

RUNNING HEADER: What *Should Be* the Content for Student Learning?

What *Should Be* the Content for Student Learning?

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Abstract

Content in education is typically conceived as subject matter, often divided into disciplines such as mathematics, English, history, science, geography, and so forth. Content is often further conceived as being embedded in media such as textbooks, handouts, movies, computers, posters, and bulletin boards that are used in the context of classrooms inside school buildings. I present Steiner's alternative conception of content, namely that of schemata for cognition, intention, and emotion, which stand in contrast to traditional notions of subject matter. I further distinguish *signs* of content from content as objects themselves, as does Peirce. I discuss Maccia's epistemology of educational objectives that includes 9 kinds of knowing: recognitive, acquaintive, and appreciative 'knowing that one'; instancial, theoretical, and criterial 'knowing that'; and protocolic, adaptive, and creative 'knowing how'. Next, through retroductive reasoning, I extend content objectives to include formation of affective (emotional) and conative (intentional) mental structures. Finally, I briefly discuss the theory of Totally Integrated Education (TIE) as a way to characterize the educational aim of guiding students to form strongly connected cognitive, conative, and affective mental structures. Instead of conceiving subject matter as acquiring knowledge within extant disciplines, I argue that educational content should be considered with respect to student mental structures that are expected to result from teaching and learning activities. This stands in stark contrast to "covering the content" presented in printed textbooks and other media.

1. What is Content?

The great American philosopher of education, John Dewey, discussed the typical conception of the primary aim of education as:

... the formation of mind by means of a *subject matter* presented from without (p. 69, italics added) ... In the traditional schemes of education, subject matter means so much material to be studied. Various branches of study represent so many independent branches, each having its principles of arrangement complete within itself. History is one such group of facts; algebra another; geography another; and so on till we have run through the entire curriculum (p. 134).... [Subject matter] consists of the facts recalled, read, and talked about, and the ideas suggested, in course of development of a situation having a purpose. (1916, p. 180)

Dewey (1916) further lamented that:

... the bonds which connect the subject matter of school study with the habits and ideals of a social group are disguised and covered up. The ties are so loosened that it often appears as if there were none; as if subject matter existed simply as knowledge on its own independent behalf, and as if study were the mere act of mastering it for its own sake, irrespective of any social values. (p. 181)

Elizabeth Steiner (1988), another great American philosopher of education, logically characterized *content* as one of the components of an education system. From a general systems perspective, she contended that:

Education is defined as a system consisting of subsystems of teacher (T), student (S), content (C), and context (X).... Learning is defined as psychical development [which is]

formation of mental structures. *Content* is defined as structures for psychical development [which are] either cognitive (CG) or conative (CN) or affective (AF). (p. 40, italics added)

Based on George Maccia's (1973; 1987; 1988) conceptions of knowing, Steiner (1988) further described cognitive mental structures as being "schemata for thought which are either quantitative (QN) [theoretical] or qualitative (QL) or performative (PF)" (p. 41). Steiner (1988) further defined conative structures as "schemata for volition", and affective structures as "schemata for feeling" (p. 42).

In discussing Elizabeth Steiner's conception of education and the role of content, I previously wrote:

Education cannot occur without content. The content is what is shared between successive generations. Students must interact with content in order to construct understandings and their personal values and beliefs. Content is not just math, English, or biology. And content is not found in books or computer programs or on the television screen either. Content is the stuff of human thoughts, ideas, aspirations, feelings, and attitudes. What is found in media such as books and TV are *representations of content*. The content may be symbolically coded in language only, or it may be conveyed through drama, for example. (Frick, 1991, p. 15)

Building on these conceptions of education and subject matter in educology, content is defined in educology as "signs of objects and objects selected for student learning" (Educology, 2018, <http://educology.indiana.edu/content.html>).

Charles Sanders Peirce's (1932) semiotic theory clarified the nature of signs:

A sign, or *representamen*, is something which stands to somebody for something in some respect or capacity.... every representamen being thus connected with three things, the ground, the object, and the interpretant (2:228).... The Sign can only represent the Object and tell about it. It cannot furnish acquaintance with or recognition of that Object; *for that is what is meant in this volume by the Object of a Sign; namely, that with which it presupposes an acquaintance in order to convey some further information concerning it* (2:231, italics added).

In summary, the content for learning may be represented with signs only, or may be the objects themselves with or without mediation by their respective signs. In education, students are expected to form mental structures (i.e., learn) through interaction with content in a context. What those mental structures *should be* is part of the philosophy of education, namely *worthwhile* education.

George Maccia (1973) developed an epistemology of educational objectives, which he further refined and described in 1987 and 1988 (see Frick, 1997). Central to Maccia's argument is that students should not only come to 'know that' but they should also come to 'know that one' and to 'know how'. Maccia (1987) particularly emphasized the importance of qualitative knowing ('that one'). These types of knowing are briefly described next.

2. Typology of Cognitive Structures

Overview of Types of Knowing

There are three fundamental types of cognition: 1) 'knowing that one', 2) 'knowing how', and 3) 'knowing that' (Brown, 1972; Estep, 2003, 2006; Frick, 1997; Geach, 1964; Maccia, 1973, 1987, 1988; Ryle, 1959; Sheffler, 1965). Clearly, these three classifications of cognition are *not exclusive* in the sense that two or more of them can occur at the same time within an individual. For example, in Figure 1, the person knows his dog, Rover, as that-one (this particular unique dog), how to give Rover a bath, and Rover as an instance of the classification, 'dog' ('know that').

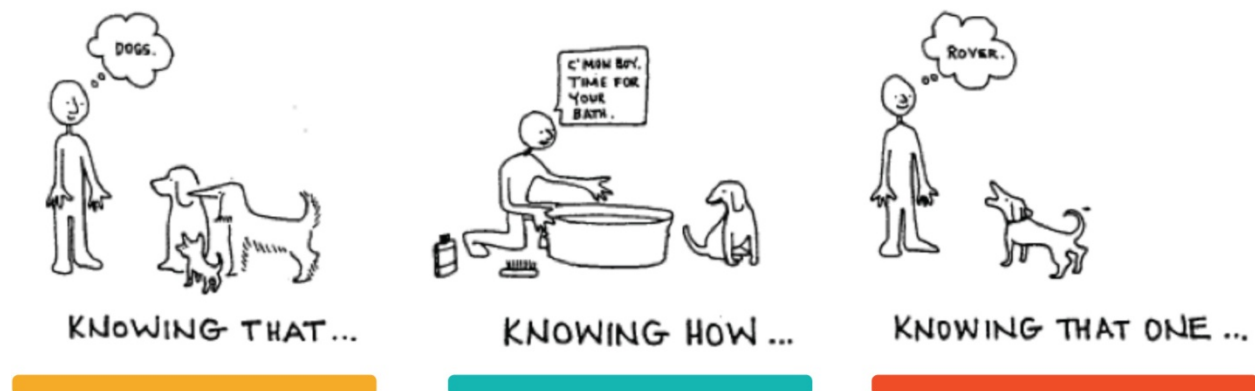


Figure 1. Three basic kinds of knowing (drawings by Elizabeth Boling)

On the physiological level, mental structures are encoded through neural connections in the nervous system (Kandel, 1989; 2001; Squire & Kandel, 1999). Steiner (1988) defined learning as the “formation of mental structures” (p. 40), further characterized as cognitive, conative, and affective mental structures. Since one’s knowing consists of cognitive mental structures that are not directly observable by another person, it is necessary to identify

indicators or signs of such knowing. We can observe the actions of another person, which indicate what she or he knows, wants, and feels. These may be evident from observing this person carry out some task, from examining a product resulting from this person's activity, and from examining signs this person uses and creates (icons, indices and symbols) during that activity or in that product. Estep (2006) refers to such indicators as:

signs of intelligence ... [which] include the broader realm of three-dimensional patterns of sign-making, sign-exhibiting, and sign-disclosure of dynamic intentional doings.... Three-dimensional signs such as signals and cues, include gestures (as with hands), but also full-body doings such as tasks or other performances.... These sign categories ... span all sensorimotor capacities, including visual, auditory, olfactory, gustatory, and somatosensory categories (including touching, moving, and proprioception). (pp. 38-39)

As an example, near the end of physicians' medical education, they become interns where they practice medicine with actual patients and their maladies. They are supervised and observed by teacher-physicians who are already licensed for practice, and who provide further coaching and feedback to these student-physicians-to-be. These physician-coaches can infer from observation whether or not their student interns are making proper diagnoses, ordering appropriate medical tests, and carrying out appropriate treatments. In short, the *test* is a method by which a teacher can unambiguously infer student mental structures from observable indicators under appropriate conditions. Tests are not restricted to answering questions or solving problems. Such exams are just one kind of indicator.

In discussing pedagogical epistemology, Maccia (1973) referred to tutorial conditions of knowing:

... knowing is viewed in light of tutorial requirements. Only those knowings to which a teacher has access, which a teacher can bring to a learner, and which a learner can communicate in some way to a teacher are taken seriously. (p. 1)

There may be other kinds of student knowing to which teachers have no access when observing and communicating with students. For example, Polyani (2015) referred to "tacit knowing," which essentially meant private, personal knowing not sharable with others as intersubjective signs. Similarly, student feelings and intentions may be tacit, unavailable to their teachers.

Without further digression here, if teachers have no way to tell if students have achieved such unobservable kinds of knowing, then these kinds of knowing are excluded from educology. This is why Maccia referred to tutorial conditions of knowing in further explicating his pedagogical epistemology (e.g., Maccia, 1987, 1988). Note that his categories within 'knowing that,' 'knowing that one,' and 'knowing how' were refined between 1973 and 1988.

Kinds of knowing are based on Maccia's pedagogical epistemology, Estep's (2003, 2006) evidential arguments about natural intelligence (in particular, knowing how), and Frick's (1997) discussion of issues in artificial intelligence. Nine kinds of knowing are outlined below:

1. **'Knowing that one':** what are indicators of *'opinion'*—is it right?
 - 1.1. *Recognitive:* select the unique Q from not- Q and not- Q from Q .
 - 1.2. *Acquaintive:* identify relations determinate of the unique Q .
 - 1.3. *Appreciative:* identify relations appropriate of the unique Q .

2. **'Knowing how'**: what are indicators of *'performance'*—is it effective?
 - 2.1. *Protocolic*: take one path to goal; inflexible, duplicative doing.
 - 2.2. *Adaptive*: take alternative paths to goal, choosing or combining paths based on specific conditions.
 - 2.3. *Creative*: innovate or invent a new way to reach an existing or new goal.
3. **'Knowing that'**: what are indicators of *'belief'*—is it warranted by disciplined inquiry?
 - 3.1. *Instantial*: classification of objects of the same kind.
 - 3.2. *Relational*: rational explanation of relationships between kinds of objects.
 - 3.3. *Criterial*: rational judgment of kinds of objects and their relations according to a norm.

Norms for evaluating these kinds of knowing are indicated by the questions following each of the three major types. For 'knowing that one', *right opinion* is essential. For 'knowing how', conduct must be *effective*. For 'knowing that', beliefs must be *warranted by disciplined inquiry*. Clearly, some opinions are not right, some actions are ineffective, and some beliefs are unwarranted.

Note that within each type of knowing, each higher level requires the lower level. Appreciation requires acquaintance, and acquaintance requires recognition. Creative 'know how' requires adaptive 'know how' that, in turn, requires protocolic 'know how'. Criterial knowing requires relational knowing, and relational knowing requires instancial knowing. In other words, within each classification of knowing, the categories are progressively inclusive.

The types of knowing are not mutually exclusive. We can 'know that one', 'know how' and 'know that' with respect to some object. This is illustrated in Figure 1, where the dog Rover, is the object of 'knowing that one', 'knowing how', and 'knowing that'.

3. Typologies of Conative and Affective Mental Structures

Maccia's typology for cognitive structures is used here as a starting point for classifying conative and affective structures.

Uniques

Conative structures can have objects, just as cognitive thoughts. For example, a person can want a particular thing, such as MacBook computer, or to be friends with a unique person such as Cesur Dagli. Similarly, one can have feelings towards that MacBook or Cesur.

Universals

In contrast to uniques, there are classifications of universals. For example, 'justice' is a universal (general). One can seek justice as a goal. This would be a conative structure. A student could develop mental structures for good feelings about justice, and bad feelings about injustice.

Means to Ends

In contrast to 'that one' and 'that,' there are 'means to ends'. For example, the Mac operating system is a means to launch apps, print documents, do text messaging, etc. One might want to use the Mac OS. One might also feel satisfied and delighted using the Mac OS. Hence, there may be conative and affective structures for ways of doing things.

Content as Conative and Affective Structures

In addition to cognitive mental structures, content in education should include goals for students to develop conative and affective structures. Students should learn more than just ‘knowing that one,’ ‘knowing that,’ and ‘knowing how.’ They should also form moral intentions and good feelings about those respective objects of cognition.

4. Summary

Content as typically conceived is the subject matter of education, often contained in textbooks, movies, posters, and more recently within software apps run by computers, tablets and smartphones. This chapter has, hopefully, dispelled this limited conception of content, largely based on arguments made by Dewey, Steiner, Maccia, and Frick (see the Educology Website: <http://educology.indiana.edu/>). I have further alluded to *conative* and *affective* schemata for student learning as Steiner (1988) described. Conative and affective mental structures are also important content for student learning.

The theory of Totally Integrated Education (TIE) is built on well-defined terminology from educology (Frick, 2018). Central to TIE theory is the premise that, to the extent that student mental structures are formed which integrate cognition, intention (conation), and emotion (affect, feelings), then student learning will be stronger and more holistic. In TIE theory, strong and whole mental structures (i.e., integrated) are predicted to be less vulnerable to forgetting. See Figures 2 and 3.

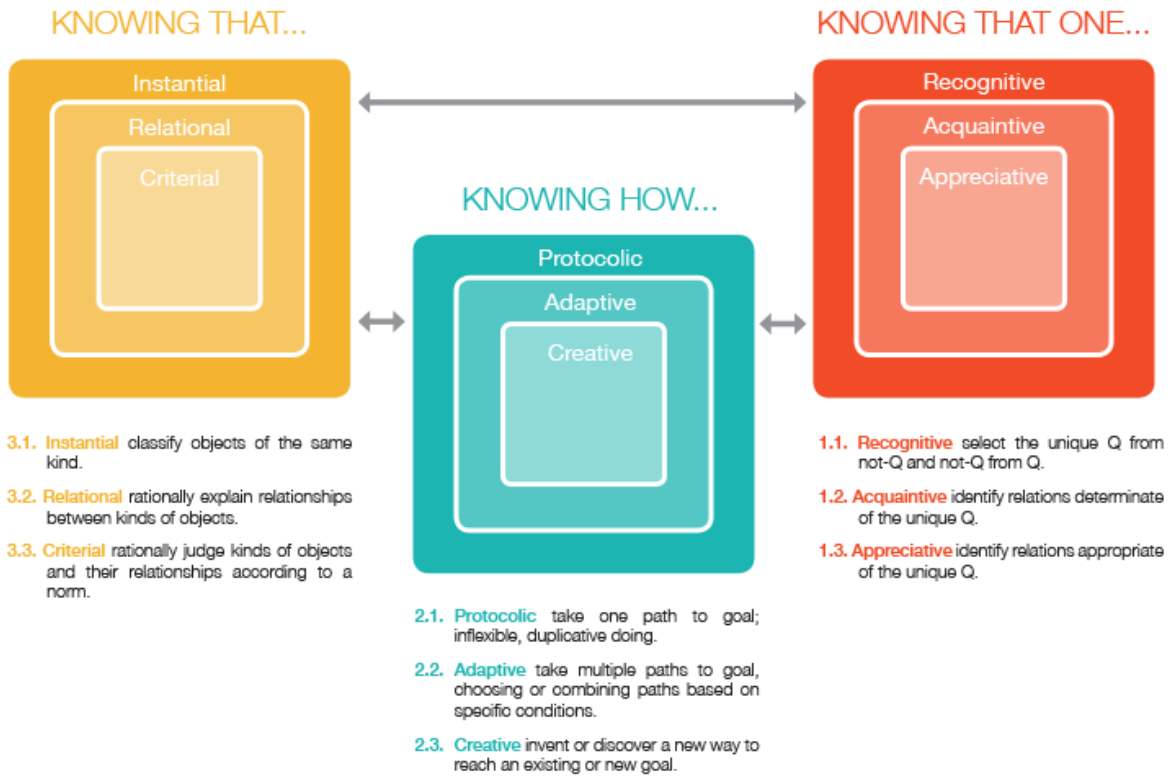


Figure 2. Illustration of integration of 9 kinds of cognition. Graphic by Colin Gray and Theodore Frick. Reprinted with permission from Frick, 2018.

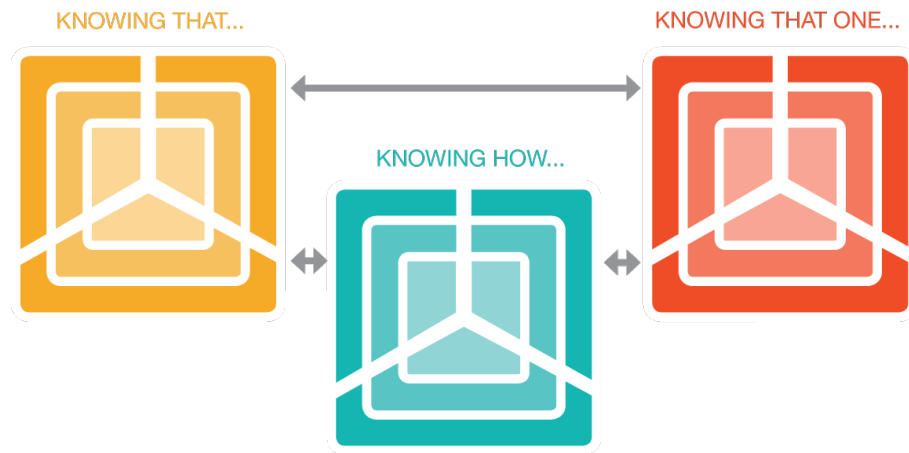


Figure 3. Illustration of totally integrated education, where cognition, intentions and emotions are completely connected. Graphic by Colin Gray and Theodore Frick. Reprinted with permission from Frick, 2018.

5. Conclusion

Worthwhile content in education is what students *ought* to learn. With respect to types of knowing, teachers should select the best of culture and lead students to:

- Knowing that: mental structures for beliefs that are warranted by disciplined inquiry;
- Knowing how: mental structures for effective performances which are ethical; and
- Knowing that one: mental structures for right opinions, where students learn to appreciate unique elements of their culture. (Educology, 2018, <http://educology.indiana.edu/worthwhileContent.html>)

In other words, students should learn to “tell right from wrong,” “distinguish opinion from truth,” and “to appreciate beauty” (Frick, 1991, p. 32).

If we pursue totally integrated education (TIE), *student learning will be grounded*. Grounding of knowing, feeling, and intending is vitally important. Students who are

grounded are less easily deceived and misled by others who are ignorant, prejudiced, or who intentionally lie or distort truth. Students who can think critically become responsible participants in a democratic society. Critical thinkers will not allow religious leaders, tyrants, shysters, or slick politicians to control us and tell us what to believe, feel, or to do.

In conclusion, everyone has a right to a worthwhile education that will:

- enhance the quality of life,
- reduce inequality,
- minimize suffering, and
- maximize overall good.

(Educology, 2018, <http://educology.indiana.edu/we2.html>)

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