

Articles

The Problem in Technology Education (A Definite Article)

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As with any field, technology education and its close relatives have numerous strengths and weaknesses. One of these weaknesses has too long been overlooked, and it is the subject of this article. We might think of technology education as empowering students, divergently fostering their own creativity. An abundance of design briefs shows that this field seems to encourage students to develop diverse and creative solutions to technological problems. It is ironic, therefore, that dogmatism is prevalent in the curriculum, literature, and research in technology education. In this sense, *dogmatism* refers to “a positive, arrogant assertion of opinion” (Neufeldt, 1997, p. 404) (if you’ll pardon my arrogant assertion of this claim.)

This article focuses not on larger, overt examples of dogmatism that can easily be spotted, but on small and subtle ones, taking a very narrow approach to attempt to identify some instances of dogmatism in technology education literature by focusing on dogmatic uses of a single English word *the* to falsely imply uniqueness. Illustrative examples are examined with the hope of beginning recognition of this problem by our field. There was no intention to review the corpus of literature in technology education according the classifications of definite articles, though the classification systems can inform the analysis.

Linguistic Classifications of *The*

There are several approaches among linguists in classifying different usage of definite articles. Quirk, Greenbaum, Leech and Svartvik (1985) mention a generic use, as in “The tiger can be dangerous” (p. 265). They additionally suggest the eight categories of non-generic usage of definite articles (pp. 266-270) seen in Table 1. Chesterman’s (1991) approach includes the *sporadic* and *logical* categories within a *non-referential use* category, eliminating the *body parts* category and adding a category of *unfamiliar*, which seems to include

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much of the *cataphoric* category. Epstein (2002) forwarded a framework, suggesting that “familiarity, discourse prominence, role/value/status, and point-of-view shifts” (p. 333) may be fruitful in understanding definite article function, rather than looking at the categories previously mentioned.

Table 1

A definite article classification scheme for non-generic usage from Quirk, Greenbaum, Leech and Svartvik (1985, pp 266-270)

Category	Description	Example
Immediate situation	the listener is in the same context	“Have you fed the cat?” [said to a housemate]
Larger situation	a shared understanding of context	“the last war” [said to a compatriot]
Direct anaphoric reference	previous reference had been made	“John bought a TV and a video recorder, but he returned the video recorder.”
Indirect anaphoric reference	an association to a previous reference	“John bought a bicycle, but when he rode it one of the wheels came off.”
Cataphoric reference	later information provides the meaning	“The president of Mexico”
Sporadic reference	reference to an “institution of human society”	“My sister goes to the theatre every month.”
“Logical” use of “the”	a logical interpretation due to uniqueness	“When is the first flight to Chicago tomorrow?”
Use of “the” with reference to body parts		“Everyone gave us a pat on the back.”

Note: descriptions are paraphrased.

One sense of uniqueness is not that the referent is the only example, but that it is the only important example. This is connected with an *emphatic usage* of *the* noted by Christopherson (1930), where a long vowel sound is sometimes, although not always, emphasized to provide contrast to indefinite article usage; “it means not merely ‘the X you know,’ but ‘the only X worth knowing’” (p. 111). There are examples outside the field of technology education, such as the name of *The Ohio State University*. Within technology education, emphatic usage of *the*, possibly without the long vowel sound, is seen in the title and subtitle for a journal of the International Technology Education Association, *The Technology Teacher: The Voice of Technology Education*. Such usage seems quite appropriate from a marketing stance where a money-making entity suggests that whatever competition may be offered is not worthy of attention. Not far behind was the crafting of the name, *Project Lead The Way*, which carries a different connotation than would *Project Lead One of Many Ways*, *Project Lead Some Way*, or *Project Lead a Way*. Were crafters of these titles aware of subtle

implications in using *the*? One would suppose. As we move from marketing and manipulating the consumer to instead focus on teaching and learning, we again find instances of an emphatic *the* effectively and appropriately used by MacDonald & Gustafson (2004), for example, when they state: “Smith (2001) suggests that too much emphasis on representation, i.e., the perfect drawing, could restrict opportunities for discovering new ideas” (p. 56). It is ironic that the title of their work was “The role of design drawing among children engaged in a parachute building activity,” implying that there was only one role and their research would uncover it. But this moves us from a discussion of an emphatic usage to a notion of unique identifiability.

Some usage of *the X* connotes: *There exists an X; this X is the one and only X*. *The* is used effectively and appropriately to convey uniqueness in statements such as “The committee chair casts a vote only to break a tie.” Sometimes we use *the* without conveying uniqueness: “Don’t mar your wood, Roberta; the nailset is used to set a finish nail,” but of concern here are uses that do convey uniqueness, but maybe should not. Richard Epstein (2002) suggested that definite article usage is not a simple matter of reference, but instead that “speakers/writers frequently manipulate the meanings of words like ‘the’ in order to achieve all sorts of rhetorical effects” (personal communication, September 19, 2009), and that they “commonly construct discourse referents under distinct conceptual guises for various communicative and rhetorical purposes – through, amongst other things, their choices of articles – rather than introducing referents into the discourse in a neutral, homogeneous fashion” (Epstein, 2002, p. 335).

Even though no attempt is made here to classify definite article usage in our field according to any of these frameworks, since none seems to include the particular usage of interest, these schemes do point to a critical factor concerning definite article reference function; as with other issues in communication, the cognitive framework of the speaker and that of the listener are of concern. Without some degree of shared understanding or familiarity with the referent, communication would be very difficult. Tied to this are the speaker’s assumptions about the listener and the listener’s assumptions about the speaker, as shared understanding can be impacted by the correctness of those assumptions. The listener’s prior understanding of a referent might be assumed by the speaker, correctly or incorrectly, in *immediate situation* and *larger situation* usage, or the speaker not making such an assumption may take care to provide the additional information to achieve shared understanding, as in the *anaphoric*, *cataphoric*, and *logical use* examples.

Critical questions about the speaker’s understanding include:

- Does the speaker believe the referent is unique?
- Does the speaker believe the referent is non-unique?
- Does the speaker believe neither that the referent is unique nor non-unique?

The speaker's actions raise questions:

- Does the speaker state or imply uniqueness?
- Does the speaker state or imply non-uniqueness?
- Does the speaker state or imply neither uniqueness nor non-uniqueness?

Regardless of whether there was a conscious implication on the part of a speaker, there may or may not have been corresponding inference made by the listener, so we should ask:

- Does the listener infer uniqueness?
- Does the listener infer non-uniqueness?
- Does the listener infer neither uniqueness nor non-uniqueness?

Even if an inference is made, it might not alter the listener's belief, so we might finally ask after listening:

- Does the listener come to believe the referent is unique?
- Does the listener come to believe the referent is non-unique?
- Does the listener come to believe neither that the referent is unique nor non-unique?

This listing allows for an intention from the speaker that may be misinterpreted by the listener. That is, a teacher can believe there are many forecasting methodologies, and not want to imply there is just one method, but refer a particular method using the phrase, "the forecasting method assumes a linear trend," meaning, "the example shown in this week's reading assumed a linear trend," but a student could understand the teacher to mean "This is the only forecasting methodology, and whenever you forecast, you must assume a linear trend." The teacher's reference was likely *immediate situation* and *anaphoric*, whereas the mistaken listener believed the teacher to use a *logical* function of *the*. The teacher had made an inaccurate assumption about the listener in this situation. There are implications here for actions to prevent giving precisely the wrong understanding by altering a choice to use a definite article. A listener may have been primed for a *cataphoric* use, when the speaker instead was using a *larger situation* use, although the listener was not aware of the required background information to make sense of that use.

More serious is where the speaker purposefully uses language to imply the reference is unique when in fact it is not. A common cause for this may be traced to the speaker's own education, where such a misunderstanding may have been propagated. Implications for action here would be to seriously call into question the possible inaccuracy of one's content and schemes. It could be that a descriptive model was inappropriately used prescriptively, or that one just never bothered to question some basic assumptions.

Falsely Implying Uniqueness in Technology Education

Of interest here is where there is a false implication or inference of uniqueness in technology education's language conveyed by definite article usage. While there may be examples where we could suspect the speaker's or writer's motive, it seems likely that most such instances may occur where the

speaker or writer is unaware their words convey a false sense of uniqueness. As often happens, I noticed this problem in my own teaching and writing before observing it in our field. I found myself teaching students about “the five families of materials,” “the six types of material processing,” “the definition of technology,” “the rules for brainstorming,” “the environmental impacts of our obsession with lawns,” and “the way to cite a journal article.” But are there exactly five families of materials, and are these five *the* five? In each of these instances, I seemed to be attempting to convey to students that one particular model, list, or procedure was the only (or the only important) model, list, or procedure, and they had better learn it. But even if I did not intend to convey this uniqueness, it is understandable for some listeners to have inferred it; after all, a speaker could have chosen some alternative phrase to “the five families of materials are,” such as: “One classification of materials uses the following five families.” If I teach students “The definition of technology is...” it conveys something different than had I said, “A definition for technology is...”

Technology education is not alone in receiving such criticism. Fendley (2009) opened his critique (in science) with:

In a 2006 book that garnered much press for its silly attacks on string theory, author and physicist Lee Smolin provides a list of "The Five Great Problems in Theoretical Physics." There are many offensive things about this list, starting with the use of the definite article in the title, which implies that people not working on these problems (the majority of theoretical physicists) are working on less-than-great problems. (p. 32)

Within technology education, a few key cases concerning questionable implications of uniqueness in definite article usage are found not just in a single author's work, but in some phrases common to the field.

The Universal Systems Model

Based on an Industrial Arts Curriculum Symposium at Jackson's Mill, West Virginia, Snyder and Hales (1981) wrote, “To assist in understanding the construct ‘system’, a universal model of a system is presented in Figure 4” (p. 10). After a graphic showing only four terms (input, process, output, and feedback) with arrows and boxes, there was additional discussion of “the universal systems model.” Article usage did not carry an assumption or implication that this was the only model, since the initial mention used an indefinite article, with the definite article used afterwards in *anaphoric* reference to that which had been presented: “the [*this*] universal systems model.”

Since that time, others have used “the” seemingly to indicate that there exists only one such model; a search on Google for “the universal systems model” resulted in 21,800 hits (but fewer than 100 for “a universal systems model.”) A typical hit is a sample from the ITEA 8th grade course on technological systems (ITEA, 2006), where students “should look at the parts that make up these systems, the intended purpose, and categorize the parts as inputs, processes, outputs, and feedback, according to the universal systems model” (p. 27). Georgia State Standard ENG-FET-3 states, “Students will

explain the universal systems model” (Georgia Department of Education, 2007, p. 1). These are not anaphoric references to that which was previously presented, but instead seem to imply there is only one model. But even where an indefinite article is used, a convergent and perhaps dogmatic approach can sometimes be seen, as with one of the learning standards technology teachers in Massachusetts use for Technology/Engineering in Grades 6-8: “2.6 Identify the five elements of a universal systems model: goal, inputs, processes, outputs, and feedback” (MA Dept of Ed, 2006, p. 87). Ironically, the model Snyder and Hales presented had four elements, not five. McCarthy (2009) left out the article altogether, though seemed to convey deference to “the universal systems model” when he shared something titled “Universal cover sheet” that included input, process, output, and feedback (p. 21). Could it be that as a profession, we have *input* a creative bit of descriptive modeling, *processed* it by reinterpreting this to be the one and only model for systems, which we then *output* to others in a way that asks them to memorize, list, and apply rather than to critique and ideate? Would it not be more intellectually stimulating to encourage our students to ask why this is a systems model since it does not seem to model a solar system, a system of language, a monetary system, or a number system, but instead only models processes? *The* is a symptom of a larger problem that can emerge without *the*, aided in this case by the word, *universal*: an attitude of dogmatic adherence rather than inquiry. One of the participants at Jackson’s Mill recently suggested our field question this model:

During the 1980s and 1990s, the Input-Process-Output Model for technological systems was very popular in curriculum design. With the goals discussed above, this model is probably not as appropriate as it once was. (Ritz, 2008, p. 62).

One could argue that our field has stipulated a definition for *the universal systems model* and the reference is unique, regardless of the fact that this might be neither universal nor a model of all systems, and regardless of the existence of other types of systems models. Language could purposefully be misused in this way, and there are precedents. Some say the Dow Jones Industrial Average is neither industrial nor an average, just as we could suggest that the Technology for All Americans Project (ITEA, 1996) did not mean *technology* but *technology education*, did not mean *all* but *K-12 public school students*, and did not mean *Americans* but *resident citizens and legal resident aliens in the USA*. An argument could be made that *technological literacy* should refer to the abilities to listen, read, speak, and write with understanding concerning technology, and that possibly for reasons of persuasion, the term *literacy* was used to mean something very different in *technological literacy* than it does in *French literacy*. It is clear that language can be used to persuade people to act, or to ask them to rally around a cause, as in *Technology Education: The New Basic*. But when we are teaching and researching, clarity and accuracy ought to be more important than persuasive or flowery rhetoric, especially if our teaching and research are to have credibility.

The Problem-Solving Process/Approach & The Design Process

How many approaches are there to solving problems? How many steps are there in different problem solving processes? Parnes (1963) suggested an approach to problem solving that had six steps, while Hutchinson and Karsnitz (1994) described a nine-step approach. A problem of how to get your friend's attention can likely be solved in one step (such as "saying your friend's name") but processes for solving environmental problems resulting from overpopulation are complex, convoluted, and certainly not easy to solve with any single prescribed method. It is true that one can take *an inquiry approach* to a problem, as one can take *a problem solving approach* to a situation. However, just as with *the universal systems model*, some in our field, I among them, have been guilty of dogmatically forwarding statements that seem to imply there exists only one problem solving process, or only one that is worth knowing.

As was mentioned, where a model or process was just introduced, we can make an anaphoric reference back to that model as *the model* or *the process* meaning *the one I just mentioned*. Too often, our literature discusses *the model* or *the process* where there was no initial introduction of *a model* or *a process*, as in the first sentence by Daugherty and Mentzer (2008): "This synthesis paper discusses the research exploring analogical reasoning, the role of analogies in the engineering design process..." (p. 7). This even emerges in the design of research instruments (e.g., "Holistic scoring (points awarded for each stage of the problem solving process)" (Boser, 1993, p. 19); "Steps that comprise the problem solving approach are clearly defined and practiced in a microteaching environment" (Boser, 1993, p. 21); and "Competency: Applying the engineering design process" (Rogers, 2006, p. 73)). Sometimes, a single work switches between an apparent implication of uniqueness and an apparent implication of non-uniqueness. For example, Olowa (2009) studied "the effectiveness of the problem solving approach..." in secondary school agricultural education (p. 37), and employed *the* thusly in both the title and the statement of purpose for that study; however, the article's running head was "Effects of Problem Solving Approaches," which sends a different message regarding uniqueness. To be fair, the title of the work included "the problem solving and subject matter approaches" though the running head, for brevity, displays an alteration to the implication concerning the number of problem solving approaches.

Hanson (1993) suggested that there are advantages to dogmatically presenting students with a single process, though not in those words: "It is quite a comfort for students to discover that the problem solving process has a set of universal steps and that the process involves the development of knowledge parallel to that developed through, for example, the scientific method" (p. 26). It is likely a comfort for teachers and teacher educators to become attached to only one of many approaches, as it protects us from having to question our assumptions and our knowledge. Even though belief systems can provide comfort, we are not there for student or teacher comfort. Our tendency toward procedure-based instruction could shed some light here; an association of "steps"

in teaching design and problem solving may be too strong in our field, as Lewis (2005) suggested, and this association could be too dogmatic:

The problem for the field of technology education in the United States and elsewhere is that the overt description of the stages of the design process, observable when engineers do their work, has become the normative design pedagogy. This stage approach runs the risk of overly simplifying what underneath is a complex process. (p. 44)

When I was presenting a new course on technology assessment to colleagues, one of them kept quizzing me, “But what is the technology assessment methodology?” I shared with him that formal technology assessment has made use of a variety of methodologies depending on the goals at hand and the nature of the information, though I suspect this was an unsatisfying answer. We crave to have a known list of procedures, and we classify that list as curricular content. We may feel that unless we can recite a single sequence of steps, we do not know a process, and therefore we do not have knowledge. Of course, sometimes there is a single sequence of steps, and to suggest otherwise would be inaccurate. But where there exists more than one viable list of steps and we incorrectly imply in speaking or infer in listening that there exists only one list, there is a problem. It is ironic that our educational mission seems to embrace a divergent view of student learning and performance, but some items of curricular content are inappropriately approached convergently, even by experts in the field.

One alternative would be to forward *a process*. ITEA (2007) *Standards for Technological Literacy* lists Benchmark 8H, which states that, “The design process includes...” (p. 97), and then lists twelve separate processes, apparently in order. This is only marginally better as it does not imply that other processes are specifically excluded, though using *the* still conveys a belief that these twelve are required in order for something to be classified as an example of *the design process*. We are then told that “the design process is a systematic, iterative approach to problem solving that promotes innovation and yields design solutions” (pp. 97-98). But what if the very first design solution one attempted happened to be optimal, and there was no need for iteration? Would that mean that this was not an example of *the design process*, since iteration was not a characteristic? As was seen earlier, definite article usage is not the entire issue here, but instead there is an underlying dogmatic proposition refusing to acknowledge alternatives, even though alternatives exist. So while we sometimes use *the* without realizing that readers and listeners could incorrectly infer uniqueness, at other times we use *the* or other linguistic devices to overtly imply incorrect uniqueness.

Other

There are other examples from our field. Aside from uniqueness, definite articles can be used to communicate number. When used with singular nouns, *the* typically conveys singularity. When used with plural nouns, there may be an implication of *all*. For example, Gray and Daugherty (2004) first state, “The

purpose of this study was to identify effective recruitment techniques....” (p. 7), seemingly implying *one* purpose and *some* techniques. But they then pose as a research question, “What are the effective recruitment techniques...” (p. 7), which suggests a task to uncover *all* of the techniques that are effective, in a parallel to definite article usage in: “Have you memorized the state capitals?” A classic form for experimental research is to look at *the* effect of *x* on *y*, but maybe it should be to uncover *critical effects, important effects, or whether any effect could be found.*

Conclusion and Recommendations

While it is not unique to technology education, this field has a *the* problem. We sometimes inappropriately use the definite article to falsely imply uniqueness. At other times, listeners or readers may incorrectly infer uniqueness because we have used *the* even when we did not mean to imply uniqueness. At first, definite article usage may seem a silly, petty, and empty concern: surely there are bigger and more important issues for our attention. Actually, inappropriately communicating uniqueness with *the* is better classified as a symptom than a problem; an underlying problem here is our understanding. Our language choices can communicate an inaccurately narrow connotation. Where this is unintentional, greater awareness of language use specifically attending to this problem may be a solution. Technology education seems to be a profession that has embraced dogma. There is a creed stating “this we believe...” from a premier association (ITEA, n.d.). Why is there such a need to believe? Why do we have difficulty deferring judgment and admitting alternatives? Can we overcome the appeal of comfort brought by satiating our need to believe?

One solution to the problems mentioned concerning definite article usage and the bigger issue of dogma is to question our assumptions, even at the expense of our comfort. A teacher or speaker who is about to state “The five types are...” could first reflect, asking herself or himself if this classification scheme has alternatives, then if these five types are mutually exclusive and exhaustive. Questions such as “Might there exist a sixth type?” and “Could types 1 and 4 be the same?” should be entertained by the speaker prior to such an assertion and encouraged in the listener. We should take advantage of instances where *the* might be used to inappropriately imply uniqueness as beacons, prompting us to ask questions about our assumptions and implications, and asking us to consider the listener’s or reader’s understanding and what they infer from our use of *the*.

There is a parallel with sexism in language. Decades ago, using *man* to refer to humans and using masculine pronouns to refer to one of unknown sex were acceptable and taught, though this was discouraged in our profession as early as 1985 (Boben). Those who were slow to adopt sex-fair language may have thought sexist language to be a non-problem that was a silly, petty, and empty concern of others. Using the word *guys* to refer to a mixed sex group is not merely a problem of language usage, but instead reaches to our basic systems of values and beliefs. We may not be conscious of our implication that this is a field

best fit for *guys*, but others could bring it to our attention that this is the message they heard from our use of that word. Learning that offensive language is determined by the listener rather than the speaker is a lesson that parallels definite article usage and dogmatism, where we might not intentionally imply false uniqueness, but our words might convey just that. Because language use and belief systems are so ingrained in who we are, we should not expect to eliminate sexist language or inappropriate, unique implications of *the* from our field in a short time.

Perhaps when we make a conscious effort to reduce our own use of sexist language, we become less sexist in our thinking and our belief systems, and in so doing we encourage this in others. If we become aware of dogmatism coming across in our language, and we then take steps to avoid that dogmatism, are we becoming more open-minded and encouraging this in others? With careful attention by a few, and assistance by them in spreading this attention to others, we may be able to effect a systemic change in our field and beyond concerning not merely definite article usage, but dogmatism and open-mindedness. It is about how we think, not about our use of a little word. It is a question of convergent or divergent thinking. It is an issue of accuracy, and the courage and humility required to admit that there are alternatives to what we are claiming to be knowledge.

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