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Making the Honor Roll: Can Schools Learn from Business Excellence?

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MAKING THE HONOR ROLL: CAN SCHOOLS
BENEFIT FROM BUSINESS EXCELLENCE?

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ABSTRACT

Our schools and school systems are feeling crunched from different directions. Some stakeholders are clamoring for more accountability, others for better results, and still others to do more with less funding. It is not surprising then that school communities are trying different approaches in an attempt to be responsive to different voices. Several schools have decided to borrow the disciplines of the International Standard known as “ISO 9001:2000” (hereafter ISO 9001)¹ from the business realm in an attempt to address these pressures. This research investigates the applicability and benefits of ISO 9001, as perceived by school administrators and educators in schools which have adopted these practices. The hypothesis is that the ISO requirements are applicable to a school setting and that benefits similar to those purported to accrue to private business can reasonably be expected to accrue in a school setting. In developing my arguments, I consider the universality of ISO 9001’s requirements, assess the similarities between the majority of school processes and private business processes by using the Zachman Enterprise Framework², and finally, use the Theory of Structure and Agency³ (ToSA) to illustrate the universality of the tradeoffs between individuals’ aspirations, goals, and vocations and the structure (i.e., the rules, requirements, expectations, and limitations within which they operate). My findings demonstrate that these dynamics are profession-independent and that this fact provides a basis for applying the ISO 9001 standards to an education setting.

¹ ISO 9001:2000 is the 2000 version of an International Standard developed by the Organization for International Standardization in 1983. In the US, it is administered by the National Institute of Standards and Technology.

² The Zachman Framework is an enterprise architecture framework, which provides a formal and highly structured way of viewing and defining an enterprise. It consists of a two dimensional classification matrix based on the intersection of six communication questions (What, Where, When, Why, Who and How) with six rows according to reification transformations.

³ At its essence, ToSA is the entanglement and interactions between the will, desires, goals, and needs of an agent (actor) and his or her environment, rules, and expectations.

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INTRODUCTION

What do school districts and schools in Liberty Center, Ohio, Jefferson County, Colo., Claymont, Del., and Lancaster, Pa., and Juarez, Chih. Mexico have in common besides pizza on their lunch menu once a week? These districts, ranging from 1,200 students in northwestern Ohio to an urban system in Colorado with 90,000 students, share a concern for quality education that is real-world oriented and based on efficient and consistent management. To this end, all four have qualified for the ISO 9001 International Quality Assurance Standard (Zuckerman 2000).⁴

Clearly our schools and school systems are feeling crunched from different directions. Some stakeholders are clamoring for more accountability, others for better results, and still others to do more with less funding (Connell 1998).⁵ It is not surprising then that school communities are trying different approaches in an attempt to be responsive to different voices. Borrowing disciplines, paradigms, standards and practices from elsewhere is certainly an attempt to address these demands. One standard being borrowed from industry is ISO 9001, although it is difficult to know how many such institutions have registered in the United States.⁶ This paper investigates the experience of those school communities who have implemented ISO 9001 in the U.S. and also explores the potential for those that have not. I used my 15 years of experience in implementing and auditing ISO 9001 in business environments and used my 15 years of experience working in an educational setting to develop some informed ideas to support my hypothesis that the benefits proven for business could accrue to any school implementing this type of Quality Management System (QMS). I will describe, in some detail, six milestones that

⁴ I invite the reader to consult Appendix 1, the complete text of the Standard.

⁵ I consider this common knowledge; but if it is not obvious to the reader, please refer to Connell (1998).

⁶ This is partly because ISO only publishes the standards and the 60 accredited U.S. registrars operate independently of each other. Consequently, no statistics exist on the number of school districts involved nationwide. Anecdotal evidence points to approximately 150 school-related registrations in the US.

are characteristic of a “typical” implementation in private industry. At every point where the corresponding issues in education are not obvious, I will rely on my educational experience and the experience of others to suggest an appropriate interpretation of the ISO 9001 requirement in an educational setting. The appropriateness of these suggestions will then be validated or refuted by information obtained from surveys and interviews with educators and consultants who have gone through the implementation experience.

I present a balanced view of strengths and limitations of ISO 9001 when applied to education; what is or is not possible, and what or should not be expected. I am mindful of the fact that schools are not businesses; however, I am hopeful that a major intention of the standard— applicability to any human endeavor—will be of benefit to educational organizations.⁷

To help answer the question as to why any school community would take on something like ISO 9001, Kiefer (2003, 79) has taken some typical motivations from private industry and translated them to educational terms, such as: 1) implementing strategic plans, 2) focusing resources on the core business of teaching and learning, 3) initiating data-driven decision making, 4) improving revenue through grants and taxpayer confidence, 5) empowering people to facilitate school-based decision making, and 6) improving processes through people working as teams.

⁷ Based on the OSHA Standard Industry Classification (SIC) Codes, there is virtually no category which does not show at least some ISO 9000 registrations in the group.

ISO 9001:2000

Developed in 1983, ISO 9001 was initially adopted by the British Standards Institute (see Appendix I).⁸ Within 36 months, 90 countries had also adopted the standard. ISO 9001 is the first attempt to develop a worldwide standard to help organizations measure and monitor their quality efforts and instill a culture of continuous improvement.⁹ A documentation-based process, ISO 9001 asks organizations to tap employees to act as internal auditors and to audit each other's and management's job against a backdrop of continuous improvement. This is accomplished by having employees and management develop quality objectives, assess work procedures and work instructions, and jointly develop a quality manual as well as corrective action procedures. After issuance, ISO 9001 was first revised in 1994 and currently the term ISO 9001:2000 denotes the effective date of its latest revision.¹⁰

My experience with the Standard dates to 1995.¹¹ I have had three primary roles in dealing with clients. One role is that of consultant, where I help facilitate the design and implementation of a Quality Management System (QMS) that will meet a company and respective customer requirements. A second role is that of auditor where Registration organizations, called Registrars¹², will contract me to perform audits (for companies which I have *not* consulted). Lastly, my favorite role is that of trainer and staff development. Here, I spend time with the organization learning the culture and needs. I enjoy planning and implementing activities and projects to promote competency, morale, qualification and knowledge, with the ultimate goal of certification of the QMS by third party auditors.

⁸ ISO standardization started right after WWII in 1947 with the establishment of the International Organization for Standardization in Geneva, Switzerland. It should be noted that standardization of quality systems only began during 1983. ISO is not initials; it derives from the Greek *isos*, meaning equal.

⁹ As of 2009, 156 out of the 193 world countries are participating.

¹⁰ Hereafter, I will use the terms "ISO 9001" and "the Standard" interchangeably.

¹¹ I earned credentials as ISO 9001 lead auditor from the National Institute of Standards and Technology (NIST) of the US Department of Commerce as in 1997 to the present (2011).

¹² These are private companies that offer registration services and are authorized by NIST.

This experience includes consulting for over 100 organizations, and auditing 150 organizations, and training of thousands of individuals in private industry over the last 15 years while at UTEP. These public and private organizations have included defense contractors, foreign governments, medical, automotive, US military installations, international/bi-national agencies, cafeterias, doctor's offices, engineering services, auto dealerships, homebuilders, Native American nations, and small machine shops.

I also have firsthand knowledge of a successful application of these disciplines in an educational organization. This came from a 3-year contract for surveillance audits at the University of Sonora in Hermosillo, Mexico. I was the auditor for three years during 1999-2001 and was able to determine that the QMS was strongly supported by everyone in the organization—the president, deans, department heads, instructors, students, and support staff. I saw very positive results, and remain intrigued to see if their success could be duplicated in educational institutions in the United States.¹³ There was nothing extreme or unusual in the University of Sonora's QMS. It was largely common sense disciplines that the leadership and faculty by and large supported. During a 1999 interview with Horacio De Oliva, the director general, he indicated it was “just that we never had a logical framework which could help us implement, maintain and improve the suite of initiatives and improvements we were committed to” (De Oliva 1999). According to the Registrar's auditor who completed a surveillance audit during 2005, expressed during an interview with the author on May 28, 2010, that the Quality Management System continues to evolve and improve even though most people in the original leadership team had moved on (Muñoz 2010).

¹³ One aspect of their QMS which caught my attention was their approach to student services, which mirrors a client manager model. Cohorts of 25 students are assigned to each faculty member for the duration of the student's stay. These “client managers” are responsible for all dimensions of student life, such as retention, personality development, social development, smoking, academic progress, etc.

In my role as consultant, I have come across a few companies unable to generate the culture and paradigm changes needed to implement such a system. In these cases, the root cause was always top management's failure to recognize the Standard's potential benefits and their lack of commitment towards changing the organization.¹⁴ Because of these experiences, I am very clear about my expectations from my clients when I sign on to lead the effort with an ISO 9001 project. They must understand that ISO 9001 is not something you do, it is something you become.

¹⁴ Other causes included financial difficulties, family businesses with personality problems, and high turnover within the management team.

STAKEHOLDERS

The first step in a typical implementation of a Quality Management System (QMS) in accordance with ISO 9001 is a review of interests, requirements, and expectations from the standpoint of stakeholders; typically customers, suppliers, employees, and regulatory entities. Stakeholders for a school community may well include students, parents, teachers, staff, employers, the community, accreditation entities, the district, and the State, among others. From this review of stakeholder's requirements, we must develop two responses. One is the Quality Policy that houses the intent to meet these requirements, couched in long-term, unchanging goals. The other is the Quality Objectives that measure the progress on the journey towards meeting the interests and expectations of the stakeholders. The Quality Policy, in private industry, is very common and should represent what the organization would like to be known for. A typical Quality Policy in industry might read as follows: ¹⁵

1. *Providing goods and services which consistently exceed the expectations and specifications of our external and internal customers.*
2. *Involving all of our associates in an effort to continually improve the value of our products, processes, and services.*
3. *An ongoing commitment to the training and development of our greatest resource, our people.*

Goals are defined as long-term, perhaps unattainable intentions [Luna 1985, pp45-49]. Typical goals in industry can include zero defects in product or services, 100% on-time delivery, continuously doing things better, faster, and cheaper, becoming market leader, becoming a learning organization, etc. The general, high-level statements in a quality policy are often

¹⁵ This is the actual quality policy for EXEL-Texas Instruments in Fort Worth, Texas and used here with their permission. Visit the website of any corporation and you can click on their quality policy.

written as goals, as reflected above.

Objectives, on the other hand, are defined as short-term intentions or steps taken on the journey towards achieving goals. Typical quality objectives in industry might include: reducing errors by 10% in the next 12 months, increasing on-time delivery to 92.5% within six months, developing two more improvement teams this year, developing two new products or services this year, etc. Admittedly, for a school community the objectives that are defined would probably be more difficult to measure initially.

The Lancaster, PA School District selected five objectives to launch their effort. These included: 1) empowering people to improve their processes, 2) improving the quality of instruction and the quality of student work, 3) improving the accountability to students, parents, staff, employers, and the community, 4) demonstrating effective stewardship of taxpayer's money, and 5) developing a common plan for data management and the reporting of results (Kiefer 2003, 79). These are appropriate objectives provided that effective metrics and measuring systems are available.¹⁶ In the absence of measuring, these objectives migrate to the category of good intentions.

For ISO 9001, quality goals are long-term, hard to measure, and may be unattainable, but provide very good direction. Quality objectives are short-term, measurable, and should be attainable in a relevant timeframe. Note that it is the organization, *not* the Standard, which sets the goals and objectives. The Standard just requires that these be developed and documented.

Initially, I saw two challenges in meeting these requirements in an education setting.¹⁷ One is that stakeholders in education are a much more diverse constituency than a typical customer in a private industry setting and seldom speak with one voice; something a typical

¹⁶ Kiefer did not indicate if this was the case; he only listed these in his article.

¹⁷ Challenge means we need to think differently, as I think a school community would not find it too difficult to meet these requirements.

industry customer almost always does. While this may be true, usually these diverse, and sometimes competing, demands and expectations are more or less negotiated, standardized, articulated, and combined as they make their way through the education system and become policy (Loverd 1997).

The second challenge is the dynamic of the relationship. In a typical setting, the customer articulates his needs through contractual requirements. He then sits back and waits for the provider (customer) to complete the task. This is not the case within the dynamic of teacher and learner. Much more so than in a typical setting, in an educational setting, the provider (education) and the consumer (learner) both share substantial responsibility for the outcome. While this dynamic is not common in manufacturing, it is far from unique in business. Healthcare-provider and patient or consultant and client are such relationships; both share responsibility for the outcome.¹⁸ In these cases, the provider, in an ISO 9001 setting, defines and documents only those processes, tasks and activities for which the provider is responsible. In an education setting, it may be advisable to articulate and document only those functions which are within the control of a given institution at the point of interaction with particular stakeholders such as student, parent, community, labor group, private industry, universities, etc.

Despite these challenges in developing goals and objectives, there remain many efforts within education to develop quality policy and quality objectives. For instance, in their 1999 report, *More Quality to the Quality Policy of Education* (European National Boards of Education 1999, 4-10), the European Education Ministers outlined several broad-based approaches to developing quality policy and quality objectives for education, suggesting that these efforts take into account ideas such as quality of education, quality assurance, the social relevance of

¹⁸ Providers who also need the efforts of the customer for success include personal trainers, singing/acting coaches, dieticians, etc.

objectives of education, quality of learning environment, and independent evaluation. Aligning their actions with this vision from across the Atlantic, The Ridge Academy in Chicago has developed six great candidates for quality policies (Ridge Academy 2010):¹⁹

- *To cultivate, recognize, and respect the opinions and contributions of child, parent, and teacher.*
- *To provide a safe, nurturing environment for learning where individuality is recognized and diversity is celebrated.*
- *To provide instruction that encourages development of each child's practical, cognitive, physical, social, and moral potential.*
- *To present a curriculum that is intellectually stimulating and developmentally appropriate.*
- *To encourage initiative, self-discipline, critical thinking and creative approaches to problem-solving.*
- *To foster the values of good citizenship through community service, civic awareness, and development of leadership potential.*

Note that these are long-term, and may never be fully implemented, but can provide excellent direction for the organization as it seeks to fulfill its mission. These goals (quality policies, in ISO 9001 terminology) are excellent specimens that meet the spirit and letter of the ISO 9001 standard.

A second approach to develop quality policies may be to develop them from a school community's principles for school quality, such as those outlined by Kiefer [80]:

- *Leaving no child behind*

¹⁹ The Ridge Academy website referred to these as School Objectives, though in my opinion they represent excellent candidates for a Quality Policy.

- *Rigorous academic work*
- *High expectations and support*
- *Progress in teaching and learning results*
- *Teamwork at the school and district level*
- *Partnerships with business and the community*
- *Accountability for results*

The Standard also requires short-term, measurable Quality Objectives which should be attainable in a relevant timeframe. Here too, examples from school communities already exist. Lakewood Elementary in Maryland has developed the following two Quality Objectives:²⁰

Lakewood School Objective #1:

To increase the reading performance of grade 2 and 4 students, as measured by an average annual percentage point increase from 77% to 80% and from 83% to 85% of the students at or above the 60th percentile on the CTBS reading test, respectively at the end of three years (2003-2006).

Lakewood School Objective #2:

To increase by 10% the writing performance of grade 1 and 2 students as measured by September 2002 Developmental Stages of Writing Continuum baseline data.

These statements meet the intent of the Standard for quality objectives because they are clear, short term, and measurable. It may also be worth noting that these objectives are both

²⁰ Lakewood School referred to these as Quality Goals, though in my opinion they are excellent Quality Objectives; short term, measurable and achievable in the timeframe.

periodically assessed by third-party auditors, with the goal of maintaining the objectivity and consistency of the measurement. This requirement is typically applied in ISO 9001 setting in business environments as well (Boedder 2010). These approaches taken by the Ridge Academy for goals and Lakewood School for objectives would go a long way in meeting the Policy and Quality Objectives requirements for ISO 9001.

PROCESSES

Once the goals and objectives have been developed, the second step in the implementation of a QMS is to define the processes that the organization uses to meet its goals and objectives. The Standard requires a mapping of three types of processes—Core Processes, Support Processes, and Management Processes—which appear to exist universally in organizations of any type. Core Processes are those which are specific to the organization such as painting, cutting, assembly, accounting, manufacturing, bending, shaping, machining, administrating, health care, education, surveying, etc. These are value-adding activities; it is “what the customer pays for” or, more generally, they define the organization. Support Processes are those which are more generic but tend to support the core processes. These include purchasing, human resources, design and development, transportation, training, facilities, equipment, etc. Management Processes are those directly related to the QMS, such as planning, continuous improvement, management review, customer focus or stakeholder feedback, documentation, records, nonconformance, internal audits, corrective actions, setting directions, deployment of resources, etc. The functions of setting direction, deployment of resources, or records and documentation would serve as good examples. Clearly, these are universal management functions that are applicable to any type of organization, education included. In fact, all of the functions within an organization are designed to meet the expectations and requirements of the stakeholders (Crosby 1984). Accordingly, the ISO 9001 requires that these be seen, documented, and audited as processes.²¹

The paradigm of processes has two intentions in the Standard. One is to facilitate the verification of outputs (outcomes) against inputs (requirements). Secondly, it is intended to promote focus on the *processes* and not on *outcomes*. The first intention of verification turns out

²¹ ISO 9001:2000, Section 8.2.3: Monitoring and Measuring of Processes.

to be straight forward in private industry to address. Outcomes, such as products, parts, material, or services from most processes are inspected, tested, assessed, evaluated, counted, or otherwise verified against inputs. In an education setting, the verifying tools may include grading, testing, assessing, observing, etc.

Focus on the process requires a culture change and, in my experience, most organizations I have worked with have had difficulty with this paradigm shift. A recent experience illustrates the problem. I was asked to come into an organization with several significant and recurring problems in their operations. After a couple of weeks of observations and participating in staff meetings, it became clear they had three different types of problems. First, they had problems of intent: sometimes they did not know what they were supposed to do. Second, they had problems of performance: even when they knew what they were supposed to do, often they did not perform up to requirements. Lastly, they had problems of effectiveness: even when they knew what to do and performed up to requirements, sometimes their actions did not have the intended effects or consequences. They had gotten very good at fixing problems but had little time for anything else. They were completely focused on the outcome (fixing it), but the process itself was not part of their focus at all.

One of my recommendations was to change the behavior paradigm from corrective to preventive action. After training and leaving a plan in place, I returned two months later to learn that the top leadership had assembled four teams to each identify the most important potential problem and develop a strategy to prevent it. Not surprisingly, they could not find many potential problems that merited this type of focus and effort. I advised them that by focusing on “the most important potential problem” they were focusing *on the results* of preventing

problems.²² Instead the focus should have been *on the process* of preventing problems. If the focus is on the process, it will not matter how big or small the problem is that is being prevented. I emphasized that what is important is that habits are being built; a culture of preventing problems is being built. They have since been making slow but steady progress and are forcing themselves to solve only the smallest potential problems to break their paradigm of only doing something which will get them the “biggest bang for the buck.” The lesson was clear: Focus on results and the paradigm is “get only the biggest bang for the buck.” Focus on the process and the paradigm is “everybody always gets bangs; it doesn’t matter how big or small the bangs are.” This viewpoint of process vs. outcomes in education is probably best summed up by Bruner (1966, 72; see also Smith 2002), who writes:

“To instruct someone... is not a matter of getting him to commit results (emphasis mine) to mind. Rather, it is to teach him to participate in the process (emphasis mine) that makes possible the establishment of knowledge. We teach a subject not to produce little living libraries on that subject, but rather to get a student to think mathematically for himself, to consider matters as an historian does, to take part in the process of knowledge-getting. Knowing is a process not a product (emphasis mine).”

Keeping the focus on the process, let us look at core process views for manufacturing donuts, healthcare, and education. Each map has some ideas as to the inputs, the actual process, and the expected outputs.²³ As stated above, this is the paradigm the Standard requires for any task or activity.

²² An analogy from education is that learning for learning’s sake is process oriented. Learning to pass the exam is results oriented.

²³ In order to illustrate examples of education core processes, I have grouped 9 “education core” processes in figure 3.1 which should be mapped out individually.

Table 1. Manufacturing Process Flow

Inputs	Process	Outputs
Flour, sugar, yeast, coloring, information	Cut or shape, bake, fry, dress	Donuts

Table 2. Healthcare Process Flow

Inputs	Process	Outputs
Information, data, patient, symptoms	Test, lab work, interview, review, observe	Diagnosis, plan, prescription, therapy

Table 3. Education Process Flow

Inputs	Process	Outputs
Learner, requirements, lesson plan, schedule	Teaching, mentoring, assessment, grading, counseling, evaluating, encouraging, coaching, advising, etc	New knowledge, skills, abilities, transformation, pass, diploma, mastery, meeting of input requirements, etc

These are generic views of the core processes. The outputs measured can be for individual lessons, and modules, or can be long term such as to develop children that will become self-sufficient adults. The Standard encourages the development of plans for specific processes or activities. ISO 9001 requires that inputs and outputs be couched in language or intent which makes them comparable and verifiable. In this view, any process can be assessed for effectiveness by evaluating the level of compliance between outputs and inputs (Crosby, 1984, 59-61).²⁴

I do not for a moment advocate that education as a process shares some characteristics with the “commodities” available in the marketplace to be bought and sold. I am well aware of the current underlying rationale in most recent reforms to use schooling as an instrument of international economic competitiveness—to link education to the wealth of nations (Tyack and

²⁴ For Crosby the First Absolute is the definition of quality as conformance to requirements to which he dedicates Chapter 6.

Cuban, 136). I confess that as an engineer and businessman, I have had to fight this bias in my profession that education should be seen primarily as an instrument of international economic competitiveness. I see the current focus on STEM education as an example bias.²⁵ My contrarian views should help keep me focused on the whole education enterprise and the entire range of motivations that drive it.

²⁵ In many forums (including political/governmental and academic) the strength of the STEM workforce is viewed as an indicator of a nation's ability to sustain itself.

ZACHMAN FRAMEWORK

To further the argument of the similarities in the functional processes in an education setting and any private industry endeavor, I present a typical Zachman Enterprise matrix (see Crosby 1984).²⁶ The Zachman Framework is an Enterprise Architecture framework for enterprise architecture, which provides a formal and highly structured way of viewing and defining an enterprise. It consists of a two dimensional classification matrix based on the intersection of six communication questions (What, Where, When, Why, Who and How) with six rows according to reification transformations.

The Zachman Framework is a tool for organizing architectural artifacts (design documents, specifications, and models), which takes into account both whom the artifact targets (for example, business owner and builder) and what particular issue (for example, data and functionality) is being addressed. There is a natural correlation between the structure and language of ISO 9001:2000 Standard and the Zachman Framework (Table 4 below provides a tabular view of that maps the correlation between the Zachman Framework and the ISO 9001:2000 Standard). I anticipate that language similar to the second column below will make up the view axis (left hand side) of the Zachman Framework when I apply it to the education enterprise. I also expect that the right hand column of the Zachman Framework in Figure 1 (see further below), which contains more specific information linked to the “who” column will contain words such as legislators, policy makers, school board members, superintendents, principals, teachers, support staff, etc when Zachman is applied to education enterprises.

²⁶ The Framework is named after its creator John A. Zachman, who first developed the concept in the 1980s at IBM.

Table 4. Mapping of Zachman Framework to ISO 9001

View	ISO 9001 language	Relevant sections
Scope describes the vision, mission, context, boundaries, architecture and constraints of the enterprise. The scope states what the enterprise is to do.	Scope, goals, objectives	Section 5
Enterprise model defines goals, strategies, structure and processes that are used to support the mission of the enterprise.	Management responsibilities	Section 5
System model contains system requirements, objects, activities and functions that implement the business model. The system model states how the system is to perform its functions.	Quality Mgmt System	Sections 4, 5 & 8
Technology model considers the constraints of humans, tools, technology and materials.	Support processes	Section 6
Detailed representation presents individual, independent components that can be allocated to contractors for implementation.	Documented procedures, control over subcontractors	Sections 4 & 7
Real system depicts the operational system (or the sliver of that system) that is under consideration.	Domain-specific knowledge and operations	Section 7



Figure 1. Zachman Enterprise Matrix

Notice that as you come down through column one, it is not subsets or finer and finer resolution. They are different views of the enterprise. Each view could and should have finer details but not within the Zachman matrix. In addition, each of the columns of the matrix (What, How Where, Who, When, Why) seems to be self-evidently applicable to an educational setting, but if not, let's apply them to the first row (Scope view) which outlines the mission, vision, boundaries, and constraints of the (Education) Enterprise as an example:

What: Education

How: Teaching and Learning

Where: Everywhere

Who: People

When: Anytime

Why: Quality of Life

Besides the correlation with ISO 9001, Zachman seems to easily describe the Education Enterprise as well. In support of that assertion, I have included a Zachman Matrix which Dr. Eric Smith, Assistant Professor of Systems Engineering at the University of Texas, and his students have developed for the “education enterprise.” He has graciously given permission for its use here. Note the straightforward and easy fitting of “education enterprise” architecture artifacts with their counterpart in the private industry generic framework in Figure 2 below:

	<i>What</i>	<i>How</i>	<i>Where</i>	<i>Who</i>	<i>When</i>	<i>Why</i>	
<i>Scope</i>	Education	Learning & Teaching	Everywhere	People	Anytime	Quality of Life	<i>Strategists</i>
<i>Business</i>	UT System	Administration	Texas	Regents	Future	State Benefits	<i>Executive Leaders</i>
<i>System</i>	University	Organize Schools	UTEP	Provost	Term of Service	Academic Excellence	<i>Architects</i>
<i>Technology</i>	Professors	Offerings	College	Professors	Semester	Transmission of Knowledge	<i>Engineers</i>
<i>Component</i>	Implements	Facilitation	Classroom	IT Support Staff	Class Sessions	Support Teaching	<i>Technicians</i>
<i>Operations</i>	Students	Interactions	El Paso	Selves	Studies	Self-Improvement	<i>Workers</i>
	<i>Inventory</i>	<i>Process</i>	<i>Network</i>	<i>Organization</i>	<i>Timing</i>	<i>Motivation</i>	

Figure 2. Zachman Education Enterprise Matrix

My only point in grouping education process with other processes is that these particular business standards and disciplines were designed not just with “business” in mind but to be applicable and useful to any “human activity or endeavor”; and I believe that education is

fundamentally an optimistic human endeavor.²⁷

Under this paradigm, a process - is a process - is a process. However, the first thing I hear from a new client is, “Oscar, we’re different!” My stock answer is “your organization is unique, but some of the tasks, activities, and functions such as purchasing, training, HR, supervision, etc. have elements which are universal.” After a while, they are glad that they are not so different after all. This is almost universally true for support and management processes. I can concede that Support and Management processes are fairly universal. That is to say that purchasing or HR functions are very similar in private and a school setting. However, when talking about core processes, there is a big difference between rebuilding an automobile engine and teaching a 5th grader.

The difference is not just in the list of tasks or activities, but in the taxonomy of attributes of the provider which come into play. I anticipate that a school community would push back hard because the attributes of the provider are so different. I am also sure that this apprehension would come more from *not knowing* than from *knowing* what ISO 9001 is about.

Roger Frost is Press Officer for the International Organization for Standardization in Geneva, Switzerland, which developed the ISO 9001 Standard Series. As Frost puts it, “Only a few years ago, the idea that you could apply ISO 9001 quality systems to schools would have earned low marks... The teaching professional, like other professionals such as nurses, scientists, or journalists, were wary of ISO 9001 because they did not see how you could “standardize” the creative and empathic aspects of their work” (Frost quoted by Zuckerman 2000). Those concerns have been overcome, Frost explains (Frost quoted by Zuckerman 2000):

²⁷ I can readily concede that education is critical for economic competitiveness. My point is that education is much more and that it contains other dimensions such as spiritual, intellectual, and social and that if we ignore these other dimensions, we do so at our own peril as a society and civilization.

“As educational institutions see that ISO 9001 improves the operational structure they work in and the day-to-day processes. With less time lost on operational malfunctions, they have more time and energy for the creative and people aspects of their profession. In addition, the implementation of an ISO 9001 quality system by a school may give confidence to taxpayers that their money is being used effectively.”

My own experience in implementing systems in highly creative atmospheres (proprietary product and processes) and branding (graphic design and advertising) supports Frost’s contention that these disciplines in fact encourage creativity rather than hinder it. I have not had anyone say to me that due to implementing a QMS, creativity has declined. But I have been told many times that creativity and output have increased after implementation of a QMS. In fact, if you look at Business Week’s list of most innovative American companies, virtually all of them have implemented ISO 9001 Quality Management Systems.²⁸ Similarly, global companies, known for innovation and admired for creativity, such as Microsoft, Honda, Google, Apple, and Toyota, have all implemented similar types of QMS.²⁹ I believe schools and teachers need not worry about a QMS they implement infringing on their creativity, empathy, and teaching. It is interesting to note that a general bias seems to be that rules and processes are the straight-jackets of creativity and innovation-- that structure suffocates individual initiative.

²⁸ These lists change annually as companies rotate in and out of the “lists” but by and large there is a stable of perennial companies on these types of lists.

²⁹ The same logic holds for the lists of international companies as does for US companies.

THEORY OF STRUCTURE AND AGENCY

Pierre Bourdieu (1977) argues that that is not the case. His Theory of Structure and Agency (ToSA) encapsulates one of the most basic debates in sociology. On the one hand, some people argue that individuals have a great capacity for acting freely and without constraints by larger structures. Indeed, some argue that “social systems” do not really exist at all - they are merely convenient abstractions which have no reality outside of our minds and language. If systems do exist in some fashion, it is only as a result of the actions of free human agents. On the other side of this debate are those who argue that social systems greatly constrain, if not completely determine, the actions of individuals. What we think, feel and do cannot be realistically separated from networks of statuses and relative power which are external to and completely independent of us. Indeed, total separation and disengagement from our environment is generally seen as pathological in psychology.

One example often used to explain ToSA is the situation experienced by members of a sports team: each member may have freedom to exercise their own will to act, but their actions are nevertheless powerfully constrained by the accepted and traditional rules of behavior which characterize that particular sport. It is hard to imagine an individual working without any rules, motives or expectations.

The current view of the Theory of Structure and Agency has moved far from this “either or approach” and is now much more balanced. Indeed, some sociologists even deny that it makes any sense to consider human agency and social systems to be separate and opposed ideas (Berger and Luckmann 1966).³⁰ In fact, both exist *because* of each other. The social system helps create what the individual is while the individual helps create the social system. Thus, they

³⁰ Berger and Luckmann saw the relationships between structure and agency as a dialectical one. Society forms the individuals who create society—forming a continuous loop.

exist in a dynamic interdependency and picking out one as being the “primary” while the other as an “illusion” does not make any sense. They are two sides of the same coin (Lopez and Scott 2000).

The ISO 9001 standard itself can easily be seen as structure or construct and fits well on the “structure” side of the Theory of Structure and Agency. However, since the educator *already* has a structure she is working with and because the ISO 9001 Standard is *not* prescriptive³¹, I argue that it also supports the “agency” side of the Theory of Structure and Agency. The standard is designed to encourage innovation and continuous improvement. It is supposed to be a framework to help a manufacturing operation, a neurosurgeon, as well as the most creative artist—it should be able to help a creative educator. The Standard is a toolbox which engenders empowerment for individual and collective agents while providing structure and support; an apparent paradox.

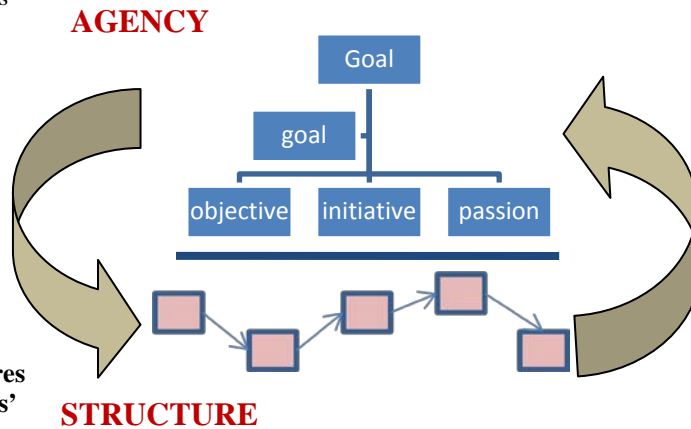
The Theory of Structure and Agency may help inform and define the constant tension between the structure, rules, and expectations a teacher finds her/himself in and her/his own ability to act and innovate as an individual. The point here is that the Theory of Structure and Agency would also explain any agent in any other profession. The dynamic is profession independent. Figure 3 in the following page graphically depicts the “agency” and the “structure” domains as articulated by Bourdieu (1977) and others. Note that sections 4 and 5 of the ISO 9001 standard address the *agency* (i.e., the goals, policies, and objectives of the actor). Sections 6, 7 and 8 of the standard address the *structure* (i.e., the processes, rules, and structures supporting or limiting the actor).

³¹ While the standard provides a high level structure, it does not prescribe who, where, or how things are to be done.

Goals and objectives drive actors to action. (Corresponds to teaching vocation, desire to teach, lesson plans, empathy, curriculum)

Goals and objectives drive actors to action. (Corresponds to Sections 4 and 5 of the ISO 9001 Standard)

Processes, rules, and structures support (but also limit) actors' range of action. (Regulation, policy, expectations, evaluation, administration, boards, parents, classroom.)



Processes, rules, and structures support (but also limit) actors' range of action. (Corresponds to Sections 6, 7 & 8 of the ISO 9001 Standard)

Figure 3. Structure and Agency

Extending the example just a little bit, consider the description below:

An individual is working with the freedom to do what he enjoys, is good at and is at the same time constrained by structures, rules, and expectations of attainment of goals.

Clearly this description is profession (activity) independent. This could be a pilot, a mechanic, a nurse, an artist, a baseball player, perhaps even a teacher. My point is that from a structure and agency point of view, teaching is no different than any other human endeavor. It involves an agent willing, wanting, dreaming, aspiring and doing something (Agency) but always in some context (Structure) and that from a core-process point of view, teaching is very different from every other profession (human endeavor), just as all professions are different from all other professions.

The Standard recognizes that core processes are unique to the organization and its mission. Section Seven, Service Provision, is dedicated to core processes and is the only section which allows exclusions to requirements exactly because core processes tend to be organization-specific. This allowance is in support of encouraging innovation, creativity, and continuous improvement. Exclusions are not permitted in any other section.

Support processes, on the other hand, would be comparable in an education setting as in a typical business setting, since these processes are the “administration” part of the business independent of the type of business. Let us look at two typical support processes such as purchasing, and Human resources (HR) functions. It may be beneficial to review how private companies have addressed these two. Then, see if that experience can inform how an education institution might address these.

Purchasing requirements that are outlined in the Standard, apply to material, products, and/or services which “can potentially affect the customer or user.”³² There is more detail, but the three high-level requirements include, “ensuring that the product or service purchased meet specified requirements” and “assessing the supplier’s capability before purchasing and to “evaluating the supplier’s performance afterwards with an eye towards continuous improvement of the product, services, and the relationship” (see Appendix I). In addressing the first requirement, it becomes necessary that the purchase order, requisition, or other documentation contain enough detail to give the supplier a fair chance of meeting the requirements. It also means that the receiving function must also have access to these details to develop criteria for acceptance of the product or service (e.g., “is this text book the one we ordered?”). Clearly, schools and districts have their own suppliers of goods and services and these goods and services are received somewhere somehow. It does not matter where the product is received or the service is provided. It can be locally, at central receiving, or out in the field, as with transportation. To address the second requirement in a school setting would probably mean to do exactly what a private business would do: develop a matrix of requisitioners and/or end-users to evaluate the appropriateness of the product or service purchased (Covarrubias 2010). Then periodically (e.g., two times a year) these data are culled and an evaluation by the users of the

³² ISO 9001:2000, Section 7.4, Purchasing Requirements.

suppliers can be made. This support process requirement is straight forward and should not be too difficult to address, as most public institutions have many records and audits related to financial transactions.

The requirements for the administration of Human Resources are contained in Section 6.2 of the ISO 9001 Standard.³³ Again, there is more detail, but the two high-level requirements are to “ensure that personnel performing work affecting service quality are competent based on education, experience, training and skills” (see Appendix I). If instances of incompetence are identified, action must be taken to eliminate them (Heffernan 2007). The second requirement is to “ensure that personnel are aware of the relevance and importance of their activities and contributions to furthering the goals of the organization” (see Appendix I). Meeting these requirements necessitates the matching of job requirements with incumbent attributes, knowledge, and skills. Inherent in these processes is the control of the HR functions of hiring, performance assessment, training, and continuous professional development. Most support processes are independent of the business or type of organization. These are similar whether the organization is NASA or a used car dealership. The functions of purchasing or human resource administration have no inherent differences in one setting or another.

The same logic would hold for other support processes such as training, calibration, transportation, legal support, document control, etc. A brief digression here might inform the problems and opportunities in translating ISO 9001 requirements to an education setting. How might for example, “calibration” apply in a school setting? In private industry, “calibration” means ensuring that the tools used to measure a product to ensure it meets customer requirements are tested, reliable, and repeatable (Morrow 1993, 33). In a school setting, “calibration” takes on a very important role as it would require that the “tools” used for

³³ ISO 9001:2000, Section 6.2.2, contains 5 detailed requirements (see Appendix 1).

measuring, assessing, and monitoring be identified and be calibrated. These tools in education would tend to be the assessment and testing instruments. How do we ensure the validity and reliability of these types of instruments? Again, there are already well established efforts in education to do just that.

In Chapter 5 of *A Tool Kit for Professional Developers: Alternative Assessment*, the authors suggest guidelines for evaluating the quality of assessment instruments (Laboratory Network Program 1993). Good assessment requires minimizing factors that could lead to misinterpretation of results. Three criteria for meeting this requirement are reliability, validity, and fairness. *Reliability* is defined as “an indication of the consistency of scores across evaluators or over time” (Carter and Kusimo 1994, 238). *Validity* is defined as “an indication of how well an assessment actually measures what it is supposed to measure” (Carter and Kusimo 1994, 238). Last, *Fairness* means that an assessment should “allow for students of both genders and all backgrounds to do equally well. All students should have equal opportunity to demonstrate the skills and knowledge being assessed” (Carter and Kusimo 1994, 238).³⁴ It is interesting to note that “all students should have equal opportunity to demonstrate the skills and knowledge being assessed,” translates in industry to “all parts should have equal opportunity to demonstrate the characteristics and attributes being assessed” (Carter and Kusimo 1994, 238).³⁵ Successful integration of the principles of Reliability, Validity, and Fairness into their “assessment tools” would earn any school high marks from external ISO 9001 assessors.

We have just discussed two support processes, namely Purchasing and Human Resources, and also considered their applicability to a school setting. Management processes

³⁴ I invite the reader to review Appendix 2, a bibliography appropriate for any education institution implementing the calibration requirements of ISO 9001:2000. This resource list was developed by the Laboratory Network Program in 1993.

³⁵ This defines valid sampling

would also be applicable in an education setting since the standard is designed to be generic enough to be applied to any human endeavor. Management processes are the “leading and improving” processes of the business. Let us look at two typical management processes: management review, and customer satisfaction. Again, let us see how private companies have addressed these processes and see if their experience can inform the way an education institution might meet the same requirements.

Requirement for Management Review calls for periodic reviews by top management of the indicators (quality records), an interpretation of what it means for the organization and an appropriate response (output). ISO 9001:2000 spells out a minimum of inputs for these reviews and also requires actions which will improve the service, processes, system, or resources of the organization.³⁶ In private industry, this usually means that twice a year, top management convenes for the purpose of doing this diagnosis based on data and information contained in quality records and derivations. For a school community, top management may be educational policy makers, boards of education, school administrators, superintendents, principals, directors, students, parents, program supervisors, teacher associations, and department heads (Thomas 2003, 61). If an individual school is the scope of registration, then “top management” would be defined differently than if a school district were the scope. But again, the process is the same: top management in the school community would convene to review the quality and service indicators they previously set up and then interpret the data and information with an eye towards improving all processes within their control. I find it hard to believe that there may be a school where this does not happen to some degree some of the time. Adoption of the standard would just formalize and standardize the practice to institutionalize it within the organization and

³⁶ If no evidence of these actions can be found, then a subsequent ISO 9001 audit would identify this as a major nonconformance and require root-cause analysis as well as corrective action. It is not punitive. The QMS is asking “do you understand what went wrong? If so, what can be done to prevent recurrence?”

internalize it within the individuals involved.

There is a psychological dynamic in play here. One side effect of the Management Review is that it brings everybody's interests and ideas to the table and, through the outputs, translates them into action towards the improvement of the organization. Given the common kernel at the cores of "reform" and "continuous improvement" of transformation; for education, this fits nicely into Heclo's assertion that, "by bringing interests, ideas, and institutions into the analysis, we are not asking which [sic³⁷] is a superior explanation, but rather, how they go together" (Heclo 1994 quoted by Clarke et al. 2006, 23). Heclo's advice is to avoid the energy loss attendant with the attitude of "my idea is better than your idea."

Customer satisfaction requirements include the proactive acquisition of the customer's perception of quality of products or services, its analysis and appropriate response. If the reader has ever completed a rating card at a restaurant or hotel, you have contributed your perception of the product or service for which you paid. Customer surveys, phone calls, and emails are typical tools for culling customer perception about quality. In a school environment customer perception will naturally come from 1) students, student surveys, and student focus groups, 2) faculty and staff surveys and focus groups, and 3) surveys of employers and vocational schools (Jackson 2010, slide 20). I would add parents, colleges, military organizations, and other schools, as sources of customer perception. Just like support processes, management processes are independent of core activities or type of organization. Management processes, like review of performance or managing customer satisfaction, have no inherent differences in one setting or another. Clearly, the two Management Processes we just looked at, Management Review and Customer Satisfaction also have logical applicability in an education setting.

³⁷ By looking at the heading of his paragraph, it is clear that by "which" Heclo was referring to which *ideas for school reform*.

DOCUMENTATION SYSTEM

By now the core, support, and management processes have been identified and defined. The third step in the implementation is the documentation of these processes. Here the standard requires four levels of documentation.³⁸ Level one is the Quality Manual (QM), which translates all of the stakeholder requirements into commitments on the part of the organization. This is typically a fifteen page document for most organizations; a restatement of the requirements adapted to fit the particular needs of the organization and its constituencies. It is meant to be high level and generic, as it is meant for any human endeavor. With a few minor modifications, the sample QM in Appendix B may very well meet the Standard's requirements for an education institution.

Level two documents are procedures. There are many procedures carried out in any organization to run the operation, but the standard differentiates between procedure and documented procedure. It requires that at least the following activities be controlled via documentation:

- *Document control system*
- *Records control system*
- *Nonconforming service or products*
- *Internal audits*
- *Corrective actions*
- *Preventive actions*

It should be noted that core processes do not require documented procedures and that pedagogy (the way we teach) is a core process. In support of creativity, innovation, and

³⁸ Level one focuses on "mission." Level two focuses on "who, what, when, where needs to be done." Level three focuses on "how." Level four focuses on the "evidence."

continuous improvement, the Standard is intentionally non-prescriptive, especially in Section 7. Core processes should be documented at the discretion of the organization. This is where the whole organization comes together to determine the best way of doing what they do. What does a perfect day look like for us and our stakeholders? There are many tasks which require Work Instructions (level three) or Checklists, such as for pilots before takeoff.³⁹ Or for surgeons *before* surgery; however a Work Instruction *for* surgery does not make sense, primarily because “surgery” is a core process. As a stochastic process, it has an infinite number of possibilities at every decision point. At best, surgery can be documented at the Procedure level (*what* needs to be done) but cannot be documented at the Work Instruction level (*how* it is to be done). Here, we must rely on the competency of the surgeon and the team. Similarly, in an educational setting, there are functions or processes which support the core process of teaching that should be documented. The standard requires documentation “where the absence of such documentation could adversely affect quality.”⁴⁰

The fourth level of documentation includes quality records as well as forms, plans, labels and anything else that is needed for the effective operation of the QMS.⁴¹ The Standard defines quality records as evidence of history that speaks to the level of quality within an organization. They also serve as the measurable indicators of quality. For example, training of personnel is likely to affect the quality of service. And as such, training records are required as evidence that some training took place at some point in the past. Similarly, assessment records are evidence that some assessment took place at some point in the past. The Standard also requires the systematic review of all quality records at appropriate intervals. The review is designed to be

³⁹ This has nothing to do with what the Pilot knows or doesn’t know. It is an aid for her to ensure she does everything she is supposed to do.

⁴⁰ ISO 9001:2008, Section 4.4.2, Document Control.

⁴¹ The documentation system is sometimes depicted as a pyramid with the policy on top, followed by procedures, then work instructions, and finally forms and records as fourth level.

one of the drivers of change and improvements within the organization. In an educational setting, the Quality Records in a school setting must certainly include indicators like those suggested by Freeman (2003, 192):

- *Grade-specific student scores in math assessment tests*
- *Grade-specific student scores in basic skills assessment tests*
- *Grade-specific student scores in reading assessment tests*
- *Number of discipline office referrals*
- *Meeting all accreditation requirements*
- *Continuing professional development of school staff*
- *Number and nature of corrective actions taken*

These indicators tend to be aggregate for the test takers, but objectives could also be developed which are vertical; perhaps following Bloom's Taxonomy from beginning to more sophisticated learning for individuals over time.

Benjamin Bloom and his team developed a classification of behavior important in learning. The levels, from basic to more sophisticated, start with the lowest level being remembering: can the student recall or remember the information. The next level is understanding: can the student explain the ideas or concepts. The next is applying: can the student use the ideas in a new way? Then comes analyzing: can the student distinguish the different parts? The next level up is evaluating: can the student justify a position or decision? At the top of the classification is creating: can the student create product or point of view? (Bloom 1956).⁴²

Once the four-level documentation system is completed, it describes the intent of how to

⁴² His former students updated terms and organization in the mid 1990's, but the concept remains the same.

run the organization. It may not be running this way right now, but this is the intention. To state the obvious, we want to run the organization in a way that furthers the goals and objectives of the organization and responds to the requirements of stakeholders and constituencies. To determine intent in a school community setting, the internal and external stakeholder would enter into a process where they, not ISO 9001, would define the way they want to run the organization. Only then are the disciplines of the Standard used to help meet their goals and objectives (Covarrubias 2010). With the best practices defined and documented through a four-level system, the next focus is on behavior and performance.

PEOPLE AND CULTURE

It is one thing to define and document how you want to run the organization. It is quite another to actually bring it to life. The fourth step in implementation includes training and educating everybody on what each procedure means to them and their job.⁴³ Visual aids are developed as examples of how a form is completed and checklists are developed to ensure that all steps in a process are followed. We build systems which help mistake-proof the processes. Errors are minimized and when they do happen, the organization is aware of them before the customers are. This is also where one can bring to life, so to speak, the quality records we identified before by generating records and evidence of our activities in core, support and management processes.

The section on Administration of Human Resources, Section 6.2.2 of the Standard, requires competency for personnel “whose work could affect” the quality to the customer or stakeholder. In the Standard, “incompetence” does not carry the negative connotation in general use. For ISO 9001, incompetence is simply a mismatch between personnel skills, and/or abilities and the requirements of the job.⁴⁴ It is an opportunity to train/educate the person or to change the work requirements by simplifying tasks, teamwork, mistake proofing, or some other modification of the work environment. The Standard recognizes that most mismatches are attributable to management.

A hypothetical example may illustrate the point. My eight year old granddaughter is incompetent to change the oil in my car. If I asked her to do that, the probable outcome would be a reflection on me not on her. I will have to either change her by training her, or change the job, by, for example, automating the oil-changing process so that all she has to do is push a

⁴³ This is not too difficult since everybody has been involved since the beginning with input into all phases.

⁴⁴ If the operator’s skills are lower than the job requirements, we say the relationship is incompetence, if the *job requirements* are lower, we say the relationship is over qualification.

button. Either action will match the skills to the job requirement and give rise to competency. It is an extreme example, but it does convey the intent of ISO 9001 in this regard. Meeting this requirement of ISO 9001 Section 6.2.2 in an education setting should be straightforward and in my opinion is already largely in place. Most schools place high value on competency in the form of qualifications, pedagogy, experience, training, and continuing professional development.

Most organizations run on the interaction and synergy between human resources and all other resources. As such, the Standard also requires proper resources such as facility, maintenance, equipment, software, hardware, support services, etc. It is obvious that an educational institution would require specific types of resources, but resources nonetheless. Given the 28 years that the Standard has been in existence, most private companies are familiar with it to varying degrees, and personnel who rotate among firms spread the knowledge and carry the experience. It should not be surprising that within an industry such as education, which has little or no experience with the Standard, the “fear factor” of dealing with the unknown would be high. From my experience, such fears are natural but unwarranted. The following excerpt, from an interview with a teacher at Liberty Center High School, supports my contention. This interview took place during 2002, *after* the school had gone through registration and obtained their certification (ASQ 2003, 63):

“One of our (and any other educational provider, for that matter) greatest fears was that a third party would look over our operation and make judgments about how good or bad we are. Nothing could be farther from the truth. We have found that our registrar⁴⁵ actually provides us with a service that helps us accomplish our mission. Auditors do not come in to conduct finger-pointing

⁴⁵ A registrar is the company that hires the auditors and issues the certificate of compliance. The language used by this teacher is also interesting: she did not say *the* registrar, she said *our* registrar (feeling of teamwork).

exercises. The fact is that these folks provide us with information that leads to opportunities for the continuous improvement of our service. Our relationships with all parties (our registrar, consultant, and staff) are seen as professional partnerships –partnerships that work.”

This fear can also be institutional and may apply for example, to teacher associations as well. It is likely they would ask themselves the same questions as our high school teacher. I have experience with several manufacturing organizations in the East Coast, which were unionized. The collective bargaining organizations model seems appropriate to help deduce some possible hypotheses. In all of these cases, the union members participated both as individuals and as representatives of their group’s interests. In none of these cases did union members see the ISO 9001 system as a “tool” of management; quite the contrary, they saw it as empowering the workforce generally. My experience has been that once people get to work with auditors, they in fact, look forward to audits because the auditor focuses on system issues, effectiveness, and improvements and is not there to “police” individuals and their work. Consultant Ramon Covarrubias, with experience working with PEMEX and CFE (both unionized environments in Mexico), shared that by and large this has been true for him as well (Covarrubias 2010).⁴⁶ It bears repeating that in my 15 years of experience with these systems, People and Culture is always the most difficult aspect by far. The Standard accounts for this with built-in safeguards to counter organizations wanting to “go back to the way it was before.”

⁴⁶ Petroleos Mexicanos, the state oil monopoly, and the Comision Federal de Electricidad.

ASSESSMENTS

The fifth implementation step is the assessment and auditing portion of the system. Auditing is strictly a management process but it is singled out specifically because it is one of several “perpetuation” requirements intended to ensure that the system perpetuates and improves itself over time.⁴⁷ These requirements make ISO 9001 a process that cannot be “waited out” because it will soon fade into memory. I have many clients who are on their fourth cycle of ISO 9001, which indicates that they are in their tenth, eleventh, or twelfth year.

The standard outlines three basic types of assessments. One is Internal Audits, which happen almost on a daily basis. Personnel, who do the work, audit each others’ work and the outcomes from the processes. Individuals from all levels of the organization are trained to become internal auditors. Such initial audit team would lead the first phase of the audit program. Because all processes and activities have been documented, these auditors, and the whole organization, should be clear on the intention of how to run the organization. The intentions are commonly couched in policies, objectives, goals, procedures, work instructions, etc. It then becomes the job of the auditors to identify all possible deviations⁴⁸ of the system from these documented intentions. Deviations are known as non-conformances and each requires root-cause analysis to understand how and why something deviated from the way it was planned. Each nonconformance then requires corrective action to determine the best way to eliminate the nonconformance (i.e., implement the action). One or two months are allowed to go by and the corrective action is revisited to ensure the problem did not recur. If the problem has recurred, it is an indication that the corrective action was ineffective and we loop back to root cause analysis.

⁴⁷ The “perpetuation” requirements include Internal Auditing, External Auditing, Management Review, Corrective and Preventive Action, and Continuous Improvement; they make ISO 9000 a process and not just another flavor-of-the-month project.

⁴⁸ That is, deviations in performance and behavior of the QMS.

Auditors should rotate in and out of the audit team. The idea is that everybody has the opportunity to be an internal auditor at some time. After a year of auditing, the paradigm of the individual is changed.⁴⁹ Even when not auditing, experienced auditors are always on “audit mode”—looking for problems, potential problems and opportunities for improvement. In an education setting, the cross-section of auditors should include principal, teachers, parents, students, and support staff. In my view, the intent of the Standard would flourish in the collegial setting of a school community.

The second type of assessment is the Management Review. This is an annual or semi-annual “strategic” assessment where top management reviews the Quality Records (indicators). Most often this is an offsite retreat-type dynamic. Quality records are analogous to X-ray images; they are necessary but insufficient. X-ray images require a professional to interpret their meaning to the patient. In Management Reviews, the management team interprets the meaning of the records to the organization. The Standard expects that improvements to the product, service and/or system be implemented, as a result of these reviews. It is entirely reasonable that a typical Jr. High School would include the principal, parents, students, department heads, program supervisors, teachers, school administrators, and selected board members in their Management Review.

The third type of assessment is an external assessment that is conducted by third-party auditors contracted by the organization.⁵⁰ These auditors are introduced during the Initial or Conformance audit for a number of days, depending on the scope and number of employees. A school organization with 200 employees would probably require two auditors for three or four

⁴⁹ It has also been my experience that internal auditing improves morale and exposes one person to the job and problems faced by others in the organization as well as to the big picture of the operations.

⁵⁰ It is these auditors the quote from Liberty Center High School refers to.

days. From this audit, the recommendation would be made to confer the certification. From then on, auditors can come back to perform surveillance audits annually or semi-annually.⁵¹

To summarize, the Standard calls for three types of audits. First, Internal Audits where people audit the level and extent of process control. Second, Management Audits are high level, strategic assessments of the whole enterprise once or twice a year. Third, External Audits are periodic audits but performed by external professionals in quality management systems.

Assessments in the Standard are designed to ensure that the organization is running as planned. But the Standard recognizes that it is not enough to run as planned—the paradigm should be that the organization is improving all the time.

⁵¹ The cost is sometimes hard to pin down as there are many factors involved but an organization of 200 employees might expect to pay a one-time \$10,000 - \$12,000 for a registration audit plus \$3,000 per year for surveillance audits from then on.

CONTINUOUS IMPROVEMENT

The sixth and hardest step in implementation is the installation of a culture of continuous improvement (CI). In reality, all activity leading up to the certification is primarily fixing problems and raising disciplines to a minimum level. The hard work of CI begins after the certificate is hung on the wall. Again, the intent is that the organization learns to focus on processes and not on results. It does not mean that results are not important; the logic is that if the process is under control, the desired results will flow from the process. The intent of the Standard for CI is different from that which might be conveyed by the words, “continuous” and “improvement” and can more or less be housed in the conceptualized Japanese KAIZEN.⁵² In North America, an improvement effort that is well thought out, well planned, has clear goals, clear milestones, adequate time and resources gets very high marks. Planning such an action will give us the best chance of obtaining a big return on our investment. In KAIZEN, this effort will get very low marks. “Obtaining a big return on an investment” is a focus on results. For KAIZEN, the Holy Grail is the smallest improvement that you personally can implement today. Efforts that are small, personal, and immediate get very high marks in KAIZEN. It is not that we do not want great innovations and breakthroughs, it is that they cannot be planned. The concept has been difficult to implement in the business world of North America. It seems that our culture is predicated on competing with ideas instead of collaborating with actions.⁵³ “My idea is better than your idea!” and “My way or the highway!” are indicators of this paradigm. Some organizations have been able to implement a KAIZEN culture and others have not. This type of culture change in an educational setting should be no less easier or harder to implement. One

⁵² KAI is “change” and ZEN is “good” in Japanese.

⁵³ I have heard Japanese plant managers working in Mexico articulate this opinion about their American counterparts.

dimension may be to think of self-renewal as a process of continuous self-improvement (Applezoller 2010).

Implementing any change anywhere people are involved, can be a daunting task. The activity or missions of an organization does not matter much; most people will oppose any change. Saul Alinsky, a famed community organizer from Chicago said that people who want to introduce change should expect 90% of people in a community⁵⁴ to be opposed (including those that will benefit from the changes). However, he also believed that if you can organize 6% of the leaders in a given community, change will come (Alinsky 1971). The corresponding change agents in education might well include “policy entrepreneurs” (Mintrom 2000 quoted in Clarke 2006). I submit that Alinsky’s observations about a community’s resistance to change would also apply to any school community. Any organization wishing to obtain certification must go through implementation phases, Stakeholders (Goals and Objectives), Processes, Documentation, People and Culture, Assessments, and Continuous Improvement. Is the effort worth it?

⁵⁴ Having worked with his organizations, I can attest that the term is applicable to any self-identified group such as neighborhood, union, church, school, etc.

SCHOLARLY RESEARCH SO FAR

ISO 9001 brings many changes and challenges, and as might be expected, it has both costs and benefits. Most consultants' websites extol the benefits, but there is limited academic work which purports to investigate these benefits and costs for ISO 9001 users. As an example, in an investigation which included 500 companies, Professor Marta Casadesus of the University of Girona in Spain quotes that the most important *internal* benefits of an ISO 9001 implementation are: improvements in efficiency, decrease in problems with procedures, increase in the motivation of workers, the analyzing⁵⁵ of data collected by the QMS for strategic and/or operational purposes (Casadesus and Heras 1999; Buttle 1997). However, this last finding directly contradicts a study by Goh and Ridgway (1993), where the majority of companies surveyed did not see any advantage in analyzing this quality cost. In another study of 288 Spanish companies, the most important *external* benefits of an implementation were improved response to a client's requirements (34 percent reported so), access into new markets (21%), improved customer relations (18%), and improved service to customer (16%) (Buttle 1997 quoted by Casadesus et al. 2000).⁵⁶ In another example, one study finds that the discipline of documentation is seen as positive (Brown 1998). In another, a negative is the added documentation needed to run such a system (Hvan 1997). There are other studies, each with confirming and/or contradictory findings. It is very hard to cull any solid conclusions yet.

In my experience as an auditor, I have come across systems where the documentation system is bloated and bureaucratic. In other organizations, the Quality Manual is one single page and the procedures are stenciled on the walls with zero paperwork. The point is that the Standard was designed to be flexible enough to meet the needs of the organization and is commonly

⁵⁵ Reported by 95% of respondents.

⁵⁶ I would classify this last dimension as an internal indicator, but this is how the research instrument was redacted.

molded to meet those needs. For legitimate reasons, sometimes consultants have to detail the system more than generally accepted. In my own experience, when an organization does not have established disciplines, I have to rely initially on the documentation system to help develop these.

Lastly, a very important critique of the Standard and its use comes from a University of Minnesota study of 1,200 firms by Naveh and Marcus (2004). Their conclusion is (Naveh and Marcus 2004, 361-2):

“Simply put, our answer to the question of when a managerial standard, such as ISO 9000 [sic⁵⁷], is associated with improved organizational performance is that it depends on the level of assimilation, i.e., the degree to which the practice makes its way into various aspects of the organizational life, and the degree to which the organization goes beyond the minimal requirements of the practice. More success is achieved if there’s both thorough assimilation of the practice and going beyond what the practice literally requires.”⁵⁸

My experience validates Naveh and Marcus’ findings. Amidst the euphoria of the celebration after registration, I always tell all my clients that ISO 9001 is analogous to exercise equipment: it is not enough to *acquire* it; the real benefit comes in *using* it. The more you use it, the more benefits accrue. With this caveat, the answer to my question posed at the end of the previous section is yes, the process is worth it.

Academic work on the pros and cons of ISO 9001 for schools is just beginning. As the Standard spreads outward from its birth niche of manufacturing, this academic work should

⁵⁷ Some individuals use the label “ISO 9000” rather than “ISO 9001” interchangeably. Typically, ISO 9001 refers to content and specific requirements, while ISO 9000 is the family of standards.

⁵⁸ This finding validates what most practitioners already know: the more you put into it, the more you get out of it.

continue to expand. One thing can be said for certain: the acceptance of the Standard continues its sustained growth.⁵⁹ Having started with private industry in the 1980s, it is fair to say that this acceptance has taken place within a community known for its focus on return-on-investment (ROI). Hardnosed businessmen have already voted on ISO 9001. Hopefully in the future, the academic work will be sufficient to prove them right or wrong. In the meantime, the question is: “should education wait to follow, or leap to lead?”

⁵⁹ The number of registrations as of 2007 was already approaching 1,000,000 organizations according to the ISO, which is headquartered in Geneva, Switzerland.

A FEW BRAVE DISTRICTS

It should be clear from the first paragraph of this study that there are already some school communities taking the lead in this experiment. Junction Elementary School in Kansas City is an urban neighborhood school setting and one of the five elementary schools in the Turner School District (TSD), headed by Winona Winn. The school faces challenges common to many urban districts. Among its 400 students, almost 50 percent are eligible for free or reduced-price lunches. In addition, 60 percent of its kindergarten students are considered at-risk.

Winn had heard that Koality Kid (2010) is an elementary school quality initiative of the American Society for Quality (ASQ). On its Web site, Koality Kid in its “what is it?” heading answers that it: 1) is a customized systematic approach to continuous improvement, 2) emphasizes a positive school environment, and 3) embraces both the spirit and the substance of total quality. One instance of total quality in education comes from Joe DeJohn, the Superintendent of another school district: Brandywine School District in Claymont, Delaware. According to DeJohn (2002), “In total quality management, you have to say what you do, do what you say, prove it and improve it. That’s what we were after... We wanted to improve and ISO 9001 has been largely a total quality management move (for us).” This is a good description of the Koality Kid approach as it is laid out in its own website.

In 1996, TSD Superintendent Winona Winn decided to explore Koality Kid as a means of helping Junction Elementary School address problems associated with chronic underachievement in meeting the Kansas and North Central Accreditation requirements. According to the principal, Allan Amos, the school community was in a panic state. Expectations for improvement were clear and persistent, and earning the accreditation from North Central was essential. They desperately needed a system that could help them address their goals and

establish the focus needed to achieve those goals. It was in desperation that the school leadership turned to Koality Kid in the hopes it would help in their turnaround (Keely 2003, 28).

Through their involvement with Koality Kid (2010), “the staff created an environment for continuous improvement, recognizing rising test scores and individual student’s grade improvements, and an ever-improving safe and orderly learning climate. Initially introduced to help the school improve on a disappointing record of achievement in the Kansas and North Central accreditation test, the process *also (emphasis mine)* had an impressive effect on student behavior.”⁶⁰ Some of the improvements and achievements since implementing ASQ Koality Kid training in 1996 have included (Keely 2003, 29):

- *A reduction from 13.9 to 4 percent of fourth-grade students scoring unsatisfactory on the Kansas Math Assessment Test*
- *A 50 percent reduction in discipline office referrals over a three-year period*
- *Reading, writing, and math assessments scores that exceed both district and state averages*
- *Meeting all Kansas and North Central Accreditation requirements*
- *State recognition with the 2000 Kansas Award for Excellence, Level II*
- *Data-driven instructional decisions*
- *Twenty percent improvement in Iowa Test of Basic Skills scores over a four-year period in fifth-grade reading and math*
- *Increase from 86 to 96 percent of fourth-grade students scoring above or at basis level on the Kansas Math Assessment Test*

⁶⁰ It would be interesting to research the psychology that may be going on here. Is it possible improved discipline of teachers and staff, clarity of responsibilities, increased accountability, defined objectives and goals, measurable progress, consistent corrective action, and controlled processes affected the students positively?

- *91 percent of fifth graders above or at basic level on the Kansas Reading Assessment Test*

Improvements and achievements indeed!⁶¹

In Lancaster, Pa., Superintendent Vicki Phillips admits she was not entirely enthusiastic when one of her school board members recommended the district pursue ISO 9001 after being involved in a company effort. But after learning about the Standard's many benefits, she says, "I became a big fan of ISO 9000 for education" (Phillips quoted by Zuckerman 2000, 2). The district went on to complete the registration ISO 9001 process.

Jefferson County, Colo., district, with 143 school sites and 89,000 students, generates a great deal of paperwork that needs tracking and maintaining. The central office also has many external customers—site administrators and teachers—whose needs must be addressed daily. Superintendent, Jane Hammond, had seen ISO 9001 in practice during her tenure as a district superintendent in Washington State. She believed in its benefits enough to launch and complete the registration for Jefferson County School District (Hammond 2000, 2). She then outlines their experience in an article in the *The School Administrator*⁶² about implementing ISO 9001 as well as some of the benefits now being enjoyed: ⁶³

- *We increased understanding and collaboration within departments, among and between departments and between central offices and schools. (emphasis mine)*
- *We are pilot testing use of a purchasing credit card to avoid the additional expense resulting from processing purchase orders for small purchases.*

⁶¹ My experience tells me that these types of results are reproducible if care is taken to ensure everybody's interests and ideas are built into the system.

⁶² Published by the American Association of School Administrators in June of 2000.

⁶³ As an example of different benefits possible, Hammond reports savings of \$900,000 in their purchasing operations in the first year after their registration (See page two in the reference).

- *We continue to increase our results on state and national measures of student achievement. (emphasis mine)*
- *We found ISO 9000 supports the implementation of our values of integrity, respect for people, teamwork and exemplary performance. (emphasis mine)*
- *We have seen increased pride among staff who knows they are more effective and efficient with a system that capitalizes on their strengths. (emphasis mine)*
- *We have been able to focus on systems thinking to engage in long-term improvement rather than quick fixes. (emphasis mine)*
- *We can find and fix inconsistencies so that quality service will be provided each and every time. These improvements can be seen in each department involved.*

RESEARCH DATA

The primary research data gathered included personal interviews with 3 (out of 5) individuals from three different schools in Mexico who have gone through the complete ISO 9001 process and are now four to seven years into the experience. Each of these individuals answered the 20 questions (Likert items) in the questionnaire identified in Appendix D. The data also includes phone interviews with individuals from one school district in Colorado USA and 2 of the district units. One phone survey from an individual in Lancaster, PA School and one from El Paso Community College were also included. Finally, I included data from returned surveys from 5 individuals with very extensive experience in both consulting and auditing schools for ISO 9001 certification.

A total of 27 surveys were delivered. Follow up was done during October 2010 and the data analysis was completed during January 2011. The response rate was 37% with 9 surveys returned and of these, 4 were emailed back, 3 were personal interviews and 2 were telephone interviews.⁶⁴ The survey instrument contained 5 questions related to *Core Processes*, five questions related to *Support Processes* and 10 questions related to *Management Processes* (to see the full survey instrument, refer to Appendix D). The survey responses provided two sets of data. One is the respondent's professional opinion as to the *applicability* of the ISO 9000 requirements to a school setting (the green text). The second set is *the level of difficulty* in meeting each of the requirements included in the instrument (Likert scale).

I also conducted a second set of phone and personal interviews with consultants and auditors that I knew did *not* have educational experience.⁶⁵ I used the same questionnaire but did

⁶⁴ Appendix E provides the list of targets for the survey instrument and the subset of respondents.

⁶⁵ Note that I designed the questions in a manner to avoid revealing our focus on schools or educational institutions, thereby avoiding any bias that might otherwise affect the answers provided by the respondents. I also wish to acknowledge Mr. Chuck Howell, president of AQA, for providing access to auditors.

not ask if or how each requirement would be met in a school setting nor how difficult it would be; I only asked for the *degree of difficulty* of implementation in their experience in private industry. Those data are presented in Tables 6 and 7 in the next section.

DATA ANALYSIS

I then averaged survey difficulty responses from both groups⁶⁶ *by question* so that Core Process question 1 (C1) was averaged from all responses. Table 5 shows the difficulty detail and averages by question. For example, Support Processes question 1 (S1) had difficulty response of 4, 2, 2, 2, 3, 2, 4, 3, 5 with an average of 3.0 (see text in red). Further below, Table 6 shows the average level of difficulty for each of the 20 questions from the group one respondents.

Table 5. Degree of Difficulty, School-Related Data

	cr	cm	s	m	i	b	f	a	r	AVG.
Core										
C1	2	3	3	3	2	4	2	3	2	2.7
C2	3	2	2	5	2	2	2	3	4	2.8
C3	3	2	3	3.33	3	5	3	2	3	3.0
C4	2	3	3	4	2	4	2	3	4	3.0
C5	3	3	2	2	3	3	4	3	3	2.9
Support										
S1	4	2	2	2	3	2	4	3	5	3.0
S2	2			2	2	3	3		5	2.8
S3	3	3			3	1	2	3	2	2.4
S4	2	3		2	2	3	2	3	2	2.4
S5	3	3	2	2	4	1	3	3	2	2.6
Management										
M1	3	3	3	2	3	2	3	3	4	2.9
M2	4	4	2	1	4	3	4	4	3	3.2
M3	3	3	2	2	3	2	2	3	5	2.8
M4	3	3	4	2	4	1	3	3	4	3.0
M5	3	3	3	2	3	2	2	4	4	2.9
M6	2	4	3	3	2	4	3	3	4	3.1
M7	2	3	4	3	2	1	2	3	3	2.6
M8	3	4	2	3	2	1	3	4	5	3.0
M9	2	3	3	2	3	3	5	3	4	3.1
M10	4	4		2	3	2	5	4	5	3.6
										2.89

⁶⁶ Group one being educators, consultants and auditors with domain experience. Group two is auditors and consultants without this domain experience.

The statistical mean is 2.89 and the variance is .0729. Standard deviation is .277 and for the population it is .27.

$$S = \sqrt{\frac{\sum (x - m)^2}{n - 1}} = .277 \quad S_p = \sqrt{\frac{\sum (x - m)^2}{n}} = .27$$

Table 6 provides results by respondent, from phone interviews with fourteen consultants and auditors *not* included in the survey above. Below is a view of results from phone interviews with 14 different consultants and auditors *not* included in the survey above. These consultants and auditors were only asked to rate the degree of difficulty they encountered in implementing these twenty ISO 9001 requirements in the normal course of business (which all admitted did not include working with educational organizations). They were not asked how each requirement is met, only the level of difficulty in meeting each requirement in private industry.

Table 6. Degree of Difficulty, Non-School-Related Data

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	AVG.
Core															
C1	2	2	3	3	3	3	2	3	4	2	3	3	2	2	2.6
C2	3	2	2	2	3	5	2	4	2	2	2	3	3	4	2.8
C3	3	3	2	3	2	3.33	3	2	5	3	3		3	3	2.9
C4	2	2	3	3	3	4	2	3	4	2	2	3	2	4	2.8
C5	3	3	3	2	3	2	3	3	3	4	3	3	2	3	2.9
S1	4	2	2	2	2	2	3	3	2	4	4	3	2	5	2.9
S2	2	1	2	3	2	2	2	3	3	3	2	2	1	5	2.4
S3	3	2	3	2	3	3	3	2	1	2	2	3	2	2	2.4
S4	2	1	3	2	3	2	2	3	3	2	2	3	2	2	2.3
S5	3	2	3	2	3	2	4	3	1	3	3	3	2	2	2.6
M1	3	3	3	3	3	2	3	3	2	3	3	3	3	4	2.9
M2	4	3	4	2	3	1	4	4	3	4	4	4	3	3	3.3
M3	3	2	3	2	2	2	3	3	2	2	2	3	2	5	2.6
M4	3	3	3	4	3	2		3	1	3	2	3	2	4	2.8
M5	3	2	3	3	2	2	3	2	2	2	2	4	3	4	2.6
M6	2	1	4	3	3	3	2	3	4	3	2	3	2	4	2.8
M7	2	2	3	4	2	3	2	2	1	2	3	3	3	3	2.5
M8	3	4	4	2	2	3	2	2	1	3	2	4	3	5	2.9
M9	2	2	3	3	3	2	3	2	3	5	3	3	2	4	2.9
M10	4	3	4	3	3	3	3	2	4	5	3	4	4	5	3.6
															2.7

The statistical mean is 2.74 and the variance is .0775. Standard deviation is .274 and for the population it is .268.

$$S = \sqrt{\frac{\sum (x - m)^2}{n - 1}} = .274$$

$$S_p = \sqrt{\frac{\sum (x - m)^2}{n}} = .268$$

Figure 4 shows the correlation between the education consultants (Edu Series) the non-education consultants⁶⁷ (Non-Edu Series). Both groups arrived independently at their results.

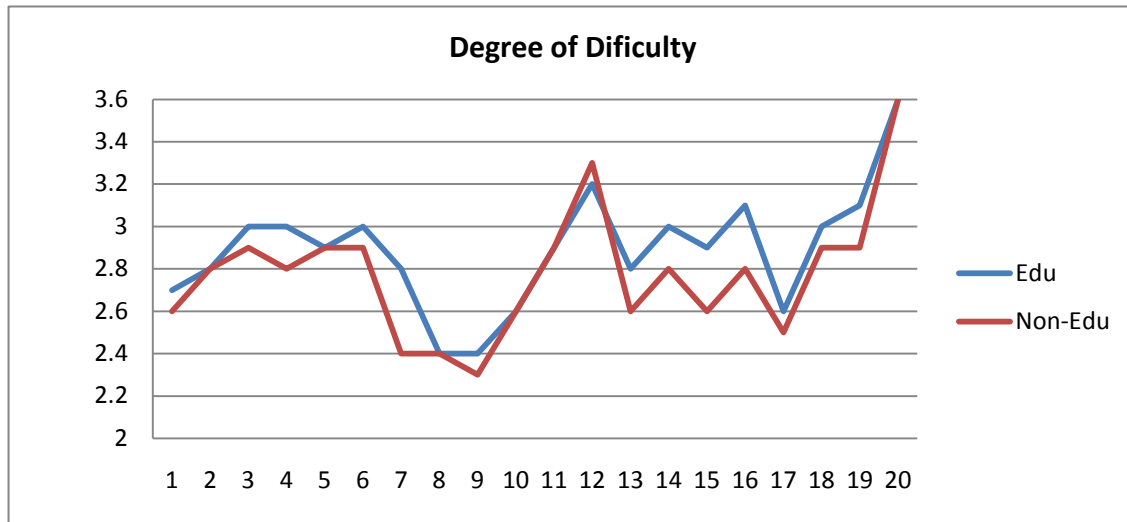


Figure 4. Two-Series Line Graph

Table 7 shows the *average* level of difficulty, for both groups to show the correlation in their opinion about degree of difficulty in implementing elements of the ISO 9001 standard. The findings of the second group correlate very well with my own experience concerning the level of difficulty for implementation in private industry. In fact, I often find that items C2, M19, and M20 Design, Preventive Actions and CI respectively, are some of the most difficult to implement in private industry.⁶⁸

⁶⁷ This group was unaware of the topic of this study. They were just asked to rate the level of difficulty of implementing ISO 9001 requirements in their normal course of business in private industry.

⁶⁸ Recall the discussion on KAIZEN (Continuous Improvement) and the extraordinarily high value it places on the “smallest” improvement that can be made. This is diametrically opposed to our culture in North America where the overriding goal is to get the “biggest bang for the buck.”

Table 7. Combined Likert Scores for Each Question

Educators, consultants and auditors (n=10) Non-educational consultants & auditors (n =14)	Very Easy	Easy	Some Degree of Difficulty	Difficult	Very Difficult
Core Processes					
1. What would you think the top three core processes would be?		XX			
2. Where might design apply?			X	X	
3. How could we “control” the core processes? Would “calibration” be an issue?			XX		
4. How might “measuring and monitoring” be addressed?				XX	
5. How might “re-work” be addressed?		X	X		
Support Processes					
1. How might “competency” of the service providers be determined?			X		
2. How might gaps in competency be addressed?		X	X		
3. How might suppliers be evaluated?		XX			
4. How might “incoming inspection” be addressed?		XX			
5. How might we control documents?		XX			
Management Processes					
1. Who might make up “top management” to review the system periodically?		X		X	
2. What might the relevant inputs and potential outputs of these reviews be?			XX		
3. How might quality objectives be developed? Can you suggest some objectives?			XX		
4. How might quality objectives made known to all? Parents, students, teachers, board members, etc?		X	X		
5. What might a Continuous Improvement plan include? How might progress be measured?			XX		
6. How might non-conformances be identified?		X	X		
7. Who should develop Corrective Actions?				X X	
8. Who should have input into Preventive Actions?			XX		
9. How might the roles & responsibilities be determined?		X	X		
10. How might “customer” feedback be addressed?				X	X

Note that *all* of the education-related consultants/auditors felt there were straightforward⁶⁹ methods of meeting the ISO 9000 requirements in a school setting. None indicated that requirements could not be met or that any had been particularly difficult to implement.⁷⁰ This opinion is supported by the fact that the level of difficulty averaged 2.89. The mean for difficulty for non-school consultants/auditors was 2.74; a five percent difference in difficulty for schools. It is possible that the majority of this difference is due to the sheer number of consulting engagements non-school consultants have (a lot more experience and proficiency) as compared to school-related engagements.

⁶⁹ I say straightforward because of the relatively low level of difficulty they saw in meeting the ISO requirements.

⁷⁰ I had no blanks or “N/A” items in any of their responses

CONCLUSIONS

I conclude that all of the ISO 9001 requirements are applicable to an education setting. As such, we can reasonably expect similar benefits as those purported to accrue to private companies. This is based on the experiences described above by educators and school community members. For example, consider the experience of the first school mentioned in this inquiry—Liberty Center School; within five years of registration to ISO 9001:2000, this institution “*enjoys the same benefits as business and industry (emphasis mine)*” with a realization of increased efficiency and profitability. Educators in particular will appreciate the fact that when you look at the requirements of ISO 9001:2000 analytically, you will find a lesson plan⁷¹ for a course in the application of business principles” (Thomas 2003, 72).

My conclusions are further supported by the input of the two groups of trained professionals. Each arrived independently at the level of difficulty in school and non-school settings. Such findings suggest that an ISO 9001 implementation in an education organization should not be harder or easier than any of the implementations applied worldwide in the private industry. Moreover, the dynamic between the goals⁷² of the actor and the supporting and/or constraining structure appear to be highly similar, if not identical, for an educator as for any other actor. More generally, the findings that the Standard’s requirements are applicable to school settings are, in my view, based on the ease and naturalness with which normal and routine education activities in this analysis were able to meet the ISO 9001 requirements.⁷³ Given all these insights, I conclude that education can and should be seen as an enterprise where goals and

⁷¹ I would not presume to put words in Mr. Thomas’ mouth, but I would make that “a fairly straight-forward” lesson plan.

⁷² I am not arguing that the goals in manufacturing and education are the same, only that the *dynamic* between an actor’s goals and the actor’s environment is similar in any profession.

⁷³ Indeed, consider the ease (and completeness) with which teacher certification, experience, skills, education, and continuing professional development of educators would met the ISO 9001 requirement in Section 6.2.2 on competency.

objectives drive the structure of the organization. This conclusion is also largely based on my 15 years of ISO 9001 experience in dealing with diverse groups of people, organizations, and processes.

IMPLICATIONS AND FUTURE RESEARCH

The results of the study hold numerous implications, many of which can and should be further tested and verified by future research efforts. At a minimum, I have shown that whatever is “wrong with education” in large part is what is wrong with any type endeavor or enterprise. It would be extremely helpful if we can see that support and management processes in an educational setting are identical (not similar, identical) to those of any other organization, and therefore subject to the same causes and solutions. Control of these support and management processes would ensure that we are focusing on process and we have learned (via 1,000,000 prior registrations) to trust that a controlled process yields the desired results.

I am confident that the original intent of the standard of applicability to any human endeavor is sound and that there is no inherent attribute in education as a human activity to be excluded. I am mindful of the fact that the number of registrations in the world is approaching 1,000,000⁷⁴ and that even if this number is significant, the academic work is just beginning. It is also fair to say that with so few registrations in education we are still at the stage of anecdotally pointing to the apparent successes and failures of the pioneers in their field.

I believe that a valid research vector for this issue and for this researcher in particular may be the lessons learned and knowledge gleaned from an actual ISO 9001 implementation in an El Paso elementary school. I was unable to find in the literature any research involving pre and post analysis from an ISO 9001 implementation in a school community setting. I firmly believe that UTEP’s Research Institute for Manufacturing and Engineering Systems (RIMES), through its technical assistance in quality is uniquely qualified to do just that. If the experiment in El Paso is designed properly, it may contribute to the research currently underway.

⁷⁴ The official ISO website claims 1,064,785 registrations worldwide as of December 31, 2009. For more information, see <http://www.iso.org/iso/survey2009.pdf>.

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APPENDIX A

TEXT OF THE ISO 9001:2000 STANDARD

Quality Management Systems - Requirements

1 Scope

1.1 General

This International Standard specifies quality management system requirements for use where an organization's capability to provide conforming product and/or service needs to be demonstrated.

The quality management system requirements are aimed primarily at achieving customer satisfaction by meeting or exceeding customer requirements through application of the system, its continual improvement and the prevention of nonconformity.

This International Standard applies to organizations from the identification of customer requirements, through all other quality management system processes, to the achievement of customer satisfaction. The standard presents processes as being closed-loop in nature.

The requirements of this Standard are generic and apply to all product categories and any industry or economic sector. It is applicable to all types and sizes of organizations.

It is intended that all requirements of this International Standard are applied. However, tailoring may be acceptable in certain situations (see 1.2.3).

1.2 Reduced scope and tailoring

1.2.1 General

Application of reduced scope and tailoring of requirements does not absolve the organization of the responsibility to provide product and/or service which meets customer requirements. Regulatory requirements are still applicable to the organization and its product and/or service.

1.2.2 Reduced scope - design and development excluded.

Where the organization's product and/or service is stated in terms of an established design or specification, the requirements in clause 7.3 Design and development of this International Standard do not apply

1.2.3 Tailoring

When customer requirements or the nature of product and/or service preclude the applicability of certain requirements for processes specified in this International Standard, such requirements may be excluded. Such exclusions need to be restricted to those product and/or service realization processes within clause 7 Process management which are not performed by the organization.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 9000: 2000, Quality management Systems - Concepts and vocabulary.

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 9000:2000 Quality management systems - Concepts and vocabulary, apply.

NOTE 1 The supply-chain terminology used in this edition of this International Standard is shown as follows:

Supplier > organization > customer

NOTE 2 The term 'organization' used in this International Standard replaces the term 'supplier' which was used previously to mean the unit to which this International Standard applies. The term 'supplier' is now used instead of the previous term 'subcontractor'. The changes have been introduced to reflect the current vocabulary used in industry.

4 Quality management system requirements

The organization shall define and manage the processes necessary to ensure that product and/or service conforms to customer requirements.

As a means of implementing and demonstrating the defined processes, the organization shall establish, document and maintain a quality management system covering the requirements of this International Standard.

The nature and extent of the system documentation shall be suitable for its application.

5 Management responsibility

5.1 General

The processes covered in this clause form part of the network of inter-related processes within the quality management system. A customer -focus when managing processes is an integral part of management responsibility.

Top management shall demonstrate that customer needs and expectations have been determined and translated into applicable customer requirements.

Top management shall demonstrate its commitment to meeting customer requirements for their product and/or service. This includes, but is not limited to:

- a) creating an environment for awareness and fulfillment of customer requirements;*
- b) establishing the quality policy and quality objectives;*
- c) establishing a quality management system;*
- d) performing management reviews;*
- e) ensuring the availability of necessary resources (see clause 6).*

5.2 Customer needs and requirements

The organization shall determine customer needs and requirements and specify them in the form of defined requirements for the organization, with the aim of achieving customer confidence in the provided product and/or

service.

The organization shall ensure the defined requirements are understood and fully met (see 7.2.1).

5.3 Quality policy

Top management shall establish its policy for quality and ensure that it:

- a) is suitable for the needs and requirements of its customers;*
- b) includes commitment to meeting requirements and continual improvement for all levels of the organization;*
- c) provides a framework for establishing and reviewing quality objectives;*
- d) is communicated, understood and implemented throughout the organization;*
- e) is regularly reviewed for suitability and effectiveness.*

5.4 Quality objectives and planning

5.4.1 Quality objectives

The organization shall establish written quality objectives, at each applicable function and level within the organization. The quality objectives shall be consistent with the quality policy. Quality objectives shall include those needed to meet requirements for products, services and related processes.

NOTE Quality objectives are the links between policy and its implementation in process management (see 7.1).

5.4.2 Quality planning

Quality planning shall determine the activities needed to achieve quality objectives. This planning shall be consistent with other requirements of the quality management system and shall be written in a format to suit the operating practice.

Consideration shall be given to the following issues:

- a) allocation of resources, responsibilities and authority needed;*
- b) processes that constitute the operating practice and where specific procedures and instructions apply;*
- c) identification and acquisition of needed equipment, resources and skills;*
- d) clarification of standards of acceptability for all requirements, including those which contain subjective judgement;*
- e) identification of suitable verification activities;*
- f) need for and preparation of quality records;*
- g) Defining selected processes and determining inputs and outputs.*

5.5 Quality management system

5.5.1 General

The organization shall establish a quality management system as a means of ensuring that the product and/or service conforms to specified requirements (see 4).

The quality management system shall be structured and adapted to the activities and size of the particular organization.

5.5.2 Responsibility and authority

Roles, responsibilities and authorities shall be defined and communicated to facilitate effective quality management.

5.5.3 Quality Manual

Top management shall be responsible for the preparation of a quality manual.

The quality manual shall include, but not be limited to:

- a) the quality policy;*
- b) defining the quality management system;*
- c) presentation of the organizational structure.*
- d) inclusion or reference to the system procedures to be used.*

5.5.4 System procedures

System procedures shall be prepared which, together with the quality manual, describe the complete quality management system.

The range and detail of the system procedures shall depend upon the complexity of the work, the methods used, and the skills and training of personnel involved in performing the work.

5.5.5 Management representative

Top management shall appoint a member of the organization's own management who, irrespective of other responsibilities, shall have defined authority for:

- a) ensuring that a quality management system is implemented and maintained;*
- b) reporting to top management on the realization of the quality management system, including needs for improvement;*
- c) maintaining awareness of customer needs and requirements.*

5.5.6 Control of documents

The organization shall establish system procedures for controlling new and revised documents required for the operation of the quality management system. Applicable documents of external origin shall be controlled. These procedures shall ensure that:

- a) documents are approved for adequacy;*
- b) documents are periodically reviewed, and revised as necessary;*
- c) the current versions of relevant documents are available at all locations where activities essential to the effective functioning of the process are performed;*
- d) obsolete documents are promptly removed from all points of issue and use, or otherwise controlled to prevent unplanned use;*
- e) any obsolete documents retained for legal or knowledge-preservation purposes are suitably identified.*

Documentation shall be legible, revision controlled, readily identifiable and maintained in an orderly manner.

NOTE: Documentation can be in any form or any type of media.

5.5.7 Control of quality records

Quality records are documents determined by the organization. They shall be available to demonstrate conformance to requirements and effective operation of the quality management system. Quality records from suppliers shall be controlled.

The organization shall establish and maintain system procedures for record identification, collection, indexing, access, filing, storage and disposition.

Retention times of quality records shall be established.

5.6 Management review

Top management shall, at defined intervals, review the quality management system to ensure its continuing suitability, adequacy and effectiveness.

The management review shall at least consist of comparison and evaluation of the following inputs:

- a) audit reports;*
- b) customer complaints and satisfaction;*
- c) process reports and product conformance analyses;*
- d) status of preventive, corrective, and improvement actions, compared to the existing quality policy and quality objectives.*

The outputs from a management review shall include, as applicable, the status or revision of action plans related to:

- a) quality management system;*
- b) quality policy and quality objectives;*
- c) needs for process or product audits;*
- d) resource allocation.*

Results of management reviews shall be recorded.

6 Resource management

6.1 General

The organization shall determine and provide resources needed to establish and improve the quality management system.

Such resources shall be applied to the managing of organizations, processes and projects.

6.2 Human resources

6.2.1 Assignment of personnel

The organization shall select and assign personnel to ensure that those whose activities impact the conformity of product and/or service are competent on the basis of applicable education, training and experience.

6.2.2 Training, qualification and competence

The organization shall:

- a) determine training needs required for achieving conformity of product and/or service;*
- b) provide training to address these needs;*
- c) evaluate the effectiveness of training on a continual basis.*

Individuals shall be educated and trained to qualify them for the activities which they perform. Competence,

including qualification levels achieved, shall be demonstrable.

NOTE: This is to provide development of organizational and individual competence.

6.3 Other resources

6.3.1 Information

The organization shall define and maintain current information necessary to achieve the conformity of product and/or service.

System procedures for managing information shall consider access and protection of information to ensure integrity and availability.

6.3.2 Infrastructure

The organization shall determine and provide the infrastructure needed to achieve the conformity of product and/or service.

6.3.3 Work environment

The organization shall define and implement those human and physical factors of the work environment needed to achieve conformity of product and/or service.

7 Process management

7.1 General

The organization shall determine which processes are required to operate as a loop, such as from customer requirements to customer satisfaction, thereby providing the required product and/or service (see Figure 1). In determining such processes the organization shall consider the outputs from the quality planning process (see 5.4.2).

The sequence and interaction of these processes shall be determined, planned and controlled to ensure they operate effectively.

The organization shall assign responsibilities for the operation and monitoring of these product and/or service realization processes.

The organization shall ensure these processes are operated under controlled conditions and produce outputs which are consistent with the organization's quality policy and objectives. For all these processes, including those for which additional requirements are specified in other parts of clause 7, the organization shall:

- a) determine how each process influences the ability to meet product and/or service requirements;*
- b) Establish methods and practices relevant to process activities, to the extent necessary to achieve consistent operation of the process;*
- c) verify processes can be operated to achieve product and/or service conformity;*
- d) determine and implement the criteria and methods to control processes related to the achievement of product and/or service conformity;*
- e) determine and implement arrangements for measurement, monitoring and follow-up actions, to ensure processes operate effectively and resultant product and/or service meets requirements (see clause 8);*
- f) ensure availability of process documentation and records which provide operating criteria and information, to support the effective operation and monitoring of the processes. This documentation shall be in a format to suit the organization's operating practice and shall, where required, include written*

- quality plans;
- g) *provide the necessary resources for the effective operation of the processes (see clause 6).*

7.2 Customer-related processes

7.2.1 Identification of customer requirements

The organization shall establish a process for identifying customer requirements.

This process shall consider:

- a) *extent to which customers have specified the product and/or service requirements;*
- b) *requirements not specified by the customer but necessary for fitness for purpose;*
- c) *obligations related to product and/or service, including regulatory and legal requirements;*
- d) *customer requirements for availability, delivery and support of product and/or service.*

7.2.2 Review of customer requirements

The identified customer requirements shall be reviewed before a commitment to supply a product and/or service is provided to the customer (e.g. submission of a tender, acceptance of a contract or order).

This review shall determine that:

- a) *identified customer requirements are clearly defined for product and/or service;*
- b) *where the customer provides no written statement of requirement, the order requirements are confirmed before acceptance;*
- c) *contract or order requirements differing from those in the tender or quotation are resolved. These review provisions shall also be applied to amendment of customer contracts or orders.*

7.2.3 Review of ability to meet defined requirements

Each commitment to supply a product and/or service, including amendment to a contract or order, shall be reviewed to ensure the organization will have the ability to meet defined requirements for product and/or service.

7.2.4 Customer communication

The organization shall implement effective liaison with customers, with the aim of meeting customer requirements.

The organization shall define communication requirements relating to:

- a) *product and/or service information;*
- b) *inquiry and order handling, including amendments;*
- c) *customer complaints and other reports relating to nonconformities (see 7.6 and 8.2.1);*
- d) *recall processes, where applicable (see 8.2.1);*
- e) *customer responses relating to conformity of product and/or service (see 7.3.3 and 8.2).*

7.2.5 Customer property

The organization shall exercise care with customer property while it is under the organization's supervision or being used by the organization. The organization shall ensure verification, storage and maintenance of customer supplied product and/or service provided for use or incorporation. Any customer product or property that is lost, damaged or otherwise found to be unsuitable for use shall be recorded and reported to the customer (see 7.2.4).

NOTE: Customer Property may include intellectual property e.g. information provided in confidence.

7.3 Design and development

7.3.1 General

The organization shall plan and control design and development of the product and/or service.

Design and development plans shall include or reference at least:

- a) stages of the design and development process,*
- b) required review, verification and validation activities;*
- c) responsibilities for design and development activities.*

Interfaces between different groups involved in design and development shall be managed to ensure effective communication and clarity of responsibilities..

The plans and associated documentation shall be.

- a) made available to personnel that need them to perform their work;*
- b) reviewed and updated as design and development evolves.*

7.3.2 Design and development inputs.

The requirements to be met by the product and/or service shall be defined and recorded. These shall include identified customer or market requirements, applicable regulatory and legal requirements, requirements derived from previous similar designs and any other requirements essential for design and development. Incomplete, ambiguous or conflicting requirements shall be resolved.

7.3.3 Design and development outputs

The outputs of the design and development process shall be recorded in a format that allows verification against the input requirements.

Design and development output shall:

- a) meet the design and development input requirements;*
- b) contain or make reference to design and development acceptance criteria;*
- c) determine characteristics of the design essential to safe and proper use, and application of the product and/or service.*

Design and development output documents shall be reviewed and approved before release.

7.3.4 Design and development review

At suitable stages of the design and development process, formal and systematic reviews of the process results shall be conducted to ensure conformance with input requirements.

Participants in the design review process shall include representatives of all functions concerned with the design stage being reviewed.

The results of the design reviews and subsequent follow-up actions shall be recorded.

7.3.5 Design and development verification

Design and development verification shall be planned and performed to ensure the design output meets the design input requirements.

NOTE: Design verification may include activities such as:

- a. comparing the new design with a similar proven design;
- b. performing tests and demonstrations
- c. performing alternative methods of analysis
- d. *reviewing the design stage documents before release*

7.3.6 Design and development validation

Validation shall be performed to confirm that resultant product and/or service is capable of meeting the stated needs of customers and/or users under planned conditions.

NOTE 1: Wherever possible, validation should be defined, planned and completed prior to the delivery or implementation of the product and/or service.

NOTE 2: Partial validation of the design or development outputs may be necessary to provide confidence in their adequacy for subsequent use. Such partial validation may use methods such as:

- a) reviews involving other interested parties;
- b) modeling and simulation studies;
- c) pilot production, construction or delivery trials of key aspects of the product and/ or service.

7.3.7 Design and development changes

Design and development changes or modifications shall be determined, recorded, reviewed and approved by authorized personnel before implementation. This activity shall consider the effect of changes on compatibility requirements and the usability of the product and/or service throughout its planned life.

7.4 Purchasing

7.4.1 General

The organization shall control its purchasing processes to ensure purchased product and/or service conform to the organization's requirements. The type and extent of methods to control these processes shall be dependent on the effect of the purchased product and/or service upon the final product and/or service.

The organization shall evaluate and select suppliers based on their ability to supply product and/or service in accordance with the organization's requirements. Evaluation and selection criteria for suppliers shall be established. Supplier evaluations, supplier audit records and evidence of previously demonstrated ability shall be considered when selecting suppliers and when determining the type and extent of supervision applicable to the purchased product and/or service.

7.4.2 Purchasing information

Purchasing documentation shall contain information clearly describing the product and/or service ordered, including, but not limited to:

- a) *requirements for approval or qualification of product and/or service, procedures, processes, equipment and personnel;*
- b) *any management system requirements.*

The organization shall review and approve purchasing documents for adequacy of the specification of requirements prior to release.

7.4.3 Verification of purchased product and/or services

The organization shall determine and implement the arrangements necessary for verification of purchased product and/or service (see 8.1.4).

Where the organization or its customer proposes to perform verification activities at the supplier's premises, the organization shall specify the required verification arrangements and method of product and/or service release in the purchasing documentation.

NOTE: Verification by the customer neither absolves the organization of responsibility to provide product and/or service which are acceptable to the customer, nor does it preclude subsequent rejection by the customer.

7.5 Production and service operations

7.5.1 General

The organization shall control production and service operations through:

- a) the availability of clearly understandable work standards or instructions;*
- b) the use and maintenance of suitable production, installation, and service provision equipment (see 6.3.2);*
- c) the provision of suitable working environments (see 6.3.3),*
- d) the availability and use of suitable inspection, measuring and test equipment, capable of the necessary accuracy and precision (see 8.2.4);*
- e) the implementation of suitable monitoring, inspection or testing activities (see 8.2.2 and 8.2.3);*
- f) provision for identifying status of product and/or service with respect to required measurement and verification activities;*
- g) suitable methods for release and delivery of product and/or service.*

7.5.2 Identification and traceability

Where applicable, the organization shall identify the product and/or service by suitable means throughout all realization processes.

Where traceability is a requirement, the organization shall control the identification of product and/or service.

7.5.3 Handling, packaging, storage, preservation and delivery

The organization shall ensure that during internal processing and final delivery of product and/or service the identification, packaging, storage, preservation, and handling do not adversely affect conformity with product and/or service requirements. This shall apply equally to parts or components of a product and elements of a service.

7.5.4 Validation of processes

The organization shall determine any production and/or service processes where the resulting output cannot be readily or economically verified by subsequent monitoring, inspection and testing. This includes any product and/or service where processing deficiencies may become apparent only after the product is in use or the service has been delivered.

These processes shall be validated to demonstrate their effectiveness and acceptability. The arrangements for validation shall be defined and shall at least consider need for:

- a) processes to be qualified prior to use;*
- b) qualification of equipment or personnel;*
- c) use of specific procedures or records.*

Evidence of validated processes, equipment and personnel shall be recorded and maintained.

NOTE 1: Such processes, where the resulting product and/or service cannot be readily or economically verified, are frequently referred to as special processes.

NOTE 2: The validation of such processes may be achieved by performing product and/or service verification activities not feasible during normal production and service operations.

NOTE 3: Where other methods of process validation are not feasible, it may be suitable to apply the requirements of 7.3 to the development of the process and to demonstrate validation in accordance with 7.3.7.

7.6 Control of nonconformity

7.6.1 General

The organization shall ensure that product and/or service which does not or will not conform to requirements is controlled to prevent unplanned use, application or installation.

The organization shall provide for identifying, recording and reviewing the nature and extent of the problem encountered.

Arrangements for ensuring that nonconforming product and/or service is controlled shall be defined (see 8.2.1).

7.6.2 Nonconformity review and disposition

The organization shall review nonconformities and determine the action to be taken. Nonconforming product and/or service shall be:

- a) corrected or adjusted to conform to requirements, or*
- b) accepted under concession, with or without correction, or*
- c) re-assigned for alternative valid application, or*
- d) rejected as unsuitable.*

Responsibility and authority for the review and resolving of nonconformities shall be defined.

When required by the contract, the proposed use or repair of nonconforming product or delivery of a nonconforming or modified service shall be reported for concession to the customer. The description of any such correction or adjustment, accepted nonconformity, product repair or service modification shall be recorded.

Where it is necessary to repair or rework product and/or service, verification requirements shall be determined and implemented.

7.7 Post delivery services

Where there is an established requirement for the organization to provide support services, subsequent to delivery of the specified product and/or service, the provision of these support services shall be subject to planned arrangements. These arrangements shall be consistent with the requirements of 7.1, together with other requirements of clause 7, as applicable.

8 Measurement, analysis and improvement

8.1 General

The organization shall define and implement measurement, analysis and improvement processes as a means of demonstrating that product and/or service conforms to specified requirements. The type, location and timing of

measurements shall be defined and the results recorded based on their importance. The results of data analysis and improvement activities shall be an input to the management review process (see 5.6).

8.2 Measurement

8.2.1 Measurement of system performance

The organization shall determine and establish processes for measurement of quality management system performance. Customer satisfaction shall be used as a primary measure of system output and internal audit shall be used as a primary tool for evaluating ongoing system compliance.

8.2.1.1 Measurement of customer satisfaction

The organization shall establish a process for obtaining and monitoring information and data on customer satisfaction. The methods and measures for obtaining customer satisfaction information and data and the nature and frequency of reviews shall be defined.. The process shall demonstrate the level of customer confidence in the delivery of conforming product and/or service supplied by the organization. The organization shall implement suitable measures for establishing internal improvement. The effectiveness of measures implemented shall be periodically evaluated.

8.2.1.2 Internal audit

The organization shall establish a process for performing internal audits of the quality management system and related processes.

- a) *The purpose of the internal audit shall be to determine whether:
the quality management system established by the organization conforms to the requirements of this International Standard, and the quality management system has been effectively implemented and maintained.*

The organization's internal audit process shall be based on the status and importance of the activities, areas or items to be audited, and the results of previous audits.

- b) *The internal audit process shall include, but not be limited to:*

- planning and scheduling the specific activities, areas or items to be audited; assigning trained personnel independent of those performing the work being audited;*
- *assuring that a consistent basis for conducting audits is defined.*
- c) *The organization shall record the result of internal audits including:*
 - *activities, areas, and processes audited;*
 - *nonconformities or deficiencies found;*
 - *status of commitments made as the result of previous audits, such as corrective actions or product audits (see 6 c));*
 - recommendations for improvement.*

The result of the internal audit shall be communicated to the area audited. The management personnel responsible for the area audited shall take timely corrective action on the nonconformities recorded.

NOTE: Guidance on quality management system audits is given in ISO 10011.

8.2.2 Measurement of processes

The organization shall apply suitable methods for measurement of processes necessary to meet customer requirements. Such measurements shall be used to monitor the output of the processes that control conformity of

product and/or service provided to customers. Measurement results shall be used to determine opportunities for internal improvement.

8.2.3 Measurement of product and/or service

The organization shall apply suitable methods for measurement of the product and/or service to verify that specified requirements for the product and/or service are met.

Evidence of required inspection and testing activities and acceptance criteria used shall be recorded. Records shall indicate authority responsible for release of product and/or service.

Product and/or service shall not proceed or be dispatched until all the specified activities have been satisfactorily completed and the related documentation is available and authorized. The only exception shall be when product and/or service is released under positive recall procedures (see 2.4 d)).

8.2.4 Control of measuring, inspection and test equipment

The organization shall control, calibrate, maintain, handle and store applicable measuring, inspection and test equipment used to demonstrate conformance of product and/or service to specified requirements. Measuring, inspection, and test equipment shall be used in a manner which ensures that measurement uncertainty, including accuracy and precision, is known and is consistent with the required measurement capability. Test equipment software shall meet the © ISO 1998 applicable requirements for the design and development of product as stated in this International Standard.

The organization shall:

- a) calibrate and adjust measuring, inspection and test equipment at specified intervals or prior to use, against equipment traceable to international or national standards. Where no such standards exist, the basis used for calibration shall be recorded;*
- b) identify measuring, inspection and test equipment with a suitable indicator or approved identification record to show calibration status;*
- c) record the process for calibration of measuring, inspection and test equipment.*
- d) ensure environmental conditions are suitable for calibrations, measurements, inspections and tests;*
- e) safeguard measuring, inspection and test equipment from adjustments which would invalidate the calibration.*
- f) verify validity of previous inspection and test results when equipment is found to be out of calibration;*
- g) establish the action to be initiated when calibration verification results are unsatisfactory.*

8.3 Analysis of data

Analysis of applicable data shall be established as one means of determining where quality management system improvements can be made. The organization shall collect data from relevant sources, including internal audits, corrective and preventive action, nonconforming product and/or service, customer complaints and customer satisfaction results.

The organization shall analyze applicable data to provide information on:

- a) the effectiveness of the quality management system;*
- b) process operation trends;*
- c) customer satisfaction, and*
- d) conformance to customer requirements.*

The organization shall determine the need for requiring statistical techniques for analyzing data, including verifying

process operations and product and/or service characteristics. Statistical techniques selected for use shall be suitable for the application. The organization shall control and monitor the use of the statistical techniques selected.

8.4 Improvement

8.4.1 Corrective action

The organization shall establish a process for eliminating the causes of nonconformity by preventing recurrence. As applicable, nonconformity reports, customer complaints and other suitable quality management system records shall be used as inputs to the corrective action process

Responsibilities for corrective action shall be established. The procedures for the corrective action process shall include, but not be limited to:

- a) identification of nonconformities of product and/or service, process, quality management system, and customer complaints;*
- b) investigation of causes of nonconformities, and recording results of investigations;*
- c) determination of corrective actions needed to eliminate causes of nonconformities;*
- d) implementation of corrective action;*
- e) follow-up to ensure corrective action taken is effective and recorded.*

The organization shall implement corrective action for product and/or service already delivered, but subsequently discovered to be nonconforming. Customers shall be notified, where possible.

8.4.2 Preventive action

The organization shall establish a process for eliminating the causes of potential nonconformities to prevent occurrence. Quality management system records and results from the analysis of data shall be used as inputs for preventive action, as applicable.

Responsibilities for preventive action shall be established.

The preventive action process shall include, but not be limited to:

- a) identification of potential product and/or service and process nonconformities;*
- b) investigation of the causes of potential nonconformities of product and/or service, process and quality management system, and recording the results;*
- d) determination of preventive action needed to eliminate causes of potential nonconformities;*
- e) implementation of preventive action needed;*
- e) follow-up to ensure preventive action taken is effective, recorded and submitted for management review (see 5.6).*

8.4.3 Improvement processes

The organization shall establish processes for the continual improvement of the quality management system. These processes shall include those methods and measures suitable for the product and/or service.

APPENDIX B

SAMPLE QUALITY MANUAL FOR UTEP RESEARCH CENTER

Quality Manual

Research Institute for Manufacturing & Engineering Systems (RIMES)

ISO 9001:2000

Quality Management System

1.1. General Requirements

The Research Institute for Manufacturing and Engineering Systems has established and is maintaining a documented Quality Management System (QMS) and will continually improve its effectiveness in accordance with the requirements of ISO 9001:2000.

We, at Research Institute for Manufacturing and Engineering Systems:

- *are dedicated to the manufacture of high quality precision-machined parts*
- *identify the activities required for the QMS and their application throughout the organization,*
- *determine the sequence and interactions of these activities,*
- *ensure the availability of resources and information necessary to support the operation and monitoring of these activities,*
- *determine criteria needed, monitor, and analyze these activities, and implement actions necessary to achieve planned results and continual improvements of these.*
- *monitor the quality of our subcontractors and suppliers in accordance with our QMS procedures.*
- *strive to enhance customer satisfaction through the effective application of our Quality system.*

1.2 Documentation

We maintain the following documents:

- *documented statements of the quality policy,*
- *a quality manual with scope, reference to procedures and interactions between activities as required in 4.2.2*
- *documents needed by Research Institute for Manufacturing and Engineering Systems ensuring the effective planning, operation and control of its activities, and*
- *records required by this International Standard.*

1.2.1 Control of Documents

A documented procedure is in place (Document and Record Control Procedure, P-1) to define how we:

- *approve documents for adequacy prior to issue,*
- *review, update and re-approve as necessary*
- *ensure that changes and the current revision status of documents are identified,*
- *ensure that documents remain legible, readily identifiable, and available at point of use,*
- *ensure that documents of external origin are identified and their distribution controlled, and*
- *prevent the unintended use and identify obsolete documents.*
- *maintain a physical central location for all documents*

1.2.2 Control of Records

Records are defined and maintained to provide evidence of conformity to requirements and of the effective operation of the QMS. Records remain legible, readily identifiable and retrievable. A documented procedure is in place to define the control needed for the identification, storage, protection, retrieval, retention time and disposition of records. (Document and Record Control Procedure, P-1)

2. Management Guidance

2.1. General Guidance

The management team is committed to the development and continual improvement of our QMS by:

- communicating to the organization the importance of meeting customer as well as all statutory and regulatory requirements,
- establishing the quality policy
- ensuring that quality objectives are established
- conducting management reviews
- ensuring the availability of resources

2.2. Needs and Expectations of Customers

Customer requirements are determined and are met with an aim of enhancing customer satisfaction. The Institute is committed to delivering products that meet or exceed customer requirements.

2.3. Quality Policy

The quality policy for the Institute has the following characteristics:

- is appropriate to our purposes,
- includes a commitment to comply with requirements and to continually improve the effectiveness of the QMS,
- provides a framework for establishing and reviewing quality objectives, is communicated and understood within the organization, and is reviewed for continuing suitability.
- has been defined by the Director on January 04, 2002 as follows:

Quality policy: RIMES is dedicated to exceeding customer expectations and to continuously improve in everything we do

2.4. Quality Objectives

The management team ensures that objectives are established at relevant functions and levels within **Research Institute for Manufacturing and Engineering Systems**. The quality objectives are measurable and consistent with our quality policy of providing good quality parts every time. Our principal quality objective is 100 % on-time delivery with zero customer complaints. These objectives are measured and the results reviewed on a quarterly basis.

We ensure that planning of the QMS is carried out in order to meet the requirements given in accordance with 4.1 of ISO 9001:2000, as well as the quality objectives, and that the integrity of the QMS is maintained when changes are planned and implemented.

2.4 Responsibility and Authority

Responsibilities and authorities are defined and communicated within **Research Institute for Manufacturing and Engineering Systems**.

Specific Responsibilities include, but are not limited, to the following:

- Director: conducts or oversees management reviews, ensures that all employees have proper tools and equipment for performing their jobs, ensures that a safe work environment is provided. Ensures that

communication processes are established and communication regarding the QMS is encouraged.

- *Management Representative: ensures that activities needed for the QMS are established, implemented and maintained, reports to the management team on the performance of the QMS and any need for improvement, and ensures the promotion of awareness of customer requirements throughout the organization.*
- *Quality Assurance Manager: oversees and is responsible for the implementation of the Quality System.*
- *Manager: oversees all production to ensure quality, on-time delivery.*
- *Field Agents: is responsible for ensuring that all projects are completed as expected by the customer, within budget and that work is performed according to schedule.*

Communication processes are established and communication regarding the QMS is encouraged.

2.6. Management Review

We review the QMS, at least twice a year, for suitability, adequacy and effectiveness. With this same frequency, we assess opportunities for improvements including the quality policy and objectives, audit results, customer feedback, quality indicators, status and follow up of corrective and preventive actions, previous management reviews, changes and recommendations for improvements. Records are maintained. Outputs from these reviews include improvements to the system, services provided to our customers, and use of our resources.

3. Resource Management

Research Institute for Manufacturing and Engineering Systems determines and provides the resources needed to:

- *implement and maintain the QMS and continually improve its effectiveness, and*
- *Enhance customer satisfaction by meeting customer requirements.*

3.1 Involvement of People

Personnel are competent based on appropriate education, training, skills and experience. This is ensured by requiring all prospective machinists to complete a prescribed test. The results of this test are kept on-file and become part of the quality records.

3.2 Competence, Awareness and Training

Regarding competence (General Training Procedure), awareness, and training, we:

- *determine the necessary competence for personnel performing work affecting service quality,*
- *take action to satisfy these needs and evaluate its effectiveness, and*
- *ensure that our personnel are aware of the relevance and importance of their activities and how they contribute to the achievement of the quality objectives.*
- *maintain records on skills and training.*

3.3. Infrastructure

We provide and maintain an infrastructure, such as workspace and associated utilities, hardware and software, supporting services and work environment, needed to achieve conformity to customer requirements.

4.0 Planning of service

We plan and develop the processes needed for service provision. This planning is consistent with other requirements of our QMS. In planning service provision, we determine the following, as appropriate:

- *quality planning objectives and requirements for the service provision*
- *the need to establish processes, documents, and provide resources specific to the service;*
- *required verification, validation, and monitoring specific to our services and the criteria for acceptance;*
- *what records should be maintained to ensure that the delivered services meet requirements.*

4.1 Review of Requirements Related to the Product

We review, keep records, and confirm the requirements prior to delivery of services to ensure that:

- *we know what the customer needs, have the ability to fill the needs, and*
- *that any contradictions are resolved.*

4.2 Customer Communication

We have effective communication with customers regarding our services, inquiries, contracts, changes and feedback, including customer complaints to monitor customer satisfaction.

4.3 Design and Development

The RIMES is dedicated to fabrication and machining. Minimal design work is accomplished. The RIMES will perform designs only in the following circumstances:

Case 1: A customer brings in a prototype and requires that the RIMES manufacture similar parts. The RIMES prepares internal shop drawings and develops the manufacturing process. The final quality test is acceptance by the customer, who performs his own test. The RIMES, working with the customer, will establish critical dimensions and tolerances which will apply to the manufacture of the part. Final inspection forms will constitute records maintained for this case. Design records will not be maintained.

Case 2: The customer requires the design of a new part. In this case, the RIMES, will subcontract the design work to a firm that employs registered professional engineers. The subcontractor will be responsible design, analysis, and the preparation of drawings and specifications. The design firm will provide the RIMES with all design documents and drawings.

4.4 Purchasing

We ensure that purchased product conforms to requirements. We define requirements, evaluate, and select suppliers affecting our quality management system. Criteria for selection and evaluation are established. We maintain records pertaining to our suppliers (Supplier Evaluation Form, F-15)

4.5 Control of Production and Service Provision

We plan and carry out service and product delivery under controlled conditions, including, as applicable:

- *The availability of information that describes the characteristics of the service or product. (We utilize inspection forms that indicate and check critical dimensions)*
- *the use of suitable resources, and*
- *the implementation of monitoring and measurement (we maintain calibrated instruments and well-defined inspection procedures).*

4.6 Identification and Traceability

We identify our service and products and its status with respect to monitoring and measurement requirements. Our instruments are regularly calibrated to traceable standards.

4.7 Customer Property

We exercise care with our customer's proprietary information while it is under our control. If any such property is lost or unsuitable for use, we report this to the customer and maintain records (Damaged Property Report, F-14).

4.8 Preservation of Product

We have designated holding areas for raw materials and finished product. We ensure that these areas are secure and that all product is well marked, packaged, and identified

4.9 Control of Monitoring and Measuring Devices

We regularly and on a defined schedule examine and calibrate all of our measuring instruments. We maintain an up to date master list of all instruments in use and an individual calibration record for each instrument.

5.0 Analysis and Improvement

We plan and implement monitoring, measurement, analysis and improvement processes to demonstrate conformity to the product, quality system and improve overall effectiveness. This is done by analyzing customer feedback and by monitoring and measuring data that indicates how well we are meeting our quality objectives.

5.1 Customer Satisfaction

We determined methods to monitor information related to customer satisfaction. We have an established process for customer feedback. This process requires that all new customers be sent a survey card after the first order is delivered. Thereafter survey cards are sent after every six orders are completed. This feed back is compiled and analyzed.

5.2 Internal Audit

We conduct internal audits at planned intervals to determine whether our QMS is implemented, maintained, and

effective and conforms to planned arrangements such as ISO 9001 and **Research Institute for Manufacturing and Engineering Systems** requirements. Audits are regularly accomplished at six-month intervals. Selection of auditors and conduct of audits ensures objectivity and impartiality of the audits. The administration of our audit program including audit scope, frequency, and methods are defined in a documented procedure. Management of audited area ensures timely actions are taken to eliminate nonconformities and their causes. We verify and report actions taken and report results. (Internal Audit Procedure, P-2)

5.3. Monitoring and Measurement of Processes and Service

We monitor appropriately, and where applicable, measure the QMS activities. These methods demonstrate the ability of the activities to achieve planned results. When planned results are not achieved, corrective action is taken, as appropriate, to ensure conformity of the service.

We monitor and measure characteristics of the service to verify that service requirements have been met at appropriate stages of process.

We keep evidence of conformity showing authority for releasing service. **Control of Nonconformity**

Service, which does not conform to requirements, is identified and controlled to prevent its unintended delivery. The responsibilities and authorities for dealing with nonconformities are defined in a documented procedure. We deal with nonconformities in service by taking action to eliminate the detected nonconformity. Records of the nature of nonconformities and any subsequent actions taken are maintained. When nonconformity is detected in service we take action appropriate to the effects, or potential effects, of the nonconformity. (Nonconformance Procedure, P-3)

5.5. Analysis of Data

We collect and analyze relevant data, to indicate suitability and effectiveness of our QMS and to evaluate where improvements can be made regarding:

- customer satisfaction and conformity to service requirements,
- characteristics and trends of processes and services, and
- opportunities for preventive actions.

5.6. Improvement

We continually improve the effectiveness of the QMS through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions as well as management reviews.

We take corrective and preventive action to eliminate the cause of nonconformities or potential nonconformities in order to prevent recurrence or occurrence. Corrective actions are appropriate to the nonconformities encountered. Preventive actions are appropriate to potential problems. A documented procedure is in place to define requirements for: (Corrective and Preventive Action Procedure, P-4)

- reviewing nonconformities, including customer complaints,
- determining the causes of nonconformities,
- evaluating the need for action to ensure that nonconformities do not recur,
- determining and implementing action needed (includes Preventive Action),
- records of the results of action taken (includes Preventive Action),
- reviewing corrective action taken (includes Preventive Action).

6.0 Listing of Procedures

P-1. Document and Record Control Procedure

P-2. Internal Audit Procedure.

P-3. Nonconformance Procedure

P-4. Corrective and Preventive Action Procedure

7.0 Listing of Forms

F-1. Estimated Job Cost

F-2. Estimated Component Cost

- F-3. Instrument Master List*
- F-4. Individual Instrument Record*
- F-5. Invoice Form*
- F-6. Packing Slip*
- F-7. Purchase Order*
- F-8. Quotation Form*
- F-9. Internal work Order*
- F-10. In-Process Inspection Form*
- F-11. Final Inspection Form*
- F-12. Non-Conformance Report*
- F-13. Corrective and Preventive Action Report*
- F-14. Damaged Property Report*
- F-15 Supplier Evaluation*

8.0 Listing of Records

- R-1. Quality Manual and Listing of Revisions*
- R-2. Customer Requirements*
Note: include Costing (F1&F2), Purchase order (F7),
Quote(F8), Internal Work Order(F9),
In-Process Inspection (F10), Final Inspection (F11)
- R-3. Results of Internal Audits*
- R-4. Corrective and Preventive Action*
- R-5. Records of Management Review*
- R-6 Reports of Lost or Damaged Customer Property*
- R-7. Customer Complaints*
- R-8. Supplier Evaluations*
- R-9. Calibration Records*
- R-9. Results of Final Inspections*
- R-10. Training and Test Results for Employees*
- R-11 Design Records*
- R-12. Non-Conformance Reports*

APPENDIX C

SAMPLE QUALITY PROCEDURE FOR UTEP RESEARCH CENTER

Sample documented procedure

Institute of Manufacturing and Materials Management (RIMES) University of Texas at El Paso (UTEP) 500 West University Avenue El Paso, Texas 79968	Quality Procedure Control of Document Procedure Page 88 of 102 Approved by: <i>Manny Pacillas</i>
Document #: 2-4.2.3	Revision: 0 Effective Date:6/1/07

Control of Documents

1.0 Purpose

This procedure outlines the policy for the generation, revision and control of all documents and data relating to the quality management system.

2.0 Scope

This procedure applies to all quality management system documents.

3.0 Responsibility

The Administration Assistant is the owner of the Document Control process. Additional authority and responsible personnel are defined within the procedure.

4.0 Definitions

- A. Controlled Documents - are the quality manual, procedures and forms used in the Quality Management System.*
- B. Master Copy – is the original controlled document attached to approval signatures.*
- C. Responsible Member – the person responsible for writing or updating a document used in the Quality Management System.*
- D. Approver – relevant personnel described in Organization and Management section of the quality manual needed to approve any documents.*

5.0 Related Documentation

*Document Control Cover Sheet
Master List of Controlled Documents
Control of Records Procedure
Quality Manual*

6.0 Procedure

6.1 General

The types of documents controlled include but not limited to:

Quality Manual, Labels, Procedures, Signage, Forms, External Standards

6.2 Document Approval and Issue

The creation of new documents or revision of existing documentation can be initiated as a result of employee suggestions, management review meetings, process changes, and customer requirements. New and revised documents will be submitted initially to the administrative assistant who will generate the official quality document and forward packages to the management review team for review and approvals. Master printed copies of current documentation will include the cover sheet identifying responsible member and appropriate approvals. Master copies will be maintained in the office of the Management Representative.

After a new document is approved it is assigned and ID# number with a "0" initial revision level and entered into the Master List of Controlled Documents. The Master List of Controlled Documents includes: document name, ID number, revision number, and appropriate distribution information. Controlled copies of certain approved documents that must be distributed to specific areas must include a red 'Controlled' stamp identification. Printed forms used for collecting appropriate Quality Management System data must have only document name, ID number and revision identification. Users of forms must ensure current revision status before use.

When an existing document is changed and approved the revision level is changed to reflect the new level. The updated document will be replaced in the controlled document file. Any original or last version of the master copy kept will be marked 'OBSOLETE' and maintained in the document file for historical purposes. Documents will have change history included on the cover sheet attached to master copies and may have a history table included in the document showing changes.

At a minimum, all controlled documents in the quality system are identified with the correct document number and revision level and are recorded in the Master Document List. Completed forms needed for effective record keeping are identified in the Control of Records Procedure.

6.3 External Documents

An official copy of the most current version of external documents such as purchased forms, customer specifications, military specifications or other will be placed External Form binder. Any paper copies of procedural documents including drawings or specifications distributed for official use will be identified with the red 'Controlled' stamp. External forms used must only show an ID or version number indication.

7.0 Revision History

Revision No.	Summary of Revision	Revision By	Revision Date	Section Revised
0	Original Issue	ISO Committee	6/1/07	

APPENDIX D
SURVEY INSTRUMENT
Questionnaire

CORE PROCESSES

1 What were the top three core processes and how were they defined?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

2 Was Design included?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

3 How was “control” assured? Was “calibration” an issue?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

4 How was “measuring and monitoring” addressed?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

5 Was “re-work” addressed?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

SUPPORT PROCESSES

6 How was “competency” determined?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

7 How were gaps in competency addressed?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

8 How are suppliers evaluated?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

9 How was “incoming” addressed?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

10 How are documents controlled?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

MANAGEMENT PROCESSES

11 Who was “top management” that gathered to review the system periodically?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

12 What were the relevant inputs and potential outputs of these reviews?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

13 How were quality objectives developed? Do you remember some of them?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

14 How were quality objectives made know to all? Parents, students, teachers, board members, etc?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

15 Was there a Continuous Improvement plan documented? How was progress measured?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

16 How were non-conformances identified?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

17 Who developed Corrective Actions?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

18 Who had input into Preventive Actions?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

19 How were the roles & responsibilities determined?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

20 How is “customer” feedback addressed?

(On a scale from 1-5, 5 being most difficult) How difficult was each one of these Standard requirements to meet in the education setting?

1 2 3 4 5

APPENDIX E
LIST OF SOURCES AND SURVEY RESPONDENTS

	Survey Sent to	Organization	Title
303-982-6801	Beverly Craddock	Jeffco Public Schools	Community Relations Specialist
Conrad@utep.edu	Conrad Soltero	UTEP	Quality Expert
704-832-2523	Brenda Clarke	Iredell-Statesville Sch Dist	QA Manager
	Miguel Miramontes	private	Consultant
303-982-1458	Barb Goings	Green Mountain High	Assistant Principal
303-982-9394	Teri Eichman	Green Mountain High	Assistant Principal
(505) 563-5406	Dr. Maria Applezoller	U.S. Department of the Interior National Indian Programs	Operations Manager
303-982-7766	Colleen Owens	Green Mountain High	Assistant Principal
303-982-3670	Bernard Hohman	Chatfield High School	Principal
maxboedder@msn.com	Max Boedder	Synergistics BPO	President and CEO
303-982-3516	KC Somers	Chatfield High School	Teacher
303-982-8863	Tracie Binford	Arvada West High	Assistant Principal
13	Paula Hrichak	Liberty Center High	Secretary of Mrs. Durante
djohnson@arrirs04.uta.edu	David Johnson	UT Arlington	Regional Director
14	Cathy Moore	Liberty Center High	Assistant Principal
656-626-9455	Ramon Covarrubias	Private	Consultant, parent
814-464-8662	Paul Fritz	Erie County Technical School	Business Manager & Board Secretary
Gallegos.ja@sbcglobal.net	Jose Gallegos	Private	Consultant
656- 688-25-32,	Ing. Isabel Torres Mota	Instituto Tecnológico de Cd. Juárez	Departamento de Calidad
614-238-3002 ext 1024	Rosa Elva Espinoza	Colegios de Bachilleres	Coordinador de Programas de Calidad
			respinoza@cobachih.edu.mx
miguel@aqamexico.com	Miguel A. Munoz	American Quality Assessors	Regional Manager, parent
303-982-6803	Helen Neal	Jeffco Public Schools	Administrative Services
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CURRICULUM VITAE

The oldest of four brothers, Oscar attended school in Ciudad Juarez through 4th grade. The family moved to Ysleta during 1966 where he completed his primary education before moving to Los Angeles California where he completed secondary education and enrolled at Devine Verb Seminary of the Dioceses of Los Angeles, CA. After a course in sociology, psychology, anthropology and biblical studies, he left the seminary to marry Sofia Carvajal in 1977. They have three children, Oscar, Michael, and Andrea.

Oscar spent several summers helping Cesar Chavez and Dolores Huerta organize farm workers in Salinas, CA. He also worked on Jerry Brown's presidential campaign. He then worked on the Gary Hart national campaign for 2 years and was subsequently hired by the Industrial Areas Foundations (IAF), formerly the Saul Alinsky Institute as a community organizer with assignments in East Los Angeles, CA, Queens, NY, and in South Texas.

He retired from the mortgage and real estate business in 1988 and moved his wife and three children to Mexico. He started his own business in Juarez/EL Paso in 1990 while back in school to complete a Bachelor's degree in Mechanical Engineering.

Oscar and his family have been lucky to have the opportunity to travel extensively in North, Central and South America as well as the Caribbean. Vacation spots have included Machu Picchu, Lima, Cuzco, Colombia, Costa Rica, Panamá, Honduras, Belize, México, Canada, Grand Cayman, and Ecuador.

While he has been working at UTEP, Sofia completed her Bachelor's in Social Work, Oscar Jr. completed a Bachelor's in Computer Science and started an MBA, Michael is studying Finance at UTEP, and Andrea completed her Bachelor's degree in Nursing in 2009.

Oscar and Sofia have purchased property in Mexico and New Mexico as options for retirements, but the immediate plans include encouraging their children to pursue graduate work and to launch two more businesses, one in January 2012 and one in May of 2013.

Oscar is proud to hold degrees in Physics (1992), Mathematics (1993), Mechanical Engineering (1994), and Masters in Political Science (2011). He strives to set a good example for his children in this regard.

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