Technology Matters: Using Technology to Develop Students’ Disciplinary Literacy Skills

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Available at: https://works.bepress.com/todd-cherner/3/
Abstract — Using technology to develop students' disciplinary literacy skills in the content areas is critical. As technology has become interwoven into society, students must be able to use it competently for academic purposes if they are to be prepared for college and the workforce. Additionally, academic standards and assessments have shifted from being content-based to being performance-based. This shift means students must first learn content-area “knowledge” and then apply it to complete a learning task. Because there are a variety of ways for providing this type of instruction, teachers have flexibility when designing lessons that prepare students for these new demands; however, teachers need support and examples before doing so. This article provides support for and examples of that type of instruction by first offering a framework that can be used when designing those lessons and vignettes of lessons that use technology to develop students’ disciplinary literacy skills.

Technology’s explosion since the advent of mobile devices – smartphones, tablets, and now even watches – is reshaping the field of education. No longer are textbooks, graphic organizers, worksheets and PowerPoints the primary resources used in the classroom. These static resources are being replaced with dynamic instructional tools (e.g., educational apps and instant Internet access), which represents a significant change in the ways teachers prepare students to be successful in college and the workforce (Kuhn, 2012). Concurrently, education in the United States is experiencing a change in academic standards, moving away from the content-based standards and assessments used by the No Child Left Behind act to a new generation of performance-based standards and assessments (Elmore, 2007; Phillips & Wong, 2010; Schmoker & Marzano, 1999). It is in this transitional context where we, today’s educators and teacher educators, find ourselves working. Although multilayered, the challenge before us is to find meaningful ways of using today’s technologies to teach our students the disciplinary literacy skills needed to be successful in school and the workforce.

In this article, I will first present a theoretical framework that can be used as a guide for designing technology enhanced instruction before offering three examples of teachers using emerging technologies to develop students’ disciplinary skills.

Using TPACK and Disciplinary Literacy as Instructional Guides

To frame the use of instructional technology, the Technological, Pedagogical, and Content Knowledge Framework (TPACK) serves as an effective guide. TPACK, as depicted in Figure 1, is a three-bubble Venn diagram. Mishra and Koehler (2009) explained that teachers must be able to align their content knowledge to their use of pedagogy in a way that is enhanced with technology. They state that “Teaching successfully with technology requires continually creating, maintaining, and re-establishing a dynamic equilibrium among all components” (Koehler & Mishra, 2009, p. 61). To use TPACK effectively, teachers cannot simply “add” technology to a pre-existing lesson. Rather, they must integrate technology so that it deepens students’ knowledge of both the content learned and the technology used. This “integration” then represents middle and high school teachers’ pedagogical knowledge in that they have to craft lessons to be both rich in rigor and relevance, which should ideally develop students’ disciplinary literacy skills (Shanahan & Shanahan, 2008).

Disciplinary literacy and content area literacy are two popular terms used in education. Though they appear similar, each term represents a different type of literacy, as explained by Shanahan and Shanahan (2012):

Content area literacy focuses on study skills that can be used to help students learn from subject matter specific texts. Disciplinary literacy, in contrast, is an emphasis on the knowledge and abilities possessed by those who create, communicate, and use knowledge within the disciplines (p. 8).

Moss (2005) further explains that whereas content area literacy is used to mean reading and writing to learn in the content area specific texts (e.g., textbooks and articles) (McKenna & Robinson, 1990), it now extends to students learning from multiple texts.
(e.g., blogs, reviews, magazines, novels) and the literacies needed to make sense of them. Disciplinary literacy then becomes something more specialized, more fine-tuned to specific subject-area discourse. Moje (2008) conceptualizes disciplinary literacy as a person’s ability to communicate their knowledge of a subject area gained from the reading, writing, viewing, and listening of texts in a way that combines diverse ideas and expands the discipline’s knowledge base. At the secondary level, disciplinary literacy means students engage and produce subject-specific texts – including written, oral, and digital texts – that demonstrate their deep understanding of a subject area (Cook & Dinkus, 2015; Nicholas, Hanan, & Ranasinghe, 2013). In this model, content-area literacy is used when students are engaging subject-specific texts to learn, and disciplinary literacy requires students to read and then communicate the knowledge they gained from the subject-specific texts. As importance is given to students developing their disciplinary literacy skills in the content areas, it is reflected in the standards teachers are required to teach.

Academic standards and the standardized assessments used to measure student learning are rapidly changing. In South Carolina, for example, the state has moved from the content-based standards and assessments used by No Child Left Behind to the Common Core State Standards that relied on the Smarter Balanced tests to new academic standards paired with the ACT Aspire assessments. This evolution of standards and assessments has shifted instruction from being content-based to performance-based (Marzano & Kendall, 1997; Zvoch & Stevens, 2003), with an emphasis on developing students’ disciplinary literacy skills (Darling-Hammond, 2012), as shown in Table 1.

Table 1. A Comparison of Standards: Content-Based vs. Performance Based

| Focus of Standards | “Describes what students should know and be able to do” (Marzano & Kendall, 1997, p. 12) | “Descriptions, via tasks, of what it is students should know and be able to do to demonstrate competence” (Marzano & Kendall, 1997, p. 14) |
| Example of Standards | Academic standards used by the No Child Left Behind act | Common Core State Standards | The Next Generation Science Standards |
| Area of Emphasis | Lower-Order Thinking Skills | Higher-Order Thinking Skills |
| Literacy Demands | Foundational and General | Building to Disciplinary Literacy |

As South Carolina and other states continue their implementation of performance-based standards, it changes the definition of knowledge and how teachers develop students’ literacy abilities. No longer can teachers use a “transmission style” of instruction that “deposits” facts and other information into students’ heads that they recall for tests (Brown, McNamara, Hanley, & Jones, 1999). Rather, teachers now must develop students’ literacy abilities, as they progress through their compulsory education. According to Shanahan and Shanahan (2008), students must learn foundational and intermediate literacy skills (e.g., decoding, fluency, word recognition) in grades K-6 before developing their disciplinary literacy skills in grades 6-12. These disciplinary literacy skills teach students how to read and communicate like mathematicians in math, social scientists in history, musicians in music, and so forth. These disciplinary literacy skills represent the knowledge students now need if they are going to pass this new generation of standardized assessments and be prepared for college and the workforce.

Table 1. A Comparison of Standards: Content-Based vs. Performance Based

There is a direct connection between TPACK and the performance-based standards that promote disciplinary literacy. Because today’s society depends on and uses technology ubiquitously, it has changed both the types of texts we read and how we read them. However, that is not to say “good” teaching requires the use of technology, but preparing students for post-secondary opportunities, whether it be continuing their education or joining the workforce, does require they develop a certain technological aptitude (Darling-Hammond, Wilhoit, & Pittenger, 2014; Pittman, 2010). The best practices that will next be described offer innovative approaches to integrating technology in ways that develops students’ disciplinary literacy skills.

Classroom Contexts

This paper is a reflective case study (Macellan, 2008) of best strategies that I saw while making classroom observations along South Carolina’s Grand Strand during the spring 2014 and 2015 semesters. As a teacher educator at one of South Carolina’s public universities, I am afforded the opportunity to visit classrooms in a variety of school districts, which allows me to see authentic instruction. I use the term authentic in this context because my classroom visits are typically unannounced, so the teachers who I am observing are not able to “plan” instruction for my visit. This case study is bound to two groups of participants, who are both connected to a teacher licensure program. The first group is comprised of 15 teachers who served as mentors to the second group, which consisted of the 14 pre-service teachers I supervised while they interned. In my role, I observe my interns multiple times during the spring semesters and specifically look for
checklist was designed to be flexible and inclusive, so it honored the “effectiveness” of diverse teaching methods. Plus, I wrote the first two qualifiers so they directly addressed the ability to read and communicate content-area texts, which is a central premise of disciplinary literacy (Moje, 2008; Moss, 2005). As I visited classrooms, I recorded the effective teaching methods I observed, and I will next offer a synopsis of three exemplary methods.

**Inspiring Approaches**

In my classes, I often tell my pre-service teachers, “There is no one way to get to Denver.” By this statement, I mean that there is not a single, magical method for correctly teaching a topic. Instead, the purpose of teaching a lesson is that students learn the objective that was taught (e.g., the “getting to Denver”). In this section, I offer three mini-vignettes that each capture a teaching method and analyze them using the Effective Teaching Traits checklist from Table 2.

**Method 1: The Silent Seminar**

I sat in the back of a high school American government classroom with another university supervisor, and 20 students were seated in rows of tables (averaging two students per tablet and three tables per row). All of the students had a tablet device and were logged onto a shared Google Drive document. Before starting the seminar, the teacher and intern quickly discussed their opinion of the article students read for homework about civic responsibility, the seminar, the teacher and intern quickly discussed their opinion of the article students read for homework about civic responsibility, their life outside of school? (Botzakis, Burns, & Hall, 2014; Duke, 2013). After five minutes, I heard the pace of typing slow and then peter out. The teacher and intern were both smiling, and the intern eagerly said, “So, let’s see what we have.” Soon, the class began discussing their different experiences responding to the original prompt and how they responded to both their classmates and their classmates’ responses.

**Applying the Checklist**

The Silent Seminar required students to use multiple skills to engage the teacher’s original prompt, their classmates’ responses to the prompt, and their responses to their classmates’ responses. In this way, the students engaged higher-order thinking skills in multiple ways, which can be unpacked using Effective Teaching Traits checklist.

<table>
<thead>
<tr>
<th>Qualifier</th>
<th>Justification of Qualifier</th>
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<tbody>
<tr>
<td>1. Are students reading and/or communicating texts specific to the content area?</td>
<td>Each discipline contains texts that are unique to it, and students must be taught how to engage the texts as readers and writers of that discipline (Fang, 2012, Shanahan &amp; Shanahan, 2008).</td>
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<tr>
<td>2. Are students using technology to collaborate?</td>
<td>To be part of a globalized community, students must be able to connect, share, and team up with a variety of individuals (Simonson, Smaldino, Albright, &amp; Zvacek, 2014; Whitehead, Jensen, &amp; Boschee, 2014).</td>
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<td>3. Will the skill students are using or the task students are completing transfer to other content areas and/or their life outside of school?</td>
<td>If they are to be meaningful, the abilities students develop in a classroom must be applicable and relevant to learning opportunities that exist in other classrooms and in their personal/professional lives (McClanahan, Williams, Kennedy, &amp; Tate, 2012; Smith, Given, Julien, Ouellette, &amp; Delong, 2013).</td>
</tr>
<tr>
<td>4. Are there high levels of student engagement?</td>
<td>Students must be interested and see the value of the learning task in order for it to be effective and engaging (Ainley &amp; Ainley, 2011; Christenson, 2012).</td>
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</table>

**Are students reading and/or communicating texts specific to the content area?** The students read a content-area text previous to engaging the Silent Seminar and the comments they provided were in response to both the text and their classmates’ responses. Their classmates’ responses constitute a content-area text, and the responses each student wrote are content-area texts they authored. Students’ responses to both the text and their classmates’ responses align to disciplinary literacy skills in that they are reading and communicating in the specific subject area.

**Are students using technology to collaborate?** The use of a Google Drive document in this manner allowed students to share their thinking via their responses to the original prompt and each other, which supports their development of disciplinary literacy. As the document came alive with student writing, I saw them make connections between comments and build on each other’s comments to make meaning. In this way, the students did collaborate using technology.

**Will the skill students are using or the task students are completing transfer to other content areas and/or their life outside of school?** In this activity, students are using multiple skills simultaneously to complete the task of responding to the prompt and their classmates. Students are using text-analysis skills to form their opinion of the article, interpersonal analysis skills to interpret the meaning of their classmates’ responses, and digital literacy skills to read and interpret an evolving, synchronous text. These skills transfer over to students’ lives when they read a variety of both print and digital texts in their academic and personal lives.
Are there high levels of student engagement? Students were actively engaged in this activity as they first considered how to phrase their response to the original prompt and then how they responded to their classmates’ responses. Additionally, because students had a level of anonymity in this activity (Park, 2013) – in that they could express themselves digitally instead of verbally – students were very interested regarding if and how their classmates’ responses built on their response.

Method 2: A Musical Chairs Think-Pair-Share

I am sitting off to the side of an English II college-placement classroom, and there are 12 pairs of desks snaked throughout the room. A student is reading Langston Hughes’ poem “I Too Sing America” to the class. While observing, I noticed the teacher, who is an intern I am supervising, has not stopped the reading of the poem to explain it. He trusts his students to comprehend the poem as it is read (Gallagher, 2009). Following the reading, the teacher instructs students to read through it once more, with the purpose of annotating the poetic devices Hughes used (Robillard, Bach, & Gulden, 2015). As the students reread the poem to themselves, the teacher makes sweeps of the class and answers questions. After a few minutes pass, the teacher pauses students and plays a video of the poem being read by Hughes. At this point, the teacher asks if they are ready to discuss the poem’s meaning, and the students say they are. The teacher then announces they will be doing the musical chairs activity.

To begin, the teacher reminds students of the activity’s rules: (1) Students have to put their belongings under their desk and only have a copy of their poem, paper, and a writing utensil; (2) Students can only talk with their partner while forming their response to a prompt; (3) Pairs have to have a response ready to share if called on; and (4) Students have to move around the room in an orderly fashion. Following that, the students put their belongings away and stood by their desk with their materials.

The teacher begins this activity by playing jazz music from the Harlem Renaissance on the computer, and the students begin moving around the room, from one pair of desks to the next. After about 30 seconds, the teacher stops the music, and each student quickly takes a seat at a vacant desk. The teacher then projects a prompt for students related to the poem, and all the students begin drafting their response. After three minutes have passed, the teacher instructs students to share their response with their partner and together combine their thoughts to make the best response possible (Allington, 2014). With that, the classroom burst with conversation. Students were reading their responses, exchanging thoughts, and drafting collaborative responses. As students were discussing, the teacher quickly volleyed himself from one group to the next, listening to conversation and adding the occasional comment. Following this moment, the teacher quieted the class and called on different pairs of students to share their responses. After each pair shared, other pairs would comment and offer their own thoughts. The conversation was rich with interpretation that used text-based evidence (Fisher & Frey, 2014). When the conversation waned, the teacher instructed students to stand up with their materials and then played a different jazz song. The students began moving from desk-to-desk and the activity repeated itself.

Applying the Checklist

The Musical Chairs Think-Pair-Share activity required students to close read (Boyles, 2013) a poem by engaging it three times before developing and then articulating their own interpretations of its meaning(s). The teacher presented the poem and this activity so it incorporated audio, visual, and kinesthetic elements, which appealed to a variety of learners and can be analyzed using the Effective Teaching Traits checklist.

Are students using technology to collaborate? The way this activity used technology was not for direct collaboration; rather, it catalyzed collaboration. Technology was used to present Hughes’ reading of the poem, to play music specific to the time period, and present writing/discussion prompts to students. Each of these attributes used technology to contextualize the poem and was part of the activities, which supported their collaboration and understanding of the poem.

Are students reading and/or communicating texts specific to the content area? In this activity, the students read the poem as a lettered text and viewed Hughes reading it. Plus, in order to annotate the poem’s devices, students had to reread it. Concerning the writing, students composed constructed responses, opinions, and commentary about the poem, which all required the use of text-based evidence. In these ways, students were reading and writing texts specific to the English language arts content area in ways that promoted disciplinary literacy.

Will the skill students are using or the task students are completing transfer to other content areas and/or their life outside of school? There is high transferability regarding the skills students used in this lesson that includes: (1) text analysis and interpretation, (2) use of text-based evidence in writing, and (3) sharing of opinions. In all academic subject areas and life outside of school, students are continually exposed to a variety of texts. Teaching students to annotate texts is a skill that carries over to other texts. In math, for example, students will need to annotate word problems for keywords before solving. In social studies, annotating the names of significant people and dates of historical events aids students’ comprehension. When reading an article of personal interest, students can annotate it in a way that distinguishes facts from opinions. In all these cases, annotating texts leads to students being able to identify text-based evidence that students will need to complete a task, which is a highly transferable skill.

Are there high levels of student engagement? Throughout this activity, students actively participated while they annotated the text, viewed Hughes’ reading of the poem, and throughout the think-pair-share activity. For example, during the “pair” component of this activity, students were particularly eager to exchange thoughts with their partner. When crafting their responses, students offered each other ideas about the poem and text-based evidence to support those ideas. That way, when...
the teacher progressed the activity to its “share” component, students felt prepared and were excited to offer their responses.

**Method 3: Kahoot as an Anticipation Guide**

I am sitting in the back left of a high school English IV classroom and the 20 students’ desk are scattered about the room – some in clusters, others in a 3x3 desk row formation, and a few just randomly placed in the room. The teacher, who is my intern, is beginning a unit on The Canterbury Tales. Before the lesson, the teacher explains to me that she wants to engage students in the moral issues faced by the characters. To do so, she will use Kahoot (https://getkahoot.com) – a free, web-based resource that uses a game-like format – to engage students. To organize the activity, Kahoot will present a value statement to students (e.g., The purpose of poems and songs should be to teach a lesson, A good story includes a moral, It is not okay to like the antagonist, etc.) and a four-point Likert scale (e.g., Strongly Agree, Agree, Disagree, and Strongly Disagree). Students respond to the prompt by tapping the corresponding Likert scale option that best aligns to their perspective, and Kahoot instantly analyzes the data and reports the responses as a bar graph. The teacher will then facilitate a discussion using preplanned questions.

After the students came into the class and the teacher reviewed the day’s agenda, she prompted students to take out their tablet devices and log into Kahoot using the code displayed on the board. Each Kahoot requires a code. Once ready, the teacher projected the first prompt, “Does a character have to be ethical to be a protagonist?” Students read it, considered it for a moment, and then selected their response. Once all students replied, the response bar graph is shown. The majority of students agreed or strongly agreed with the statement, and the teacher asked, “Why does a character have to be ethical to be a protagonist? What about characters who realized the error of their ways and want to repent? There was a pause while students considered this question (Barnett & Francis, 2012), and then hands shot up. However, before the teacher called on students, she had them write their thought(s) as bulleted lists, journal entries, brainstorms, and any other way they pleased. The teacher explained that she wanted students to first consider their thinking before responding, and pausing to write allowed a mechanism for them to do so (Certo, 2011). After about two minutes passed, the teacher then asked if anyone wanted to share, and the students were more eager to offer their ideas than before the pause for writing. The teacher reminded students to raise their hands and she would call on them because, as she said, “If we all talk at the same time, no one is listening to what we say.” The teacher then called on the first student to share his response, and the class conversation quickly took off.

Students were raising their hands and responding to their classmates while adding their own thoughts. When the conversation started to fizzle, the teacher advanced the activity to the next Kahoot prompt and followed the same procedures, which quickly reignited the discussion. The teacher did this five times before concluding the activity by saying, “These ethical dilemmas are what I want you to consider while we read The Canterbury Tales.”

**Applying the Checklist**

By using Kahoot as an Anticipation Guide, the teacher activated student background knowledge regarding some of The Canterbury Tales’ major themes. This activity resulted in building students’ awareness for these themes, which would impact how they read the text. When analyzing this activity using Effective Teaching Traits checklist, it demonstrates how a pre-reading strategy prepares students for reading in the content area.

**Are students reading and/or communicating texts specific to the content area?** Unlike the other activities where students read a text and then articulated their interpretation of it, this activity activated student schema about the text they would be reading (Ming, 2012). Furthermore, students had to compose a brief text that explained their position regarding their stance as related to the prompt. This activity, therefore, prepared students for the reading while still requiring them to produce a text. In fact, the preparation for reading the text and composition of the text were both disciplinary acts of literacy because students were activating their schema specific to the English language arts content area.

**Are students using technology to collaborate?** Kahoot itself is a website that presented students with the prompts, recorded responses to the prompts, and reported response data as a bar graph. Kahoot then was used as a tool that catalyzed a collaborative activity for the students and teacher using response data.

**Will the skill students are using or the task students are completing transfer to other content areas and/or their life outside of school?** There were two main skills used in this activity: (1) The ability to compose a written justification that substantiates a claim, and (2) The non-hostile exchange of moral/ethical ideas and beliefs with peers. First, being able to justify an opinion with reasoning transfers into all areas of life, including: academic, professional, and personal. Being able to offer a rationale for an opinion lends credibility to the opinion. Second, being able to discuss opinions in a way that promotes shared learning and understanding, as opposed to heated argument, is a skill that serves people well in all areas of life. Therefore, both of the skills used in this activity have high transferability.

**Are there high levels of student engagement?** Students were very engaged throughout this activity. They were excited to read the prompts, compose their responses, and exchange their ideas with classmates. By appealing to students’ opinions about moral topics, the teacher successfully engaged students in the entire activity.

**Discussion**

As students progress into middle and high school, teachers must develop their disciplinary literacy skills, and TPACK provides a frame for having students read and write in the different content areas. Though a quintessential way for using TPACK does not exist, the teachers who planned these activities each aligned their pedagogy, content, and technology usage in a way that interested students while developing their disciplinary literacy skills.
The “Silent Seminar” had students read a content-area article before responding to the teachers’ prompt and their classmates’ responses. The “Musical Think-Pair-Share” allowed students to read and write content-area texts and then share those texts with both their partner and entire class. Finally, the “Kahoot as an Anticipation Guide” activated students’ background knowledge by their responding to prompts first in writing and then by sharing, so they were prepared to read a content-area text. The commonality that cuts across these three activities is that technology is used to spur students’ responses, and the way students responded was specific to the content area while the skill could transfer to other content-areas and be applied to students’ personal and professional lives. In these ways, the activities presented here each were uniquely designed to support students engage and develop their disciplinary literacy skills. Through these activities, and the skills students utilized were transferable to their academic, professional, and personal lives.

Conclusion

As the calls for teaching disciplinary literacy in the content areas continue to get louder and louder, teachers need to use the technology in their schools – whether they work in a 1:1 school where all students are provided technology, only have access to computer carts, or are limited to a projector and laptop – in ways that develops students’ reading and communicating abilities. As they plan these activities, teachers need to be dually aware that the skills they are teaching need not only be specific to their content area but also transferable. It is this “transfer of skills” that teachers must consider and emphasize in their instruction as they work towards preparing all students for academic and career success.

References


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