

Measuring Mindset Change in the Systemic Transformation of Education

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Introduction

As the whole society is experiencing a notable shift from the industrial age to the information age, an urgent need for a mindset change in education has been frequently discussed during the past decades. This paper will approach the mindset change through three interconnected sections: the first section reviews the conceptualization of mindset and then gives our definition of mindset concentrating on understanding its unique significance to the educational system. The second section presents, compares, and contrasts the key markers of the information-age mindset and the industrial-age mindset. The third section displays an instrument designed and developed by the authors that can be used to measure the status of individual and group mindset.

Definitions and Significance of Mindset

What is a mindset?

Since this paper is a part of a transforming education system project, we need to define our “mindsets” concept in order to explore the interaction and interrelationships between peoples’ mindsets and systemic change in education. Webster’s dictionary (n.d.) defines mindset in two ways: the first is “a mental attitude or inclination” and the second is “a fixed state of mind”. Both definitions explain the mindset as something that occurs in a person’s head; however, the mindset also has the power to control a person’s attitudes, and potentially influences a person’s behavior.

In order to have a deeper understanding of the mindset and its importance, our exploration of the mindset definition goes beyond a literal explanation. A few related terms are examined, including paradigm, belief, and worldview. These concepts provide insight into the meaning of mindset.

Kuhn defined and popularized the concept of paradigm in his remarkable *The Structure of Scientific Revolutions*, in which he argues that a paradigm consists of “rules that guide particular normal tradition” (p16). In many areas including education, a paradigm is a model or an exemplar that forms the foundation that prepares people for professional practice. In most social structures, paradigms are well-defined and rigid. And when people accept a paradigm, it becomes a firmly fixed belief in their mind. However, paradigm shift does take place when an anomaly undermines the basic beliefs underlying the basic practice. The paradigm shift doesn’t refer to a piecemeal change or a minor modification of the current practice, instead it is a revolution, a transformation, or a kind of metamorphosis. In a word, it is a fundamental change from one way of thinking to another.

Mindset sometimes can be simply expressed as “I (we) believe.” Belief is the major component of the mindset, because people set up their expectations and goals based on what they believe the nature of situations should be. Their activities are guided by their beliefs and they are inclined to act to implement the paradigm in the life. For example, learners’, educators’, and administrators’ beliefs about what schools should achieve determines the face of school systems, such as the design of schools’ key characteristics and their major functions.

A worldview describes “a consistent and integral sense of existence and provides a framework for generating, sustaining and applying knowledge.” (WorldIQ, n.d.). Mindset understood through the worldview perspective focuses on the interaction between the mindset owners and the global/local environments. Mindset here is “a habitual or characteristic mental attitude that determines how people will interpret and respond to situations” (HyperDictionary, 2003). People originate their worldview from the unique experience they have perceived, by their own or through heritage, and then forge their opinions and engage in activities based on their worldview. For example, Shantz and Rideout (2003) pointed out that the industrial-age worldview might interpret learning as “possession of knowledge and ability contained in the overt curriculum” (p 203), and thus stress the standardization and centralization in schools.

Our definition denotes a comprehensive set of the mindset components that are the basis of people’s

cognitive process and their operational guidance. Therefore, we define mindsets as the basic assumption, beliefs, core values, goals and expectations shared by a group of people who are committed to a specific field, and what they will use as rules to guide their attitudes and practice in the field.

Why are mindsets important?

Kuhn said that a shift in paradigm occurs as a response to crisis. In most cases, a crisis begins from the awareness of an anomaly in a changing environment, such as the emergence of new objects. If the existing paradigms fail to explain the emerging phenomena or solve the new puzzles, a search for creative or adaptive responses will be demanded. During the past decades, there have been massive changes around the world, stimulated by the advancement of information technology. These changes present a number of key markers that distinguish the emerging new age, the information age, from the industrial age (Reigeluth, 2001). As the industrial-age mindset still pervades the ways we see the world and we do things, these changes force us to question the industrial-age mindset and its capability to solve the information-age puzzles. For example, the business world has found that the traditional-centralized organization is obsolete for providing customized services demanded by the information-age customers, so shifts have taken place in business culture from working around departments to working around process that provide value to the customers (Hammer & Champy, 1993).

In exploring the complexities of human history, Toffler has seen three great waves: the first agricultural revolution that began to move people from hunting to peasant societies about 10,000 years ago; the second industrial revolution which took the shape in the 18th century when people began to leave the peasant culture of farming to come to work in city factories; and now the whole society is undergoing a third wave that is transforming the industrial era to a knowledge-based era, triggered by the rise of the analog and then digital technologies. The current transition from brute force to brain force accompanies a painful dislocation of all the aspects of our lives. Institutions that were designed to work in a factory-based society are gasping for their last breath.

The history of educational reform has proved that when a society is undergoing fundamental changes, education needs to change fundamentally, too. A good example is the systemic change that took place in education when we moved from the one room schoolhouse to industrialized mass education during the transition from agriculture age to the industrial age. The Lancastrian model of education made it possible to provide a large amount of skilled labor for the factory-centered society. However, when the third wave came along, the information age, the prevailing mindset in education, as well as in many other social facets, was unable to generate effective solutions to the problems of the information age. Because of this, another mindset change is urgently needed.

The predominant industrial paradigm of education became entrenched in the early 20th century. During the past hundred years, learning has been defined as the acquisition of knowledge or ability in a separately enclosed learning environment by a group of learners. It requires learners' adherence and obedience to the covert curriculum and the design of schooling is a typical conformity system: diverse learners learn same content at the same time and with the same rate. (Shantz & Rideout, 2003)

The report *A Nation at Risk* (1983) discloses a number of risks the industrial-age education system has generated in the information era: from high dropout rate to low academic achievement, from enlarging the functional illiterate population to a declined proportion of exceptional performance in standard tests. With a continuously improved awareness of the crisis of education, many crucial questions have been raised about the influence of information-age characteristics on education. The implications of the new trends have been examined in educational technology, instructional theory, and instructional systems technology and a call for the emergence of an information-age mindset could be heard more and more, including the transformation from a closed system to an open one, from a bureaucratic approach to a team-based one, and from a student-screening focus to a learner-enabling one (Banathy, 1992; Cornell, 1999; Deuchar, 2004; O'Neill, 2003/2004; Reigeluth, 1999; Solomon, 2000).

In the 21st century, which will be dominated by information-age trends, it is important for educators to recognize the industrial-age mindset that limits our thinking and empower the education system through a redesign or transformation to the information-age mindset.

Information-Age Mindset vs. Industrial-Age Mindset

In the section one we have briefly discussed the movement to the information-age mindset from industrial-era mindset. However, many may still wish clarification about the distinction between these two mindsets. This section will focus on what are the key markers of these two mindsets and contrast their features in order to generate a deep understanding of the two mindsets' impact on education system design.

As transforming from the industrial age to the information age, tremendous changes have taken place in the society's structure and the way people behave themselves in their lives. Passi, Michelet and Passi (2003) compare and contrast the industrial age and the information age from a broad scope of interests, including economy, family, social activities, technology, education, among other things. Table 1 displays the major characteristics that the authors have used to distinguish the two eras.

	Industrial Era	Information Era
Wealth	Industry/Tangible Assets	Information/Knowledge
Dimensions of Life	Earth + Universe	Earth + Universe + Cyberspace
Habitat and Social Unit	Mega-city Static (tied to factory)	Global community Mobile (link through Web)
Social Classes	Owners, workers	By level of knowledge and ideas
Warfare	Mechanical technology, mass destruction	(Dis) Information technology, targeted destruction for control
Economy	National/International	Global, vet local
Energy Source	Non-renewable: fossil, fuels, gas, oil, coal	Renewable: solar, nuclear, laser
Production	Mass-produced and distributed (cheap) for others	Mass-customized (cheap)for others
Family	Small, nuclear, mobile	Individual, mono-parental, mobile
Education	Mass-education, same for all (3 Rs)	
Position Determined by	Wealth	Individualized and differentiated for all
Management	By rationality	By responsibility (?)

Table 1: *Key Markers of Industrial Age and Information Age*. Adapted from Passi, et. al. (2003).

The changes occurring in the environment have a great impact on the whole human culture. Key markers of both the industrial age and the information age, such as core values, principles, philosophies, and organizational management, have been described and analyzed as to distinguish these two eras (Berge, 2003; Gordon, Morgan, & Ponticell 1994; Hanna, 2003; Reigeluth, 2003). Table 2 depicts these key markers and how they represent the two fundamentally different ages.

Key markers (global items)	Industrial Age	Information Age
Philosophy	Standardization	Customization
Relationship	Mass production, etc. Adversarial relationships CEO or boss (teacher) as "king" Compliance Bureaucratic organization	Customized production Cooperative relationships Customer as "King" Initiative Team-based organization
Value	Conformity (compliance)	Diversity
Decision making	Autocratic decision making	Shared decision making
Communication	One-way communications Compartmentalization	Networking Holism
Process	Parts oriented (division of labor) Planned obsolescence	Process oriented (integration of tasks) Total quality
Quality control	Centralized control	Autonomy with accountability

Table 2: *Key markers that distinguish industrial age and information age organization*. Sources from: Reigeluth (1999, 2001, *n.d.*). Key marker added.

Education, as any other social aspect, is unavoidably influenced by the changes triggered by the information age. Table 3 presents a comparison between the industrial age education and the information age education, particularly as these differences correspond to philosophy, leadership, teaching, assessment, and relationship.

Key markers (education-focused items)	Industrial Age	Information Age
<i>Philosophy</i>	Focus on teaching	Focus on learning
	Teaching (caring about) a subject	Teaching (caring about) Caring about the whole student
	All students learn the same thing	Cultivate special talents of each students
<i>Leadership</i>	Command & control leadership	Participatory/empowering leadership
<i>Teaching</i>	Students progress at the same pace (students all learn the same thing at the same time)	Each students progresses upon mastery (Students learn what they ready to learn when they are ready)
	Focus on presenting all the materials	Focus on learning all the materials
	Grade levels	Continuous progress
	Covering the content	Outcomes-based learning
	Group-based content delivery	Personal learning plans
	Classrooms	Learning centers
<i>Teacher' s role</i>	Teacher as sage on the stage, Teacher as dispenser of knowledge of learning	Teacher as guide on the side, Teacher as coach or facilitator
<i>Purpose</i>	Only the good students succeed	All students succeed
<i>Assessment</i>	Non-authentic assessment	Performance-based assessment
	Norm-based testing (compared students to each other)	Criterion-based testing (compares students to a standard)
	Norm-referenced testing	Individualized testing
<i>Relationship</i>	Adversarial learning	Cooperative learning
	Separate from community	Community involvement
	Parents as occasional spectators	Parents as partners
<i>Content</i>	Memorization of meaningless facts skills	Thinking, problem-solving and meaning making
	Isolated reading, writing skills	Communication skills

Key markers related to education-focused items. Sources: Reigeluth (2004).

As shown in the above tables, we see a total departure of information-age mindset from the industrial-age key markers. The recognition of the information-age mindset not only forces us as educators to think about their implication on the education, but also enable us to redesign today's schools in order to serve learners diverse potentials and multiple intelligences.

An Instrument of Measuring Minds

Why the measurement of mindset is important?

As the mindset change in education is gaining more and more proponents, we have little appreciation

and few criteria for measuring the status of mindset. Too little of the education literature provides clear criteria for assessing the positions of mindset in a practical continuum. So it is the focus of this section to advance clear criteria that others can use in evaluating people's mindset and to what extent and in what manner it is going to change.

The context for the instrument application

Mindset change has been discussed tremendously in various contexts, from sociology to pure technology, and we have found that there is a lack of consistence regarding the definition and application of the mindset concept in all these contexts. The measurement of mindset also has different criteria under various circumstances. In order to enhance the practicability, the instrument we created would like to limit the boundaries only in the education field, with a concentration on systemic change.

A tool for measurement

Mindset indicators Based on this definition, people's cognition, affection and behaviors are engaged in the notion of mindset. In other words, if somebody has the information-age mindset (or the industrial age mindset) about education, he/she may have explicit and/or implicit knowledge about the information-age (or the industrial-age mindset) through experiences and/or learning. He/she also may have positive attitudes and affective evaluation about his/her mindsets and its relevant events or situations whereas he/she may have relatively negative attitudes towards irrelevant situations. In addition, naively speaking, his/her consistent behaviors with his/her mindset can be also expected. In three domains (cognitive domain, affective domain, and behavioral domain) all factors such as applications of cognition to situations, affective reactions such as favorability or affective evaluation, and intention of behaviors can be indicators of people's mindsets.

Cognition and its application to various situations. Mindsets are unlike human traits; therefore, they are not innate but learned. Current mindsets that people possess are products of learning from their experiences, and for mindset evolution, formal or informal learning processes need to be engaged. During learning processes for mindset evolution, people should acquire notions of new mindsets, and by evolving mindsets they can apply new mindsets to relevant situations naturally. In addition, mindsets are relatively consistent frameworks to see, accept, and understand situations, and events. Therefore, people's knowledge and especially, its application to various situations can be an appropriate indicator to show people's mindset

Based on this point, mindset about education may be measured using:

- Artificial scenarios which contain conflicts between information-age mindset and industrial-age mindset about education, and people's open-ended responses.
- Small group discussion with real cases or scenarios about education evaluated by discussion peers and/or third party evaluators who are knowledgeable about mindset change in education.

Affective reactions When measuring cognition and its application to various situations, it may be helpful to measure affective reactions and evaluation about the situations since mindset is not only about cognitive processes but also about people's affective attitudes. In other words, people may tend to be more favorable to situations which are more relevant with their mindsets. People with the information-age mindset will rate that situations or decisions which support the information-age mindset are more 'favorable', 'appropriate', 'beneficial' and/or 'correct' than those related to industrial-age mindset, and vice versa.

Based on this, as one of the indicators of the mindset about education affective reactions can be measured using;

- People's self report concerning possible decisions about scenarios (for cognition application above) using 5 point Likert scale for example; inappropriate – appropriate, unfavorable-favorable, incorrect-correct, not-preferable-preferable, etc.
- (if possible) after the small group discussion about real cases or scenarios about education, peers and/or third party evaluators assess people's affective attitudes towards situations and cases

Intention of behaviors One of the ultimate goals of mindset change is people's behavior change. However, it is hard to measure actual behaviors based on evolved mindset because many studies about attitudes, and theories of reasoned behaviors show that it takes time to reflect people's mindsets including cognitions and attitudes to their behaviors, and more complex processes and variables involve in behavior changes. Therefore, in the current situation, instead of actual behavior change, the intention of behaviors can be preferably measurable.

To reflect ideas of behavior intention in the scenarios above, questions need to be asked using the first party viewpoint instead of the third party view point such as “if you were in the situation, how would you behave?”

Self-report vs. measurement by others The self report method to measure mindset is one of the possibilities. Through the self-report method such as responding to given scenarios people’s understanding level about mindset and its components can be clearly disclosed. In spite of this strength it is dangerous to use self-report as the only measurement because social preference can contaminate measuring the mindset. Currently the targeted subjects to measure mindsets are leadership team members, and they might respond with what they have learned in the leadership team of Systemic Change in Decatur School District and with preferable answers of the team rather than individual beliefs intentionally or unintentionally. The issue of intentional deception to respond can be reduced by emphasis of self-disclosure and the purpose of measurement which is not for evaluation but for diagnosis and help. However, the issue of unintentional deception in responding -- people reflect knowledge they learn in the team instead of their beliefs-- can still be problematic in self-report method.

To complement the weakness of self reporting, it would be preferable to use the measurement conducted by others. In regular meetings and small group discussions peers and knowledgeable third party observers can assess people’s mindsets, and the data from others can be triangulated with self-reports. This triangulation can provide higher reliability of data.

In summary, in reference of measurement tools firstly scenarios with open-ended questions, Likert scales for emotional reaction, and questions about intention of behavior will be used in self report. Secondly, small group discussions and rubrics for peer evaluation and third party evaluation will be used to complement the self-report. The rubrics will contain standards for people’s knowledge levels, application of knowledge, and emotional reactions.

Type of measurement	Applications of cognition	Indicators	
		Affective reactions	Intention of behaviors
Self-report	Open-ended scenarios	Affective adjectives rating using Likert scale about the scenarios	Open-ended scenarios
Measurement by others	Small group discussions and peer- third party- evaluation	Attitudes toward situations and topics in discussion	-

Table 4. *Measurement Methodology*

Conclusion

As massive changes are forcing the whole society moving toward the information age, education will prepare students for a world that doesn’t exist anymore if it is still dominated by the industrial age mindset. However, before we can know how the mindset will change, we must be aware of the current status of the mindset. In order to facilitate the mindset shift in education, this paper creates a three-indicators instrument that provide the practical criteria for measuring mindset, and therefore, help educators to gain more insights about the relevance between mindset and systemic change.

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