## Theories of Intelligence http://otec.uoregon.edu/intelligence.htm

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### A Definition of Intelligence

The study and measurement of intelligence has been an important research topic for nearly 100 years IQ is a complex concept, and researchers in this field argue with each other about the various theories that have been developed. There is no clear agreement as to what constitutes IQ or how to measure it. There is an extensive and continually growing collection of research papers on the topic. Howard Gardner (1983, 1993), Robert Sternberg (1988, 1997), and David Perkins (1995) have written widely sold books that summarize the literature and present their own specific points of view.

The following definition is a composite from various authors. Intelligence is a combination of the ability to:

1. Learn. This includes all kinds of informal and formal learning via any combination of experience, education, and training.
2. Pose problems. This includes recognizing problem situations and transforming them into more clearly defined problems.
3. Solve problems. This includes solving problems, accomplishing tasks, fashioning products, and doing complex projects.

This definition of intelligence is a very optimistic one. It says that each of us can become more intelligent. We can become more intelligent through study and practice, through access to appropriate tools, and through learning to make effective use of these tools (Perkins, 1995).

PBL can be used as a vehicle in which students can use and improve their intelligence. More detail on the work of Gardner, Sternberg, and Perkins is given in the next three subsections.

### Howard Gardner

Some researchers in the field of intelligence have long argued that people have a variety of different intelligences. A person may be good at learning languages and terrible at learning music--or vice versa. A single number (a score on an IQ test) cannot adequately represent the complex and diverse capabilities of a human being.

[Howard Gardner](http://www.geocities.com/Athens/Column/7568/gardner.html) has proposed a theory of multiple intelligences. He originally identified seven components of intelligence (Gardner, 1983). He argues that these intelligences are relatively distinct from each other and that each person has some level of each of these seven intelligences. More recently, he has added an eighth intelligence to his list (Educational Leadership, 1997).

The following table lists the eight intelligences identified by Howard Gardner. It provides some examples of the types of professionals who exhibit a high level of an intelligence. The eight intelligences are listed in alphabetical order.

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| Intelligence | Examples | Discussion |
| Bodily-kinesthetic | Dancers, athletes, surgeons, crafts people | The ability to use one's physical body well. |
| Interpersonal | Sales people, teachers, clinicians, politicians, religious leaders | The ability to sense other's feelings and be in tune with others. |
| Intrapersonal | People who have good insight into themselves and make effective use of their other intelligences | Self-awareness. The ability to know your own body and mind. |
| Linguistic | Poets, writers, orators, communicators | The ability to communicate well, perhaps both orally and in writing, perhaps in several languages. |
| Logical-mathematical | Mathematicians, logicians | The ability to learn higher mathematics. The ability to handle complex logical arguments. |
| Musical | Musicians, composers | The ability to learn, perform, and compose music. |
| Naturalistic | Biologists, naturalists | The ability to understand different species, recognize patterns in nature, classify natural objects. |
| Spatial | Sailors navigating without modern navigational aids, surgeons, sculptors, painters | The ability to know where you are relative to fixed locations. The ability to accomplish tasks requiring three-dimensional visualization and placement of your hands or other parts of your body. |

### Robert Sternberg

Different researchers have identified different components of intelligence. Sternberg (1988, 1997) focuses on just three main components of intelligence:

1. Practical intelligence--the ability to do well in informal and formal educational settings; adapting to and shaping one's environment; street smarts.
2. Experiential intelligence--the ability to deal with novel situations; the ability to effectively automate ways of dealing with novel situations so they are easily handled in the future; the ability to think in novel ways.
3. Componential intelligence--the ability to process information effectively. This includes metacognitive, executive, performance, and knowledge-acquisition components that help to steer cognitive processes.

Sternberg provides examples of people who are quite talented in one of these areas but not so talented in the other two. In that sense, his approach to the field of intelligence is somewhat like Howard Gardner's. However, you can see that Sternberg does not focus on specific components of intelligence that are aligned with various academic disciplines. He is far more concerned with helping people develop components of intelligence that will help them to perform well in whatever they chose to do.

Sternberg strongly believes that intelligence can be increased by study and practice. Quite a bit of his research focuses on such endeavors. Some of Sternberg's work focuses specifically on "street smarts" versus "school smarts." He notes that some people are particularly talented in one of these two areas, and not in the other. This observation is consistent with the work of Lev Vygotsky (Fosnot, 1996) who argues that the type of learning that goes on outside of school is distinctly different than the type of learning that goes on in school. While some students are talented in both informal and formal education, others are much more successful in one rather than the other.

### David Perkins

In his 1992 book, Smart Schools, David Perkins analyzes a number of different educational theories and approaches to education. His analysis is strongly supportive of Gardner's theory of multiple intelligences. Perkins' book contains extensive research-based evidence that education can be considerably improved by more explicit and appropriate teaching for transfer, focusing on higher-order cognitive skills, and the use of project-based learning.

Perkins (1995) examines a large number of research studies both on the measurement of IQ and of programs of study designed to increase IQ. He presents detailed arguments that IQ has three major components or dimensions.

1. Neural intelligence. This refers to the efficiency and precision of one's neurological system.
2. Experiential intelligence. This refers to one's accumulated knowledge and experience in different areas. It can be thought of as the accumulation of all of one's expertises.
3. Reflective intelligence. This refers to one's broad-based strategies for attacking problems, for learning, and for approaching intellectually challenging tasks. It includes attitudes that support persistence, systemization, and imagination. It includes self-monitoring and self-management.

There is substantial evidence to support the belief that a child's neural intelligence can be adversely affected by the mother's use of drugs such as alcohol and cocaine during pregnancy. Lead (such as from lead-based paint) can do severe neural damage to a person. Vitamins, or the lack thereof, can affect neural intelligence.

Moreover, there is general agreement that neural intelligence has a "use it or lose it" characteristic. It is clear that neural intelligence can be maintained and, indeed, increased, by use.

Experiential intelligence is based on years and years of accumulating knowledge and experience in both informal and formal learning environments. Such knowledge and experience can lead to a high level of expertise in one or more fields. People who live in "rich" learning environments have a significant intelligence advantage over people who grow up in less stimulating environments. Experiential intelligence can be increased by such environments.

Reflexive intelligence can be thought of as a control system that helps to make effective use of neural intelligence and experiential intelligence. A person can learn strategies that help to make more effective use of neural intelligence and experiential intelligence. The habits of mind included under reflexive intelligence can be learned and improved. Metacognition and other approaches to reflecting about one's cognitive processes can help.

**FOOD FOR THOUGHT:**

Obviously, this Article of the Week ties into our “knowledge = intelligence?” discussion. Through reading the article, you now have an insight into three of the major theories in current thinking about intelligence. Here’s what I’d like you to consider:

1. Regarding Gardner’s Multiple Intelligences Theory, where do you YOU fit in? In your opinion, what are your dominant intelligences? How do you know? How might this direct what you choose to do with your life? (Understanding, Analyzing levels)
2. Robert Sternberg indicated three main components of intelligence: practical, experiential, and componential. In your evaluation, which is most important? Why? (Analyzing, Evaluating levels)
3. Now, on to David Perkins – which of his three components seems most susceptible to outside influences (things that are out of our control)? Explain clearly, please. (Applying, Analyzing levels)
4. Just out of curiosity (and to get you realizing your own METACOGNITION – which means “thinking about your thinking”), what sorts of reading strategies did you apply while reading this article so you could better understand it…since it was a little dry, eh? (Analyzing level)