Structural Integrity: A Paradigm of Systemic Engineering and Organization

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Abstract

   This article addresses the nature of educational organizations for an engineering perspective. Principles of structural engineering are employed as a means of examining and addressing problems within educational organizations. Both current and future issues are addressed in relation to the redesign of educational organizations in relation to function, flexibility, and efficacy. Suggestions and recommendations are provided.

In October of 1989 a severe earthquake struck the San Francisco Bay area. Over the next few hours and days millions of Americans, via television, viewed scenes of horror and heroism, tragedy and triumph. One of the most tragic sights was the remnants of what once had been the two-tiered Nimitz Freeway in Oakland. The support for the two tiers had collapsed leaving the formerly impressive structure in rubble on the ground, one freeway tier atop the other, with drivers, passengers, and their automobiles crushed in the debris.

The scene in the Bay Area once again brought the nation's attention to focus on the issue of *infrastructure*. During the 1980s and 1990s, collapsing freeway bridges, overused sanitation facilities, and depleting sources of clean drinking water caused experts to examine the "decaying of America." This decay was primarily evident in what was believed to an outmoded and insufficient infrastructure of our nation's cities and roadways.

Infrastructure is a term generally applied in an engineering sense to mean "the physical systems that provide transportation, water, building, and other facilities that are needed to meet basic human, social, and economic needs" (Grigg, 1988) The concept of infrastructure dates back to Socrates. His theories included the notion that to function, a person needs the facilities and arrangements available from community, security, institutions, and economic goods, and that these can only be provided when persons support the concept of community and the responsibilities it entails (Kolenda, 1984). An integral part of such support involves the understanding that components of the infrastructure must be constantly monitored, refurbished, and re-designed to deal with the ongoing stress to which they are subjected. Hutchison and Karsnitz (1994) define stress as the interaction of forces from live loads (variable loads that can and do change). Both types of leads must be considered when designing or addressing organizational needs from a systemic perspective, in that both can define structures via strain or deflection due to stress.

These types of forces can cause organizations to "change their shape" under

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stress as they attempt to manage the constant conflict between those forces trying to destroy the structure and those trying to hold the structure up. There are essentially five ways a structure can react to stress forces. These forces can effect a structure both in an individual or collective manner. They are:

1) Compression – The tendency for a material to be condensed or squashed.
2) Tension – The tendency for a material to be stretched or pulled apart.
3) Shear – The tendency for a material to be divided by two opposing forces.
4) Bending – The tendency for a material to bend under stress.
5) Torsion – The tendency for a material to twist under stress.

Such forces lead to "distortion" within structures, a phenomenon where major and minor modifications in the shape of the entire structure and/or various elements of the structure. The distortion caused by these forces contributes to overall weakness, and possibly structural failure.

All these forces exert stress along thrust lines, areas created by loads. While both dead and live loads exert force, live loads have the further ability to move the thrust line. The sole limiting factor in the size of any structure is the location of the thrust lines, not the strength of the components. When thrust lines are loaded beyond a certain point, a structure becomes unstable. As most structures primarily involve the use of compression to maintain integrity, there is a limit to their size. Therefore, most of the strength inherent in any structure is used to support its own weight.

While these concepts were originally developed in and apply to the field of engineering, they hold a great deal of applicability for the profession of education. School districts that have come under conservatorship, districts with inordinately high dropout rates, or highly bureaucratic state departments of education are all examples of organizations in which the stress forces are distorting the structure. These organizations could also benefit from systemic engineering to improve integrity.

While the concept of infrastructure has been included as a component of educational systems, within that context it has most often been applied in an engineering framework to describe the physical structure of an educational facility (Ornstein & Levine, 1989). By using an infrastructure model in a different sense, to analyze the educational system, this article identifies specific stress points that are causing the educational system in the United States to either collapse or be less than successful in dealing with the variety of problems children brig to the educational setting.

While in a pure sense, the concept of infrastructure is not intended to apply to an educational model, there are some important analogies which can be drawn. Analytically, examining education via an infrastructure framework can be interpreted as quasi-systems analysis. Using a systems theory approach (Senge, 1990) the educational system may be viewed either in terms of interacting persons or in terms of analytical abstractions (Betts, 1992; Newell, 1978; Sistrunk, 1974). In both instances, the school system is perceived as a social system in which persons act individually (Getzels & Guba, 1957; Getzels & Thelen, 1960) or as being composed of artificially defined subsystems of human interactions (Banathy, 1991; Parsons, 1968).

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Systems Analysis

The systems approach to analyzing and solving problems is crucial to the effectiveness of any organization. Systems thinking allows individuals to understand that 1) structure influences behavior and 2) structure in human systems is subtle (Blackbourn, Papasan, Vinson, & Blackbourn, 1999; Hamson & Zukerman, 2002; Senge, 1990).

The challenge of applying systems thinking to education lies in uniting internal (i.e. organizational) and external (i.e. environmental) components together in some reasonable manner to enhance proactive planning and decision making. Sistrunk (1974) states that the leader who manages the decision making process rather than the decision is more effective. Further, Langford (1995) holds it is the job of leaders to work on the system and improve it continually. This requires leaders to adopt a proactive than a reactive approach when addressing those internal and external forces stressing the system.

This relationship between organization and environment often becomes integrated in an unproductive fashion. For example, many school districts fail to distinguish policy (which may emanate from environmental sources) and administration (which is organizational in nature). Individual school board members all too often become entrenched with policy which brings them into the administrative arena and leaves school administrators in a quandary as to how to implement these policy initiatives on a day-to-day basis. Part of this difficulty lies in systemic infrastructure and part in the linear cause and effect mindset the system imposes on organizational members (Rader & Rader, 1998). This mindset results in a fixation on events rather than processes.

Systems analysis, therefore, leaves us with a single question, "How much and what types of stress can be placed upon our school system before the system collapses of becomes ineffective?" A systems analysis approach based on the concept of infrastructure is one way to examine the effect of this stress on the system.

Infrastructure Analysis

To paraphrase the Grigg (1998) definition, in an educational context, infrastructure would include the philosophical, economic, and physical foundations required to meet basic student needs in cognitive, affective, and psychomotor domains (Bloom, Englehart, Hill, Frust, & Kratwohl, 1956; Harow, 1972; Krathwohl, Bloom, & Masia, 1964). Operationally, this definition would translate into components that are commonly evaluated from a programmatic standpoint: personnel/facilities, curriculum, fiscal outlay (funding), and methodology/pedagogy. These four components are supported and underpinned by a fifth component, educational philosophy, which is foundational to the entire system.

As depicted in Figure 1 (see end of article), the four visible components of the educational infrastructure (personnel/facilities, curriculum, funding, and methodology/pedagogy) would not stand with the foundation of an educational philosophy. These four components are pillars which support the educational system but, by their very existence, further add stress to the system. The stronger and more flexible each component is, the more support will outweigh the added stress.

External variables, shown in Figure 1 as layers above the pillars, can also serve to add stress and/or support to the system as a whole. These external variables, more often than not, can be viewed as stresses, but this stress to the system can be mitigated as a function of the strength of the four component pillars supported

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by a sound educational philosophy. Each major infrastructure component is discussed below, beginning with the least visible, but most important component, educational philosophy.

Philosophy

The philosophical foundations of a given educational entity are not as easily detectable as the other four infrastructure components. Yet, without an underlying philosophy, personnel decisions, facilities management, curriculum design, allocations of fiscal resources, and instructional methods would be implemented in a random or haphazard fashion. Essentially, the philosophical orientation of an educational system *drives* and *shapes* that system and the manner of implementation among the four pillars.

Adaptability, flexibility, and awareness are underlying themes to an effective philosophy of education. Within such a philosophical approach, excellence can be promoted in a variety of ways which meet the educational needs of all stakeholders (parents, students, teachers, administrators, and community members). It should be noted some theorists advocate a less flexible approach to excellence in education (Adler, 1982). However, such an approach ignores the obvious individual differences existing within educational organizations, the variety of external factors impacting organizations and the relationship of contextual understanding of individual educational organization's unique needs values, goals, and vision (Blackbourn & Center, 1999; Blackbourn, Hamson, & Walker, 2002; Blackbourn, Papasan, Vinson, & Blackbourn, 1999; Center & Blackbourn, 1993). In essence, a single track, inflexible philosophical approach will not address the varied dynamics or patterns of individual or group socio-biological behavior. These behaviors are constant interactions evolving into new and more complex patterns.

The variables produced modify structures and systems in unexpected and unpredictable ways. Only a flexible and adaptive philosophical foundation can address these stress-producing factors in an effective way.

Human Resources

Such philosophical approaches must be rooted in proactivity. Seeing "what's coming down the road" is a requisite skill for school leaders (Blackbourn, Edmundson, Dye, & Rose, 1996; Waterson, 1996). Responding appropriately ahead of the curve is a vital aspect of successful organizations. This orientation must not be the sole domain of the leadership, rather infused throughout all members of the organization. Effective human resource development is the key reaching this goal.

The human resource pillar of this model allows for the diffusion of the philosophical foundations into the organizational members. Baum (1991) states the most important of all resources are the human resources. The effective development of such resources tends to strengthen this infrastructural pillar, while ignoring the development and growth of individual organizational members will bring about the pillar's erosion.

Hamby, Blackbourn, Edmundson, Hampton, and Reardon (1997) describe human resource development that is evolutionary and builds upon the individual organizational members' ability to grow. They understand "growth opportunities" must be created for individual organizational members in an associated tenet of effective human resource development.

For the human resource pillar to be strong, the creation of a learning-based environment is critical. Such an environment supports risk taking, innovation, and failure. Essentially, organizational members are

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empowered t become self-directed learners who translate what they have learned into their work, to apply their knowledge in active problem solving without fear of reprisal if they fail. If an educational system is supported by a human resource pillar composed of productive, self-directed personnel, every other support pillar will be positively affected.

Curriculum

Curriculum, or "the body of educational experiences sponsored by the school" has undergone many reform efforts in American educational history. The work "curriculum" is drawn from the Latin, "circuire," to run a circuit. The word infers a restricted, limited course on may traverse. While a multitude of variables shape what is taught in public schools, much recent curricular reform has been influenced by a "world view" in which the performance of American students is compared with students from other countries.

From an infrastructure standpoint, curricular reform must be internally drive, emanating from those resources most in touch with the educational system: students, parents, community stakeholders, and teachers. Those who are not charged with the daily delivery, planning, monitoring, or consumption of the curriculum (e.g. legislators, university faculty, administration, and special interest groups) have , in the recent past, had a disproportionate influence as change agents on public school curriculum. This is reflected in the authorization and reauthorization of P.L. 107-110, the *No Child Left Behind Act* in which the authors delineate the direction and extent of the expectations of university personnel, public school personnel, and the parents of public school children. Such influence is often translated as the basis for overall curricular change (Common Core Standards), and the practitioner in the field is often left with no clear

direction or specific strategy as to how to deliver the curriculum to students who are quite different from those the change agents are most associated with. To deal with the stresses of modern society, curricular design must be a "bottom up" process involving those with instructional expertise necessary to account for the variety of student types enrolled in our schools and those whose needs must be served.

Funding

Based on current data relative to school funding levels, it is clear that despite all of the recent rhetoric about improving education, the federal government is unwilling to seriously fund education at a level commensurate with the stresses on the educational system. It appears the value of a child's public education has undergone "inflation" over the past thirty-plus years. The outcomes of this fact jeopardize the very fabric of democracy in this country for the next generation. The consequences for this inadequate federal support of education are already being felt. Little improvement in the dropout rates, "spotty" results (at best) in the war on drugs, a dramatic increase in youth crime, and an ever increasing number of prisons (often surpassing the number of new schools constructed on an annual basis) being built are indicators funding is not being utilized effectively for education of the nation's young people.

There seems to be a sort of funding "cop out" whereby the federal government (typically predicated upon the position there is no constitutional guarantee to an education) expends a limited funding allocation for entitlement and sometimes research purposes. The federal government then passes the bulk of the responsibility for funding education on to the states. The states, in turn, due to mounting problems and needs, contribute an ever tighter share of the cost, primarily in the area of basic

skills instruction. The remainder of the cost of educating a child is passed on to the local education agency (LEA). Local school boards (not to mention teachers and administrators) are then faced with the dilemma of generating income (usually through property taxes) to make up for the fiscal shortfall from the bureaucratic "buck passing." At a time where an aging American populace has a declining *direct* vested interest in the public schools and already feels overburdened with taxes, raising local property taxes to support the needs of the educational system is becoming less of an attractive alternative. When this fact is considered in combination with rising medical costs (and the stresses they being to future federal and state budgets), as the "boomer" generation continues to age, grim times seem to be ahead for public education.

Current debates on funding reform (e.g. tax credits, vouchers) abrogate the role of the federal government as the leader in addressing our most valuable natural resource, and the most important national security issue: The education of American children and youth. Until our government invests in children at the rate it does in other programs, fad solutions involving "incidental" rather than "fundamental" change will not contribute to serious reform.

Methodology

Accommodating the learning needs of the diverse student population existing in the United States requires teachers to employ a variety of instructional methods. Thus, rather than teachers using just one or two instructional strategies over the course of a content unit, they must be creative and mold methodology to the learning needs of individual students as well as individual instructional groups. This creativity therefore, elevates the act of teaching to an "art of instruction" or pedagogy (Ornstein & Levine, 1989).

Unfortunately, to a great extent, educational reform has focused more effort on *what* we teach (e.g. curriculum) rather than *how* we teach it (e.g. methodology/pedagogy). Yet, to make the curriculum relevant and meaningful to an ever-changing school population, the methods used in the classroom are of critical importance if learning is to transpire. An idea as to how the student population can change in a relatively short time is evidenced in these figures:

➢ Between 1975 and 2002, the percentage of minority students in the public schools in the United States rose dramatically as illustrated by increases in African-American enrollment, from 15.5% to 19.3%; Hispanic enrollment, form 6.14% to 17.4%; and Asian-American enrollment, from 1.2% to 8.4% (National Center for Educational Statistics, 1976).

➢ The percentage of households in which children are raised by single parents rose from approximately 16.5% in 1975 to just over 51% in 2002 (United States Census Bureau, 1976, 2003).

➢ The percentage of children under 18 raised in a household where there is a working mother rose from less than 27.7% in 1975 to over 70% in 2002 (United States Census Bureau, 1976, 2003).

➢ Though years of decline have been transformed into a "flattened" profile, Scholastic Aptitude Test (SAT) scores in 2002 were 21 points lower than in 1975 (United States Census Bureau, 1976, 2003).

The varied student population, with a variety of learning needs, clearly adds stress to the already under-supported national endeavor of education. Policy makers (e.g. federal and state legislators, school boards) initiate curricular change to

upgrade the quality of education in the United States without providing educators with insight as to how this quality is supposed to be delivered to a diverse student population. In many instances, policy makers place hurdles before future teachers in the form of illogical degree requirements. Clearly, our teacher education departments and our instruction in the schools must reflect the pedagogical needs of an increasingly diverse student population.

Currently, the No Child Left Behind Act of 2002 (NCLB), has increased the focus on a standardization of practice and qualifications, particularly concerning the concept of "highly qualified teachers." Such an emphasis on employee behavior of preparation rather than educational quality not only reflects a micro-objective, functionalist approach to the complex process of education (Skirtic, 1990), but it also perpetuates the reductionist, prediction and control perspectives of Frederick Taylor's Scientific Management Theory (English, 2003).Many of Taylor's theoretical constructs ignore systemic realities and profound knowledge (Deming, 1994) and simply serve to make the administrator's job easier while complicating and frustrating the activities of teachers and students (Blackbourn 2003, 2004).

Indeed, many fully-certified special education teachers initially became "unqualified" by fiat under NCLB. These individuals taught students with disabilities at the secondary level and as they lacked a minimum of 18 hours in a content area could no longer hold a junior or senior high school position. It is highly unlikely the addition of an 18 content emphasis would make these persons more effective teachers of students with disabilities. In essence, the standardization process in NCLB eliminated many excellent, experienced teachers and reduced the public schools' ability to effectively address human diversity.

Suggestions for Educational Infrastructure Reform

In this section, suggestions, not solutions, are offered. The status of education in the United States has been allowed to decay for such a length of time that, at this juncture, there are no "quick fix" solutions. But, swift and bold intervention is critical to keep the educational system supported and lay the foundation for ongoing improvement. The following are a minimal effort in reinforcing our educational infrastructure.

Suggestion #1: Provide a Federal Constitutional Guarantee to an Education.

The philosophical and pragmatic implications of this issue are paramount to "getting serious" about education (and deal with all the stresses placed on the educational system). A federal constitutional guarantee to an education in this country is a major component of a comprehensive systemic reform of education. Such a guarantee will force the political element to begin to fund education at a rate that is commensurate with the stress on the system. The combined effect of all the initiatives and research thus far in the field of education has resulted in outcomes such as a dropout rate of approximately one-third of our students, lower achievement test scores, and increasing violence in the schools.

While we have excellent research and policy initiatives that have potentially positive effects on isolated groups of students over a short-term, there is no evidence of any long-term, wide-spread systemic improvement (Blackbourn, 2004; Blackbourn, Hamson, & Walker, 2002). Dissemination of methodologies, materials, ideas, and procedures takes time and money for the training and re-training of educators. Until there is a federal drive to assist in this, the combined effect of the

research and development efforts in education will continue to be analogous to "spitting in the ocean." In essence, this lack of seriousness is simply a means to "get by cheaply" at state and local levels because the federal government has no authority to intervene, except via court decisions or pinpointed legislation. Some communities possess far greater levels of wealth related to property values. These discrepancies only add to the dilemma due to the embellished norms generated. In the state of Mississippi, the gulf between the highest and lowest assessed values of a single mil is over $1.3 million (Putnam, 2010). This differential is so askew the norm between the extremes offers no sense of reality in funding for either school district.

If it were not for *Brown v. Board of Education* or *Public Law 94-142* (both of which emanated from the federal branch of government), some states would likely still not have equal education opportunities for minority students, and some states would still deny access to the public schools for handicapped children. It is time for those *public servants* who are charged with the well-being of the country to be put to the litmus test: If leaders support quality in education, then they should support a constitutional amendment guaranteeing it.

Suggestion #2: Close the Gap Between Expressed Philosophical Statements and Realized Philosophical Outcomes:

Expressed philosophical statements are those pronouncements, usually emanating from national, state, or local educational agencies, in which an ideological view of education is established (e.g. "all students will achieve commensurate with their potentials"). Such mission and vision statements must have validity points related to short-term and long-term goals to ensure practice is related to vision and mission. In essence, what is proffered in any educational organization must be related via the

validity points to the organization's mission/vision or it will not be considered. While these statements often reflect pure democratic principles (e.g. an egalitarian approach to education), in practice, exemplifying the mission or vision is often more difficult (e.g. "realized" outcomes). Educational agencies must be accountable, not for test scores improvement, but for fulfillment of their philosophical views.

Expressed philosophical statements can be compared with realized philosophical outcomes on the infrastructure pillars mentioned earlier. For example, if our philosophical statement reflects some achievement potential for all children, do we then allocate our personnel, fiscal, curricular, and pedagogical resources accordingly? To the extent we do not allocate accordingly, we cannot declare our expressed statements and realized outcomes are congruent.

Suggestion #3: Use Differentiated Salaries in Recruiting Teachers in Critical Need Areas.

In many occupations in this country, salaries are differentiated for the same job based on skill level required, perceived need, and market value. One need only examine the gap in salaries between university faculty members in a school of education to similar faculty in a school of business. It is commonly accepted knowledge that heart transplant specialists earn more than general practitioners, and quarterbacks make more than linemen who protect them. These differentiated salaries are acceptable due to specialized training and demand of the jobs.

It would therefore behoove the policy makers of our educational system to examine differentiated salaries rather than bemoan impotent attempts at attracting teachers to areas such as science, mathematics, or special

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education. Here again, an opportunity arises for involvement by the federal government in subsidizing salary stipends or providing annual bonuses for teachers in high need geographical areas to augment recruitment efforts by the poorest local education agencies. These salary supplements would only be offered to those educators teaching in critical need areas who were fully certified to teach in those areas. Temporary or emergency certification would preclude involvement in the salary supplementary program. If our leaders are serious about employing instructors in areas of high demand with full certification (as espoused by NCLB), they must "raise the ante" in reinforcing this aspect of the educational infrastructure.

Suggestion #4: Infuse "Functionalism" Across the Curriculum.

In recent years there have been efforts to infuse processes such as written language across all curricular areas in an attempt to bolster the written communication skills of American youth. The adoption of the Common Core State Standards (CCSS) has further heightened the efforts for such inclusion of writing skills. While these efforts are laudable, they fail to address an issue more basic to the facilitation of skill building: relevancy.

In too many cases in American school, subjects are taught in abstract ways, with little attention to each other or to the "real world." While curricular integration can encourage an interrelationship among subject disciplines, those disciplines must be made relevant to their applications in modern society. Despite data cited in this article and elsewhere on the changing needs of American children and youth, there still exists an erroneous assumption wherein all students come from a background sufficient and supportive enough to promote educational relevancy. It is no longer adequate

to merely teach a subject; students must be shown why the skills of that subject needs to be learned.

Infusion of functionalism, which has been a thrust in working with students with special learning needs, must be applied to the whole student population. Currently, models exist which promote functionalism through career education into existing subject areas. If teachers are to infuse functionalism into their instruction, then teacher preparation programs must lead the way by training teachers not only to teach a subject, but to also teach their students why the subject is import to society.

Suggestion #5: Promote the Acquisition of Process as Well as Content.

Recent reform initiatives have produced an educational environment wherein "content" (e.g. knowledge displayed on standardized tests) are valued at the exclusion of other education variables. Indeed, test scores have the "be all, end all" for most public schools administrators and board members. This deification of educational products has even spawned instances where "teaching to the test" (pedagogy taboo #1) is not only practiced, but encouraged. Yet, rational logic dictates that if a student is to gain some measure of educational content and attainment, then the student must activate the processes to learn and comprehend the nature of the content. It seems logical therefore, that as we teach students the content we also instruct them in the processes through which this content is most effectively acquired. Thus, applications of information processing can assist the student in learning requisite material while becoming a more proficient learner as well.

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Suggestion #6: Use Teacher Writing Teams in Curricular Development.

Curricular change should not only reflect subject matter, per se, it should also apply to instructional methodology (i.e. how we teach the subject matter). A means to address both subject matter *and* methodology/pedagogy is to use teacher writing teams in developing new curricula. Advantages of the use of teacher writing teams are:

> ➢ unique instructional concerns can be addressed;
> ➢ the curriculum and instruction can be tailored to the needs of a specific school district of building;
> ➢ assessment processes tend to be more practical and instructionally relevant;
> ➢ if so constructed, the team can address the continuum of a subject, from elementary through high school.
> ➢ the team approach, itself, builds collegiality among professional educators who share common curricular interests; and
> ➢ a vested interest is conveyed to the curriculum because those who wrote it will be those who deliver it.

The major obstacle to using teacher writing teams focuses on the providing the release time needed for teachers to participate in the team process. To promote the concept of teacher writing teams, school districts must view the role of the teacher in a broader, more professional sense than solely someone who delivers instruction. As such, teachers must be perceived as professionals with expertise in curricular development and instructional

delivery who are links between theory and practice.

Suggestion #7: Increase Role of the Federal Government in Providing Fiscal Resources.

The federal government must take a more aggressive role in providing school districts with fiscal resources. The current contribution of between five and thirty percent (range of support provided to states through various Title Program involvement) of total school revenue is wholly inadequate with the stresses placed on the educational system from the federal perspective. Providing stipends to districts for hiring teachers in high need areas, or providing a supplement to teachers who are employed in inner-city or rural areas are examples of ways in which the federal government could support the educational infrastructure.

Forcing mandates on the schools (i.e. integration of minority students, the mainstreaming of handicapped students, or the assurance all students have a fully certified teacher) without backing up those mandates with adequate fiscal resources simply adds to the stress of an already stressed system.

Suggestion #8: Address the Effect of Research on Infrastructure.

Research-based instructional or curricular interventions should be analyzed from two perspectives. First, the traditional view of research should be addressed wherein the effect of procedures or materials on the performance of students is discussed from a statistical significance framework. In other words, did the procedures or materials bring about significant positive change in some pinpointed dependent variable? Currently, solid research, in most cases, addresses this issue. But, the question remains as to how best to export or replicate these procedures or materials.

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An infrastructure analysis can follow the model depicted in Figure 1. Each infrastructure pillar, including the philosophical component, should be discussed from the standpoint of stresses or changes which must occur for successful replication of the procedures or materials to be enhanced. Thus, if retraining of faculty needs to be accomplished, the pillar of personnel / facilities should be analyzed as to how the added stress to the pillar can best be mitigated.

If research articles and presentations did not leave the educator "hanging" with a quandary of "how can we implement this in our school district?," then the prospect for greater acceptance and adoption of significantly successful methods and materials would be facilitated. To this end, positive changes as a result of research efforts may extend their effect beyond isolated or limited instances.

Discussion

The infrastructure model presented above is offered not only as "food for thought," but also as a means to address the stresses and pressures under which our educational system must operate. Through court decision, legislation, population changes, and other variables of influence, the educational system has become much more than a purveyor of the "3 Rs." While expectations and responsibilities have been, in many cases, *forced* on the educational system, resources have not followed to bolster the system in supporting the additional weight or burden. Those policy makers who contribute to adding weight and stress to the system, in most cases, have had no "field experience" as a point of reference to understand the dynamics of the system over which they have substantial influence. In the political arena there is an unwritten rule wherein to achieve the nation's highest offices, a person must have had a background in law, business, or the military (a

blend of the three is particularly helpful). In the future, those who seek political influence in the country will, increasingly, be called upon to substantiate their experiences in the classroom, because if we do not begin the process of reinforcing our nation's educational infrastructure, the freedoms we enjoy in our democratic society will be in serious jeopardy.

Figure 1. An Infrastructure Model of Educational Systems
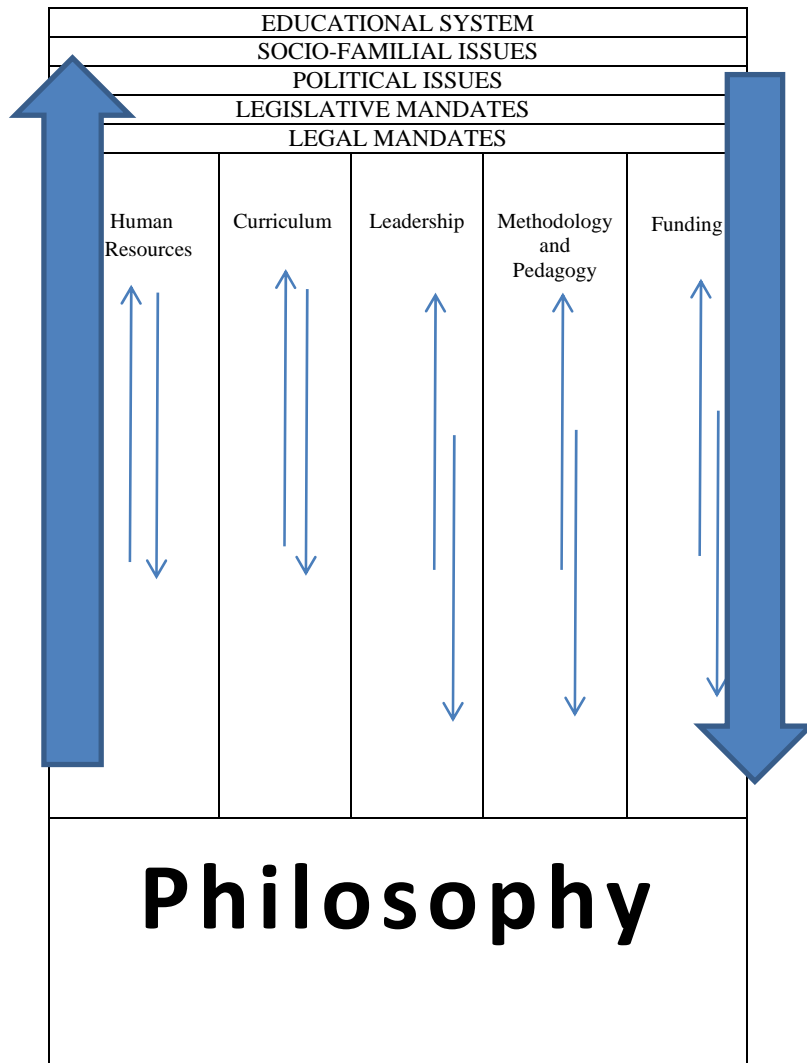
References

Adler, M.J., (1982). The Paidia proposal. *The American School Board Journal*, 17-20.

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Banathy, B. H., (1991). New horizons through systems design. *Educational Horizons, 69(2)*, 83-89.

Baum, T. (1991). Management trainees in the hotel industry: What do managers expect? *Journal of European Industrial Training, 15,* 3-8.

Betts, F., (1992). How systems thinking applies to education. *Educational Leadership, 50(3)*, 38-41.

Blackbourn, J.M. (2003). The new Taylorism: Lessons we forgot to remember. Unpublished manuscript. The University of Mississippi.

Blackbourn, J. M. (2004). How we prevent the prevention of school failure. Unpublished manuscript. The University of Mississippi.

Blackbourn, J. M., & Center, D. B. (1999). Monopolistic educational bureaucracies (MEBs) V: Revisiting the disease destroying public education. Unpublished manuscript. The University of Mississippi.

Blackbourn, J. M., Edmundson, S., Dye, C., & Rose, R. (1996). Beyond partner schools and professional development sites. *International Journal of Educational Reform, 5(1)*, 86-90.

Blackbourn, J. M., Hamson, N. & Walker, J. (2002). What's love got to do with it? In J. C. Owens and J. C. Simmons (Eds.), *Creating quality reform: Programs, communities, and governance.* (pp.53-65). Boston, MA: Pearson.

Blackbourn, J. M., Papasan, B., Vinson, T. P., & Blackbourn, (1999). Leadership for the new millennium: Lessons from Deming, Glasser, and Graves. *National Forum of Educational Administration, 17E (4)*, 57-63.

Bloom, B., Englehart, M., Hill, W., Frust, E., and Kratwohl, D. (1956). Taxonomy of educational objectives: The classification educational goals, Handbook I. New York, NY: McKay.

Brown v. the Topeka Board of Education. (1964). 347 U.S. 483.

Center, D. B., & Blackbourn, J. M. (1993). Monopolistic education bureaucracies (MEBs): The disease destroying public education. *National Forum of Educational Administration and Supervision 10(2)*, 91-96.

Deming, W. E. (1994). *The new economics for industry, government, and education.* Cambridge, MA: Massachusetts Institute of Technology.

English, F. W. (2003). *The postmodern challenge to the theory and practice of educational administration.* Springfield, IL: Charles C. Thomas.

Getzels, J. W. & Guba, E. G. (1957). Social behavior and the administrative process. *The School Review*, 423-441.

Getzels, J. W. & Thelen, H. A. (1960). The classroom group as a unique social system. In N. B. Henry (Ed.), *The dynamics of instructional groups: Sociopsychological aspects of teaching and learning.* New York, NY: The Society for the Study of Education.

Grigg, N. S., (1988*). Infrastructure, Engineering, and management.* New York, NY: John Wiley and Sons.

Hamby, D., Blackbourn, J. M., Edmundson, S., Hampton, B., & Reardon, M. (1997). Metamorphosis and human resource development. *The Record in Educational Leadership, 17(1)*, 94-98.

Hamson, N., & Zukerman, A. (2002). *Managing Quality.* Oxford, UK: Capstone.

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Harrow, A. J. (1972). *A taxonomy of the psychomotor domain.* New York, NY: McKay.

Hutchinson, J., & Karsnitz, J. R. (1994). *Design and problem solving in technology.* Albany, NJ: Delmar Publishing.

Kolenda, K. (1984). Moral philosophy in the core curriculum: The bipolarity of morality. In *Assembly Magazine*. West Point, NY: McKay Publishing.

Kratwohl, D. R., Bloom, B. S., & Masia, B. B. (1964). *Taxonomy of educational objectives, Handbook II: Affective domain.* New York, NY: McKay Publishing.

Langford, P. E. (1995). *Approaches to the development of moral reasoning.* Hillsdale, CA: Erlbaum Associates.

National Center for Educational Statistics. (1976). National Digest of Educational Statistics. Washington, D. C.: Author.

National Center for Educational Statistics. (2003). National Digest of Educational Statistics. Washington, D. C.: Author.

Newell, C. A. (1978). *Human behavior in educational administration.* Englewood Cliffs, NJ: Prentiss Hall.

Ornstein, A. C., & Levine, D. U. (1989). *Foundations of education (4th ed.).* Boston, MA: Houghton Mifflin Company.

Parsons, T. (1968). An overview in T. Parsons (Ed.) *American Sociology: Perspectives, problems, methods.* New York, NY: Basic Books.

Public Law 94-142. (1975). The education of all handicapped children act. Washington, D. C.: Congressional Record.

Public Law 107-110. (2002). The no child left behind act. Washington, D. C.: Congressional Record.

Putnam, M.R. (2011). Equity in Mississippi: A study of public school funding. (Doctoral dissertation). Retrieved from http://search.proquest.com/docview/880398582

Rader, D. R., & Rader, J. (1998). The three little pigs in a postmodern world. Paper presented at the mid-south instructional technology conference, Murfreesboro, TN. April 5-7, 1998.

Senge, P. (1990). *The fifth discipline.* New York, NY: Currency Press.

Sistrunk, W. E. (1974). *Principles of secondary school teaching: A worktext.* Dubuque, IA: Kendall Hunt.

Skirtic, T. M. (1990). Social accommodation: Toward a dialogical discourse in inquiry. In E. G. Guga (Ed.) *The paradigm dialogue: Options for inquiry in the social studies.* Beverly Hills, CA: Sage Books.

United States Census Bureau. (2003). Statistical abstract for the United States. Washington, D.C.: Author.

United States Census Bureau. (1976). Statistical abstract for the United States. Washington, D.C.: Author.

Waterson, B. (1995). *Attack of the deranged, mutant, killer, monster snow goons.* Kansas City, KA: Andrews and McMeel.

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