (the top of the iceberg) and we might be able to bring those epistemologies to the surface (at the water line) through interviews or other research methods, but what is really going on internally is, by nature, unobservable. It is often difficult for students to describe what they know but may not be able to voice or put into words (e.g. invisible or semi-conscious material, Shieber,

2016; Driscoll & Wells, 2012; Driscoll & Cui, in preparation). And consequently, it may be difficult for us to understand learner epistemologies about transfer because learners have no experience articulating them and have not been taught about them in coursework. Without language to describe a concept, epistemology may be less salient or unexpressed in the minds of students. In articulating the need for transfer-oriented language, we take the hopeful position that transfer can be facilitated for new writers. We also note that regardless of what tools writers may have in entering new situations, adaptation, enculturation, and struggle are also routinely part of adapting to new rhetorical situations and discourse communities and that transfer is never seamless (Anson, 2016; Brent, 2012). That is, the box under the bed metaphor offers us another tool to teach students about transfer and to manage their learning consciously, but certainly doesn't "solve" the transfer problem for good.

The use of this term as part of our interview protocol each year offered us tremendous exploratory power, as it was a term that students could easily understand and relate to—and in many cases, remembered from year to year. However, we also acknowledge that using this term each year may have had an influence on participants responses by making the concept and their epistemology more generally salient; as a longitudinal study, we aren't sure that issue could have been avoided due to the nature of longitudinal research. But we note that this salience does suggest considerable pedagogical benefit.

In offering students the box under the bed metaphor to describe transfer and their related epistemology, we may have helped students not only respond to a research question, but offered them a working metaphor that they can carry with them, engage with, and discuss. In our series of interviews, after being introduced to the "box under the bed" concept in their first yearly interview, students not only remembered the concept from year to year when asked, but also occasionally used the concept in subsequent interviews before it was raised and reported thinking about it outside of the interviews. In this way, students were offered a kind of epistemological framework to make use of through these interviews. We might offer this same kind of epistemological framework as an intervention for students in various disciplinary and first year writing classes. While it was presented to students in a neutral way in the interview question, as teachers or researchers, we might frame it in different terms to help students move from fatalist to omni and unidirectional perspectives and to offer a transfer-oriented language that is salient and lasting. Exposure over time to the same epistemological framework, through this longitudinal study, ended up forming a kind of unintended epistemological and metacognitive intervention with these students. And while some research purists may see this as a negative outcome of a study, as teacher-scholars, we recognize the importance of this in students' own lives and development as writers. The box under the bed was a highly accessible, direct way to engage with students in this study about learning transfer.

Pedagogically, this metaphor offers us a teaching tool that is accessible to students and that can help us explore the complex phenomenon of transfer with them in a direct and approachable way. The question is—how might we best use it? The answer this question depends on our own epistemologies and values as teachers of writing.

While we might be immediately drawn to cultivate an omnidirectional perspective in our students, the study also had very successful unidirectional learners. These learners used the BUTB as a strategy for managing their learning, choosing what to keep and what to allow to gather dust, depending on their immediate learning contexts and needs. From the genre and reported transfer of learning measures, these students were just as successful (if not more focused on disciplinarity) as our omnidirectional learners. Further, in transfer theory, the concept of "negative transfer" seems salient here—not all knowledge is applicable in all situations, and indeed, some knowledge may be detrimental to new learning contexts where old knowledge can interfere with the new (see Beaufort, 2007; Anson, 2016). What we see this metaphor doing is giving students a tool to raise their awareness of their own epistemology and learning transfer—to facilitate conversations and to prime students for transfer opportunities.

Given these experiences with the box under the bed metaphor, we encourage writing and disciplinary faculty to consider the ways in which they can might introduce and engage with learner epistemologies more directly in first year, general education, and disciplinary writing classes. Talking with students about the box under the bed as a metaphor for transfer, directly in class, may help faculty who are struggling to share with students the relevance and importance of broad subject matter. Teaching this epistemological framework to students earlier in their careers as college writers may give us more powerful ways of engaging with writing knowledge in disciplinary contexts and help them shift to more productive epistemologies that will serve them throughout not only their time in college, but well beyond.

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Notes

1. Special thanks: We'd like to dedicate this article to Dana's mentor, the late Linda Bergmann, whose "Box Under the Bed" concept allowed this work to happen. Special thanks to Michael Pemberton, Chris Anson, and Joan Mullin for their helpful feedback and suggestions. Thank you also to Wenqi Cui for transfer coding and Gwen Gorzelsky for genre-based coding and analysis tied to this study.

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Complete APA Citation

Driscoll, Dana, & Jin, Daewoo. (2018, December 26). The box under the bed: How learner epistemologies shape writing transfer. *Across the Disciplines*, 15(4), 1-20. Retrieved from <https://wac.colostate.edu/docs/atd/articles/driscoll-jin2018.pdf>