

Educology Is Interdisciplinary: What Is It? Why Do We Need It? Why Should We Care?

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Abstract

Education provides guided and intended learning across various human disciplines. The result of disciplined inquiry about education is distinct from the process of education itself. If adequate, educational research should result in knowledge about education—that is, educology. Educology is needed to improve education, in contrast to trial-and-error approaches. Not only should education become more effective, it should also become more worthwhile. Worthwhile education is needed to improve the quality of life for everyone everywhere.

Key words

Educology, knowledge, education, learning, knowing, theory, effective education, worthwhile education.

1. Introduction

Learning is a phenomenon that occurs across various domains of knowledge. Learning further spans disciplines that are formally focused on learning—including psychology, brain science, educational psychology, education, learning and instructional sciences, and instructional design.

Learning is a phenomenon that even spans biological species. Not only can human beings learn, but also dolphins, dogs, and donkeys.

Furthermore, what is the difference between learning and education? Between education and schools? Education and professional training on the job? Learning and human performance improvement?

We have different words and phrases—let alone expressions in different languages and cultures—that can mean the same thing. Worse, the *same* word can have *different* meanings, depending on the context in which it is used. Then consider fake news, outright lies, and falsehoods—in contrast to truth (e.g., see Kakutani, 2019).

Unfortunately, we have a lexicon in education and educational research that is reminiscent of the biblical “Tower of Babel”

(https://en.wikipedia.org/wiki/Tower_of_Babel). How can we sort this out? We need an interdisciplinary field that spans various specialized domains of knowledge and that is well-defined.

What we need is ‘*educology*’ (Frick, in press; Steiner, 1981).

2. What is *Educology*?

Educology is ‘*knowledge of education*’. Sounds almost self-evident but is profound—if we are precise about what is *knowledge* and *education*. The difference between schooling and *education* is but one example of how *educology* can make clearer what we are talking about when we lament problems we see in our schools, and what to do about these problems.

I am using italics to identify terms in this chapter that are defined more precisely than common usage would typically indicate. I have created a growing and evolving website which provides a glossary of proper terms, definitions, and examples of *educology* at: <http://educology.indiana.edu>. The intent of this *Educology* Website is similar to *Stedman’s Medical Dictionary* (Stedman, 2006) and *Terminologia Anatomica* (FCAT, 1998) which define terms used in medical science, anatomy, and physiology.

Without *educology*, educators and others will continue to talk past each other, much as in the biblical story about the Tower of Babel. The language we typically use in talking about *education* is imprecise, and so we literally often do not understand what each of us is talking about—because the same words refer to different things. For example, you are talking about a *student*, meaning she or he is a young person who attends a school or university, and I am thinking about a *student* as being a person who intends to *learn* under the guidance of another—she or he does not have to be in school or college, nor young, nor inside a building, nor guided by a state-licensed *teacher* or a college professor. We may both use the same words, *student*, *teacher*, and *learning*, but we mean different things.

Unfortunately, we may think we are talking about the same thing, when in fact we are not. This kind of miscommunication and inconsistent use of terminology hinders advancement of *knowledge* in the field of *education*. You do a research study on *student learning* and find one result. I do a study on *student learning* and find a different result. Whose results should we believe? But we may not even be talking about comparable *students* or comparable *learning*. *Learning* is yet another term that needs clarification.

It is as if you are studying cooked oatmeal with added sugar (*sucrose*) and I am studying cornflakes with added high *fructose* syrup. But we both call them sweetened cereals. This clarification is important because *fructose* is *metabolized* differently than *glucose* in the human body. *Fructose* is effectively a chronic toxin that when *metabolized* rapidly in significant amounts repeatedly over time can lead to diseases that include Type 2 diabetes, atherosclerosis, and cancers. See for example: Lustig (2009; 2017), McKinley, O’Loughlin and Bidle (2016), and Taubes (2016).

It is as if in physics *mass* and *energy* meant different things to different people—a wide range of misconceptions. For example, some people think of mass being associated with how big something is and how much it weighs. Not so, as it turns out, in the field of physics. *Mass* is different from *weight*. An astronaut living in the space station that orbits the earth has zero *weight* and appears to just float in the air. Yet the same astronaut standing on a scale in the doctor’s office on earth weighs 130 *pounds*, or about 59 *kilograms*. Her *mass* has not appreciably changed. Just orbit the earth at about 17,600 *miles per hour*, and we will *weigh* nothing. And there are some new terms: *pounds*, *kilograms*, *miles*, *hours* and the implied concepts of *velocity*, *force*, *acceleration*, and *gravity*.

3. What is *Education*?

Education is conducive learning, which stands in contrast to *compelled learning*, *discovery learning*, and *accidental learning*. *Conducive learning* is ‘*guided learning and intended learning*’, which meets Steiner’s (1988) criteria for what constitutes the *universal class, education*. These essential relationships are further illustrated next and by Venn diagrams on the *Educology Website*: <http://educology.indiana.edu> and in Figures 1.1 to 1.13 below. Figure 1 illustrates relationships among important concepts, in order to separate *education* from all *learning*:

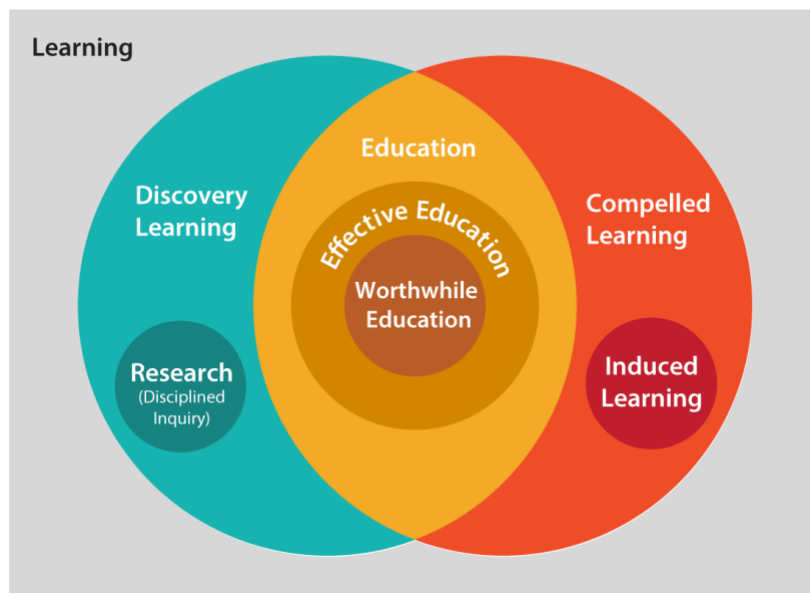


Figure 1. Venn diagram representation of kinds of *learning* and *education*

Key concepts from which definitions of types of *learning* are derived from this Venn diagram are further illustrated by specific shadings in Venn diagrams in Figures 1.1 – 1.13:

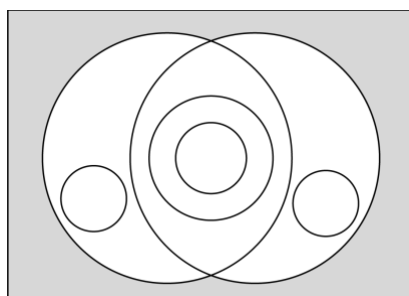


Figure 1.1. *Accidental learning*: neither *intended learning* nor *guided learning* (Type 1)

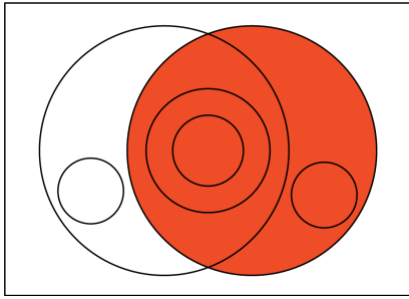


Figure 1.2. Guided learning (Type 2)

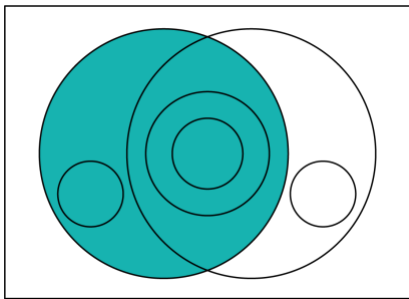


Figure 1.3. Intended learning (Type 3)

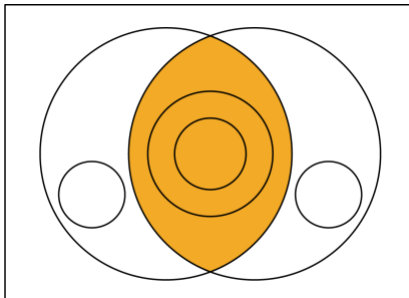


Figure 1.4. Conducive learning (education): Intended learning and guided learning (Type 4)

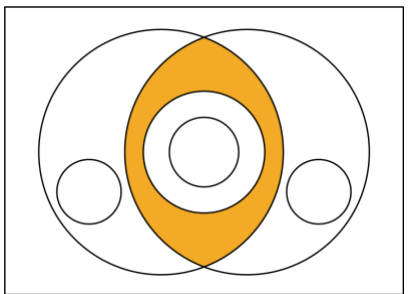


Figure 1.5. Ineffective education: neither instrumentally good nor intrinsically good (Type 5)

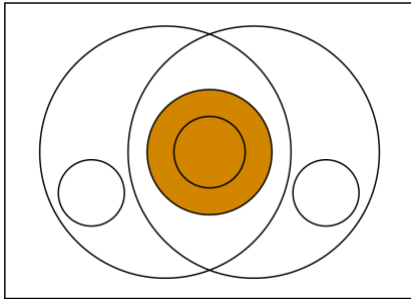


Figure 1.6. Effective education: instrumentally good (Type 6)

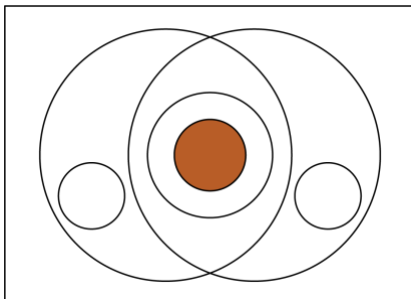


Figure 1.7. Worthwhile education: instrumentally good and intrinsically good (Type 7)

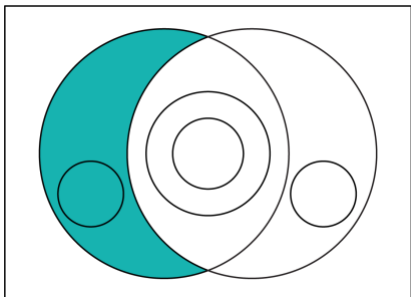


Figure 1.8. Discovery learning: intended learning but not guided learning (Type 8)

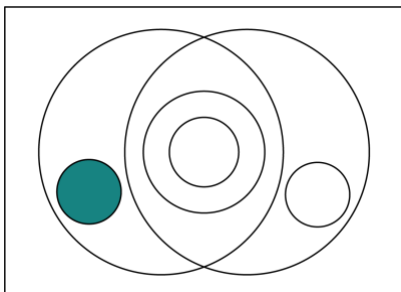


Figure 1.9. Disciplined inquiry (research): discovery learning that is regulated by criteria (Type 9)

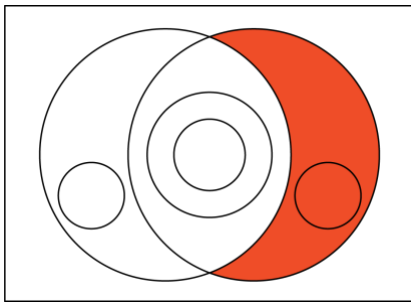


Figure 1.10. *Compelled learning: guided learning but not intended learning (Type 10)*

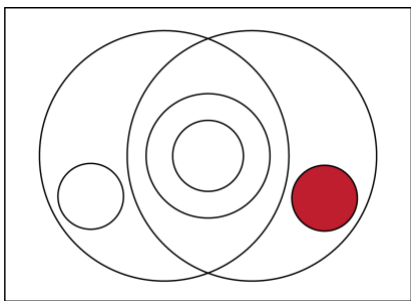


Figure 1.11. *Induced learning: guided learning but initially not intended learning (Type 11)*

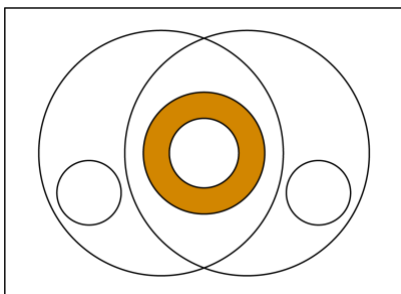


Figure 1.12. *Effective bad education: instrumentally good but not intrinsically good (Type 12)*

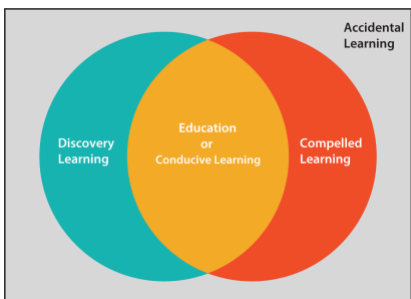


Figure 1.13. *All learning: accidental learning or discovery learning or conducive learning or compelled learning.*

What is important to note is that these terms are well-defined. In particular, *educology* is defined as ‘recorded *signs of knowing* about *intended learning* and *guided learning*’. *Educolology* is thus *knowledge of education*.

4. How is Educational *Theory* Different from *Educolology*?

Education provides *guided* and *intended learning* across various human disciplines. The result of *disciplined inquiry* about *education* is distinct from the process of *education* itself. If adequate, educational research should result in *knowledge* about *education*—that is, *educology*.

Knowledge is taken to be ‘recorded *signs of knowing*’. Such records are intersubjective, i.e., between persons, and they are preserved in some medium over a period of time. Steiner (1988) argues that:

First, *knowing* should be distinguished from *knowledge*. *Knowing* is a psychological state in which one has certitude about something and has a right to that certitude.... *Knowledge*, however, is recorded *knowing*; it is the body of expressed certitudes. (p. 5, italics added)

Recorded *signs of knowing* can be preserved in a variety of media. At one time, cave paintings, stone and clay tablets, and papyrus were used. Nowadays, in addition to printed paper and books we have video and audio recordings, photographs, animations, and computerized games and simulations. We also have electronic storage devices to store records such as hard drives, flash memory, and the “Cloud”—remote storage on devices which can be accessed over computer networks such as the Internet.

The record of *knowing* consists of *signs*. The *signs* are not the object of what is known, but rather the *signs* represent what is known. Charles Sanders Peirce spent much of his life attempting to develop a *theory of signs* (see Short, 2007). Peirce’s *theory* evolved over his lifetime, which he never finished to his satisfaction. Peirce (1932) defined *sign* as follows:

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).

In discussing mind and nature, Bateson (1979) makes the same observation: “The map is not the territory, and the name is not the thing named” (p. 30). Bateson’s territory and thing are Peirce’s objects, and the map and name are Peirce’s *signs*. Bateson’s map is a *sign* whose object is the territory being represented. The map is what Peirce refers to as an index in the sense that it is affected by an existing object—the actual territory that is represented by the map. While this distinction may seem obvious, it is important to keep it

in mind: a *sign* is not the actual object itself but represents the object. A satellite photograph of the territory would also be an *indexical sign*.

In *educology*, *theory* is defined as ‘intersubjective signs of universals about essential properties and their relations, yet to be warranted by disciplined inquiry’ (<http://educology.indiana.edu/theory.html>). Therefore, *educational theory* is intersubjective signs of universals about essential properties and their relations about *education*, yet to be warranted by *disciplined inquiry*. And *education* is defined as *conductive learning*—*learning* that is both *intended* and *guided*. See Fig.’s 1.4 and 1.9.

Disciplined inquiry is *discovery learning* that is guided by criteria for conducting research to create *knowledge*.

Thus, *educational theory* becomes *knowledge of education* when it is verified through *disciplined inquiry* (Steiner, 1988; Frick, in press, 2019). In summary, *educology* is more explicitly defined as ‘recorded *signs of knowing* about *intended learning* and *guided learning*’.

Educology is interdisciplinary by virtue of the fact that *education* (*intended* and *guided learning*) occurs in a variety of disciplines, such as mathematics, music, physiology, anatomy, physics, biology, psychology, etc. *Educology* should further be considered a discipline by itself. *Educology* is *knowledge of education*, which is different from the process of *education* which is the object of educational research (*disciplined inquiry* about *education*).

5. Conclusion

Trial-and-Error Approaches to Improving Education Are Risky and Inefficient

Educators who have been around several decades have seen widely touted changes come and go. In the past four decades, for example, some of the innovations have been referred to as: site-based management, constructivist classrooms, technology integration, school restructuring, systemic change, and re-inventing schools.

Despite such rhetoric, changes that have occurred in U.S. K-12 schools appear to be “tinkering around the edges.” In 2019, for example, there may be more use of computer tablets, Chromebooks, and wi-fi networks in schools, more standardized achievement testing, more accountability for *student learning* achievement, less state funding for public schools, more tax dollars going to private charter schools, and increased regulation of schools by state and federal governments.

But, have any of these changes significantly improved K-12 *education*? While apparently well-intentioned state legislators and state departments of *education* are mandating changes in K-12 *education*, there are no guarantees of improving matters.

Worse, these changes may cause more harm than good. The stakes are very high. The consequences of mistakes can be devastating for our children and our future. The following questions have not been adequately addressed:

- “Change what?”
- “Change how?” and
- “How do you *know* the change is likely to work?”

We must *know* what to change in order to *know* how. Without *knowing* what to change, the “how” is irrelevant (Frick, Thompson & Koh, 2006). We must *know* whether the change is likely to accomplish the goal and that the change will not have negative, unintended effects.

For example, attempts to hold *teachers* accountable for *student* achievement not under their control may drive the best *teachers* to leave the profession, due to frustration with such working conditions. It may also discourage potentially good *teachers* from entering the profession. Moreover, the best *students* might leave the public schools to attend private charter schools, if their parents can afford it. This would leave public schools in possibly worse straits, with the least capable *teachers* and lowest achieving *students* remaining, and less money from public tax dollars to support them. Then what?

Paradigm Change for Improving Education Requires Sound Knowledge

Some scholars argue that an entire paradigm change is needed in *education*. For example, Reigeluth & Karnopp (2013) have promoted a vision and strategies to get there. These include significant curriculum expansion, individualized *learner*-centered instruction, and attainment-based evaluation of *learning*—that contrasts with existing time- and age-based structures for moving *student* groups through lock-step grade levels. As another example, Duffy (2009) is promoting systemic change efforts.

But do we know how well such new paradigms will work? This does not mean that a new *education system* that is learner-centered and attainment-based is not worthwhile. Nor does it mean that changes to expand and revamp curriculum in school are not needed. It just means that we lack sound *knowledge* to predict outcomes of new designs of *education systems*.

Why Sound Knowledge of Education is Needed

As an analogy, consider an old bridge that is failing—it is structurally weak and is impeding the flow of traffic. If the bridge is not fixed, it will collapse and vehicles will plunge into the river. When engineers design a new bridge, they utilize adequate scientific *theories*. No one in modern times would consider designing a new bridge by trial and error. Nor would they let politicians try to do it.

Yet, in *education* we are essentially proceeding by trial and error in attempts to improve *education*—whether tinkering around the edges or by creating new paradigms. We lack sound *knowledge* to make reasonable predictions whether or not the proposed remedies will fix the problems in *education* we face.

Disciplines Require Precise Language

In disciplines where *knowledge* has significantly advanced, there has been careful development of terminology so that researchers *know* what each other is actually talking about. For example, in physics the concepts of *atoms* and *molecules* are clearly defined. Each *atom* has a particular combination subatomic elements called *electrons*, *protons*, and zero or more *neutrons*. For example, in chemistry a *molecule* of *water* is comprised of two *hydrogen atoms* and one *oxygen atom*. A *hydrogen atom* consists of one *electron* and one

proton. A stable *oxygen atom* contains eight each of *electrons*, *protons* and *neutrons* (see “Properties of water,” n.d.).

As another example, it was not that long ago that the field of medicine was not a discipline. There was no medical science, as there now is. At one time, physicians would prescribe bloodletting to treat all kinds of disease, which turned out to be an ineffective practice and has been largely abandoned (“Bloodletting,” n.d.). Many people were harmed by such ignorance.

Medicine advanced, in part, because researchers in the field became more disciplined in their inquiry. Terms are now precisely defined in medicine. *Osteoarthritis* does not mean whatever people want it to mean. *Osteoarthritis* is the precisely described medical term for a particular disease. Researchers and practitioners in the field of medicine have agreed on what this term means. Thus, when treatments of this particular disease are investigated, competent medical professionals *know* what they are talking about.

The Need for Precise Language in Educology

In the field of *education*, such precise terminology has not been developed until now. Steiner (1977, 1986, 1988) has long argued that such terminology is sorely needed for the field to advance, and has proposed the term, *educology* to mean ‘*knowledge of education*’.

Basic terms of *educology* have now been defined: *learning*, *knowing*, *signs*, *education system*, *teaching-studenting processes*, *teaching-studenting structures* and many others. The definitions are available to all at the *Educology Website* at: <http://educology.indiana.edu/glossary.html>.

A standard vocabulary will lead to advances in *educology* that, in turn, will help improve *education*—that is, develop *worthwhile education for everyone*.

Worthwhile education for everyone is needed to:

- Enhance the quality of life.
- Reduce inequality.
- Minimize suffering.
- Maximize overall good. (<http://educology.indiana.edu/we2.html>)

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