

# Quantitative Measurement of Quality in Healthcare and Higher Education

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## Abstract

*The article provides a baseline science course on measurement of quality as a quantitative entity, by defining types of quality and listing examples of quality indicators for each type of quality in healthcare and higher education. Total quality is a sum of objective quality and perceived quality, and the difference is explained. Objective quality consists of quality of resources, quality of process, and quality of outcome. Resources are composed of ethics, knowledge and skills, equipment, and safety. Quality of outcome should be the most important component of total quality evaluation. Value of education and healthcare is defined as a ratio of the received quality divided by the incurred cost.*

**Key words:** Value, Objective Quality, Perceived Quality, Resources, Process, Outcome.

## Introduction

Education and healthcare are for people provided by people. People-providers passionately and productively deliver education and healthcare to people-clients. They should work not only hard but also smart. This article is intended as an introduction to the science of providing the best to people by people, the science of Quality.

As a society-responsible organization offering education and healthcare, we strive to fulfill our mission by providing of the highest Value. The Value of anything, including education and healthcare, may be best defined as delivered/received Quality over incurred Cost. We want to successfully treat and cure patients at the minimal expense for them and for our society. We want to superbly educate and graduate members of our society at Affordable expense so they join the working force and form an Economic Engine pushing this society to greater economic and social levels. Members of such a sophisticated society will both look for and prepare a wider Access to education and healthcare. Therefore, the Value is directly proportional to Quality as the numerator in this equation, and reversely proportional to Cost as the denominator. The higher Quality leads to the higher Value of our efforts. I will show in this article how to measure Quality and how to potentially improve it by modifying its types and characteristics. Nevertheless, combined evaluation of Value is needed at the final conclusion, since Cost-effectiveness may actually improve Quality independently, and changes in Quality may have a secondary impact on Cost.

**Value = Quality / Cost**

## **I. Quality**

**Quality is a characteristic of a product or service or concept which defines its nature, property, capacity, accomplishments, and rank, with pragmatic understanding that it does not just reflect a degree of excellence, but it denotes a high degree of excellence and superiority in kind.**

Maintaining and improving Quality as a high degree of excellence and superiority is a branch of science. Science is an organized knowledge which can be reproducibly applied in rationally explaining occurring phenomena and forming correct predictions. Scientific approach to quality maintenance and quality improvement is a part of Performance Management. Performance Management is not only either a business component or a philosophical approach, but it is a program required to be a part of any society-responsible organization, like healthcare or education organizations, by licensing (mandatory) and accreditation (voluntary) agencies, and having been analyzed and inspected by them for its successful results. Performance Management leading to improved Quality, therefore, is not a free choice for healthcare or education organization, but a requirement to justify their existence.

To assure and improve Quality through scientific methods, a system of measuring it must be developed. Quality becomes a subject of quantitative assessment; Quality scientifically becomes a Quantitative entity. The individual items we measure are called Quality Indicators, and they provide a composition of scores we analyze. The scoring allows us to determine where we are, compared to where we thought we should be, with a subsequent strategic planning that leads to where we would like to be in the specified future. The quantitative scores of Quality show our standing in two areas. One is the world of our mission: do we guarantee Quality of our product (healthcare, education, manufactured product, business service) according to our mission goals, design blueprints and ethical expectations. The other world is a group of our peers and competitors: what is our rank on that list.

### **Quantitative score of Quality:**

- 1. High degree of excellence in fulfilling the mission (“fit to purpose”)**
- 2. Superiority among peers and competitors (rank)**

## **II. Types of Quality**

This article defines entities of Quality, by providing a distinction between two major types of Quality (Objective Quality and Perceived Quality), and focuses on subtypes: Resources, Process, and Outcome components of these entities (Godyn 2009). It is intended for a strategic approach to Quality in higher education; however, it may be used in any enterprise since Quality is a characteristic of any existing phenomenon, including producing, servicing, caring or educating. In addition, the concepts and examples provided in this article are rooted in general quality pillars, which apply to any type of Quality, and include: Correctness, Timeliness, Communication, Safety, and Cost-effectiveness (Godyn 2005). Due to the fact that the article may serve to assist a strategic development in our specific university with variety of excellent schools, including schools of engineering and business, and also two schools of medicine with a unique situation of having both allopathic and osteopathic programs (one of two only such universities in the United States), examples of definitions and indicators are related to healthcare and education areas. Moreover, focusing on two areas consisting of healthcare and education gives us a special opportunity of addressing two situations: 1. reactive processes, often urgent, of healthcare where unwelcome negative events are cured to reverse to a most achievable positive baseline, and 2. proactive processes, always elective, of education where only positive events are planned to achieve a higher level of standing.

The Quality has different properties; therefore, the scoring system has to be adjusted to different types of Quality and must be accordingly designed. There is a more important reason to define the types Quality; it is to understand their contributions to the total Quality, how they connect into a dynamic structure which is a subject of synergistic laws, how they form the total Quality assessment, and how we are able to improve the total Quality by modifying its types separately.

The first major division is into two areas of Quality: (A) Objective Quality (Quality of Care in Medicine, Acquired Knowledge in Education) and (B) Perceived Quality (Quality of Service in Medicine, Respectability of Diploma). There are phenomena where you may evaluate Objective Quality only or Perceived Quality only. As examples, we may measure quality of water from a well (measuring chemical and microbiological contamination) as Objective Quality, or quality of religious services as Perceived Quality (never possibly to score its Objective Quality by knowing or not if a person subjected to it really enters the promised Kingdom after death). However, most phenomena of Value will have Quality scored as a sum of Objective Quality and Perceived Quality, e.g., you buy a car from a specific dealership because of consumer reports scoring high reliability of a car type (high Objective Quality) and because you know from the past their client-friendly service department (high Perceived Quality), or, if being a devil's advocate, you like the well water for its taste (high Perceived Quality) and you drink it despite the fact that it may be contaminated (poor Objective Quality).

**Quality = Objective Quality + Perceived Quality**

### **III. Objective Quality**

The Objective Quality is the high degree of excellence measured and compared to benchmarks and /or expected goals, and superiority in kind ranked among peers. The Objective Quality in healthcare is Quality of Care, which is a measure of the outcome and the objective evaluation of the most effective ways to achieve the best outcome. The Objective Quality in education is the measurable Quality of Graduates. The Objective Quality in research is Quality of Publications and Patents, although successful Quality of Grant Applications appears sometimes more important to simply sustain research activity. Major types of Objective Quality are Quality of Resources, Quality of Process, and Quality of Outcome. The latter is frequently synonymous with Quality. However, the other types are pre-determinants of outcomes and they may constitute the main mission goal, or outcomes may not be reliably measurable; then Resources and Process Quality may represent Objective Quality. Moreover, understanding contributions and separately scoring types of Quality allow us to modify them independently to achieve better scores for the entire Objective Quality.

**Objective Quality = Quality of Outcome + Quality of Process + Quality of Resources**

#### **III A. Objective Quality of Outcome**

Outcome of Quality of Care would mean a measurable result of Medical Outcome. However, the outcome may not be a result of Care. In healthcare it may appear easy to understand but actually it is difficult to measure Quality of Outcome on individual patient basis. There are a number of variables influencing the outcome which are not always under control of providers. Therefore, Quality of Outcome is typically measured on a population basis, which reflects a combination of factors including individually applied Processes and provider's Resources but focuses on the averaged level of achieved Outcome. Quality of Outcome in Education is a measurable Quality of Graduates. Similarly, evaluation of education is performed on a population basis since intellectual abilities of a single individual graduate can not necessary

be a representative outcome of educational activities. Below, I provide just a few exemplary indicators of Quality of Outcome to explain the concepts; since this is a Quality 101 level of discussion, the lists should not be considered complete or final. The indicators' results may be compared either to the best expected results (excellence in fulfilling the mission) or to results achieved by peers and competitors (rank among peers). The purpose of comparing the results to the expected or highest-achiever benchmarks is to set up high but realistic goals and successfully implement an improvement plan. However, it has to be of no surprise that each organization works very hard on improving any national or state-reported scores, and even significant improvement of performance and outcomes may or may not improve our rank among peers. Therefore, primary goals should be of excellence in fulfilling the mission.

1. Healthcare examples of the Quality of Outcome indicators, on a population basis, are:

a. mortality – this may be compared to the expected mortality of the hospitalized patients' population cared for as calculated from their disease complexity and severity; or compared to other hospitals of the same geographic area by assuming similar population disease prevalence, or compared to hospitals of similar level of care (e.g., primary vs tertiary) by assuming similar complexity of cases. 30-day mortality of patients with acute myocardial infarction or pneumonia compared to the national top 10% performers may be a good example of this indicator.

b. hospital acquired infections, like catheter-associated urinary tract infection – there is no allowance for this type of complications; any numbers are detrimental; this indicator of Quality of Outcome reflects also on Safety Processes in the healthcare organization.

c. re-admissions within 30 days – this would suggest incomplete care during the original hospitalization; however, this indicator is also dependent on post-hospitalization outpatient or nursing home care. The results may be compared to the other hospitals in the same geographical area (due to a similar manner of outpatient treatment).

d. Post-treatment disease-free survival of patients with initially diagnosed malignancies, adjusted for the site and type and a disease stage; this may be compared to the national and state statistics.

2. Educational mission's examples of Quality of Outcome Indicators are:

a. average score of university graduates on national examinations or state certifying examinations – this is the most objective measure of Education Quality of Outcome; our score may be compared to the national or state average score and to the score of the best performing university.

b. furthermore, we may compare the national entry scores of our students on enrollment with their national scores on graduation, and then see the extent of the progress of our students compared to those at the best and median universities, and that difference would reflect on the strength of specifically our educational process.

c. ratio of graduates who pass national boards or certifying examinations on the first trial – those who passed were well prepared, and those who failed were lead to think they were ready. The indicator may be compared to the best and median results of the other colleges.

d. ratio of timely graduating students compared to all initially enrolled students – although it may be an obvious Outcome indicator of any Educational mission, it really depends on both educational processes and a number of non-educational issues like level of sophistication of accepted/enrolled students, their life commitment to graduate, and their financial strength to complete the program (think: Affordability). This may be compared to ratios in the colleges of the same geographical region.

e. amount of salary increase the graduation diploma provided on average to new graduates estimated per school and calculated separately for different specialties (salary level before undergoing study compared to

salary level obtained after graduation, either in absolute dollar numbers or percentage increase) – this Quality indicator belongs to Objective Quality of Outcome since the market will react most likely to the real value of our graduates. However, Perceived Quality of Outcome in Society (Respectability) may also play a role in the score of this indicator and dissecting and estimating the weight of each component may be attempted. The salary increase may be compared to the highest achievers among universities and the national averages.

f. type of places the graduates are offered jobs or postgraduate trainings – for example “Big Four” for business graduates, “Ivy League” for medical residency programs, and so on. The percentage of graduates accepted to the top places may be compared to those at peer-colleges and competitors.

At this point, let’s assume we learn from the scores that our Graduates are not passing national boards at the level of those from the top university. We go to the Process and Resources scores and learn that those are below the scores of the top university, and we have the answer of what to do next – improve scores of those areas. However, we may learn that our Process and Resources scores are equal (if not better) to the scores of the top university. A conclusion is that our student body is not as good as that of the top university. We provide all that is needed; they just do not have the same capacity to achieve the top level scores. Is there any room for improvement then? Surely, there is; at least in two areas. First, our educational Process has to extend to and improve the pre-college educational environment of our geographically primary student population for which as a State higher educational organization we are responsible. Second, we have to work on improving scores of Respectability (Perceived Quality of Outcome by Society, see below) to attract top national/international students who would improve general student body knowledge and bring some competitiveness to our classrooms. Any further improvement of Objective Quality of Outcome will depend on our innovation.

### **III B. Objective Quality of Process**

The number of uncontrollable characteristics like complexity of pre-existing conditions and compliance of the patients, and pre-college education and intelligence of students, may be critical factors modifying an individual Outcome and subsequently population Outcome; therefore, it is also useful to measure exclusively our design of action that is consistency of application of correct evidence-based processes as Quality of Process.

Quality of Process is what we do in the best possible way, and that should lead to the best possible Outcome, unless patients or students individually contribute interfering and uncontrollable variables. Our defense in Outcome failure is proving that we have provided proper Quality of Process.

1. Some examples of Quality of Process indicators in healthcare are:

- a. Prophylactic antibiotics given within 1 hour before surgery and discontinued within 24 hours - we measure this together with a correct selection of the antibiotic given in timely periods: even if an individual patient has a subsequent infectious complication, but not attributable to complications of the performed procedure, we did all that was right according to the evidence-based care. Our compliance with the standard may be compared to the national 10%, top state performers and results of the local peers and competitors.
- b. Consistency of giving aspirin on arrival to patients with myocardial infarction – the same logic applies to it as above: we provide correct medication or other treatment in a timely manner. The patient may have detrimental outcome but our Process is of high Quality and that is what we guarantee. Again, our compliance with the standard may be compared to the state averages and results of the local competitors.

- c. Proper selection and timing of antibiotics for pneumonia for immunocompetent patients – again, correct type and timely doses may save the patient life. And again, our compliance with the standard may be compared to the national 10%, state top performers and local peers and competitors.
- d. The ratio of nurses to bed-ridden patients offered in hospital units – and related to it patients' falls from beds with possible bone fractures, since they are more an indicator of Quality of Process than Quality of Outcome, in the context of proper nursing staffing. These indicators are a part of Care and Safety Processes. Both the nurse to patient ratio and number of falls per hospitalization days may be compared to the national and state statistics.
- e. Length of hospitalization – fewer days indicate more intense process of diagnostics and treatment that equates to better Quality of Process. This indicator usually adjusted for age and/or payor may be compared to the national and state statistics.

2. There are also indicators of Education Quality which are related to Quality of Process. Examples of those are:

- a. The ratio of students per a full time faculty in a classroom – also a ratio of university faculty to adjunct faculty may be measured, assuming that the full time faculty is probably stronger in the sense of knowledge and commitment to teaching. Additional advantage of having full time faculty is their availability to students beyond class hours. However, adjunct faculty in practical fields may be actually more experienced. The ratio of student to faculty may be compared to the national averages; ratio of adjunct faculty may be compared to the peer-colleges. Students' convenience of communicating with full time or adjunct faculty may be evaluated as Perceived Quality of Process.
- b. The optimal ratio of laboratory to lecture hours per subject, which could guarantee the most intense time-efficient transfer of knowledge. In broader sense of medical education, the ratio of classroom study to patient-contact exercise has to be optimally determined. The indicator may be compared to the peer-colleges and competitors.
- c. Ratio of graduates finding jobs within 1 or 3 months after graduation – this Quality Indicator belongs to Objective Quality of Process related to university services assisting and placing graduates with companies that are looking for specialty new hires. However, it also is determined by Perceived Quality of Outcome in Society (Respectability); it may be that some Schools are so renowned that their graduates are looked for and are booked for jobs well before they graduate. This indicator may be compared to the highest achievers among colleges.
- d. Admission process is a classic area where Quality of Process is very important. Effective assistance is critical; it may determine how easy/difficult is to get enroll to a university by both good and willing students (think: Access) – what is the amount of paperwork to be submitted, and what is the timeliness of university responses to the applications, including phone calls regarding corrective actions needed in the application papers. In addition, agreements with junior colleges facilitating smooth transition of students for further studies would be helpful. All these indicators and their improvement may be compared to the internal benchmarks. Improving Access will depend also on Quality of Process in financing division that may determine Affordability.
- e. Student loans, if granted, should be able to finance all the pertinent expenses related to both educational process and life necessities during the college years. This indicator may be compared to internal benchmarks.
- f. Information Technology is critical these days – we measure the IT support for faculty and students, wireless communication present all over the campus with emphasis on consistently high speed in all geographical areas of the campus, availability of free software programs, the ratio of publicly available

printers/scanners (and computers – although students usually have their own) to number of potential users on university premises, and the correctness and timeliness of IT troubleshooting if needed. All these indicators and their improvement may be compared to the internal benchmarks and the expected best performance goals.

### **III C. Objective Quality of Resources**

We can build a good college and a good healthcare organization on a well planned and executed foundation of Resources. The starting point of such a design is adherence to the mission of organization. The community-beneficial purpose solidified by ethical performance will serve as the basis for any corrective measures leading to ultimate success.

Good ethics are most important in both healthcare and education. They include assuring privacy and confidentiality for people-clients (patients, students). Minds and souls (and physical bodies literally) of those people-clients are opened to people-providers; there must be a complete trust and undoubted fulfillment of this trust. Also, proper ethics will assure proper appropriateness of delivered care. It is not frequent, but not unusual, that patients are offered unnecessary procedures – and since they may not be sick enough to qualify for those procedures they may also have not-complicated outcomes. But good Quality of Outcome in those cases should be rejected and the process should be re-evaluated and corrected. I do not offer scoring indicators for proper ethics; however, a culture has to be created and both leadership and first-line people must not tolerate unethical behaviors. Mechanisms should be in place to assure that there is a penalty-free reporting opportunity for everybody and swift corrective actions as a follow-up.

A good foundation requires good people. Both in a university and in healthcare, you need to gather the most knowledgeable persons who also possess proper skills to perform their tasks. The way to score knowledge and skills of individual faculty members (person-provider) is to set criteria for excellence of their education (degree, prestige of school, type of post graduate training) and proven experience that could be measured by time (years of practice) or by volume (number of procedures or individually mentored graduates). Effective innovations, either incorporated or invented, should be seriously considered since they will influence both Process and Outcome. The Quality of Resources indicators may include ratios of doctoral and master degrees among faculty compared to the national averages. A total sum of the extramural financial awards (grants) and the number of awarded patents may be compared to that of the leading universities, locally and nationally.

People-providers (meaning organization employees as differentiated from people-clients), are the most important part of any organization Resources, with their Ethics, Knowledge and Skills. However, people operate in an environment we prepare for them. This includes real estate with fixed equipment which may or may not be technologically at the leading edge. In addition, safety measures of any operations, related to both building design with functioning hardware and procedural processes, are a critical part of the Resources. There is no “good” safety; proper safety is the required and expected standard. However, lack of proper safety, the “poor” safety will negatively impact on Quality of Resources, and subsequently will be detrimental to the entire mission including Quality of Process and Quality of Outcome. Strangely enough, in some organizations, including healthcare companies frequently, assuring Safety is the major determinant of providing successful Quality. Safety in healthcare means protection of patients from errors of wrong medication/dose/timing or wrong site/side in surgery, from possibility of misidentification of patients potentially resulting in fatal transfusion reactions or critical misdiagnosis, and from other serious iatrogenic complications. However, safety measures must protect not only clients (patients, students), but also providers to avoid biological contaminations or chemical exposures. Issues of individual human safety

should be a priority in approving university research programs. Both safety drills should be conducted and breach-of-safety episodes with corrective actions should be reported as Quality indicators in this category. Quality of Resources may be beneficially or detrimentally influenced by a legal frame in which healthcare organization and university operate. Some of the rules may be mandatory (federal, state, specialty accreditation), and some may be provided by voluntary accreditation agencies assuring compliance with the nationally recognized standards of high quality. A separate issue is a presence of trade unions and their participation in human resources management. Since most of the legal ramification is not modifiable by the organization itself, it is not listed in the summary formulas. However, quality monitoring should include successful regulatory compliance of the organization. Furthermore, any legal issues brought against the organization should be considered an opportunity for quality improvement and a root cause analysis should be conducted. Excellence in quality indicators for all the types of quality as listed in this article, should guarantee successful licensing and accreditations.

**Quality of Resources = Ethics + Knowledge & Skills + Equipment – Poor Safety**  
**Knowledge & Skills = Education + Experience + Innovation**

#### **IV. Perceived Quality**

Perceived Quality is a subjective rating of outcome and impression of the process leading to it. Subjective evaluation may result in low scores related to high initial expectations, and not related to ongoing performance.

It is not unusual that students praise certain faculty members, rewarding them with awards for excellence in teaching and at the same time they get the lowest scores on national examination in those subjects. That means that Perceived Quality is high, but Objective Quality is low – clearly misalignment to the detriment of graduates. Therefore, what is more important, Objective or Perceived Quality?

In healthcare, we call the Objective Quality as Quality of Care, and Perceived Quality as Quality of Service. Similarly, some medically-skillful doctors may have excellent medical/surgical outcomes (high Quality of Care) but they do not have good social skills (poor Quality of Service) and they are not appreciated by patients. Some others show superb people-skills and are liked and followed by patients, despite of poorer than expected outcomes (Godyn 2009).

Perceived Quality is heavily affected by Expectation of Quality. People-clients who have already experienced or learned-about an excellent level of Quality of Service (“spoiled” clients) will never be as satisfied as naïve people-clients entering the processes without unusual expectations and who are appreciative of any health improvement or educational enrichment. Therefore, the higher the Expectation of Quality, the lower the perceived score for received Quality that will be awarded.

We certainly should be aware of scores of Perceived Quality since they provide additional, sometimes non-predicted information. But why should we focus on Perceived Quality of Process; would Perceived Quality of Outcome be sufficient? To answer it, I’d like to quote a story I read in psychological literature of my parents’ library half a century ago (and I am not able to reference it):

A farmer bought a parrot and taught it by repeating: “Say Uncle Joe”. The parrot did not reply, so the impatient farmer hit it in the head with a stick while repeating “Say Uncle Joe”. Since the parrot did not say a word, an angry farmer placed it in a coop with chickens. But when he heard a wild noise coming from there, he went back to the coop to see that his parrot was hitting a chicken in a head and repeating: “Say Uncle Joe!”. Most phenomena are distinguished by both Quality of Process and Quality of Outcome, especially in the education. Students learn not only WHAT we teach, but HOW we teach; and HOW may actually be part of WHAT.

**Perceived Quality = Perceived Quality of Outcome + Perceived Quality of Process – Expectation of Quality****IV A.1. Perceived Quality of Educational Outcome by Graduates:**

The following indicators should be scored in this type:

- a. It may sound paradoxically, but the most objective of subjective scores in the Perceived Quality of Outcome is satisfaction of graduates with their own acquired skills after graduation while entering job market – therefore, feedback from graduates in a short-term follow-up (a year or two after graduation) should be looked for. Satisfaction scores may be compared to internal benchmarks or to results of similar surveys available on market.
- b. Another score included for analysis should be the subjective pride of the graduates of having diploma of this school, their ways of publicizing the fact of having been an alumnus of this school, possibly using it in their business advertising or participating in networking among alumni. Any publicity generated by graduates should be recorded and understood for their reasons, to amplify the scenarios in the future.
- c. However, the most revealing and simplest measurable score of Perceived Quality of Outcome is the amount of money donated to a school foundation by alumni, possibly compared to other universities. Although it partly reflects Objective Quality of Outcome which is the alumni' financial situation after graduation, it is primarily related to their perceived assessment of high Quality of Education they received and school's ability to provide it further to future generations, which fact the satisfied alumni will support as a worthwhile investment into its excellence.
- d. As a long-term follow-up, we score Perceived Quality of Outcome in two categories: (i) quality of education *per se* and (ii) quality of life-affecting outcome.
  - (i) The benefits of attending a college are acquired knowledge and usefulness of a college diploma. These two scores may be compared to internal benchmarks describing our goals of perceived academic quality.
  - (ii) Years after, however, when the knowledge is enriched by work experience, it may appear less important what they learned in a classroom and more important what they learned during college years in life lessons: what they experienced in personal interactions with some exceptional teachers, good friends and irritating roommates, what teamwork and leadership skills they acquired in student associations and on sport teams, how they were philosophically, ethically and emotionally enriched in the entire college years' period. If they attended more than one college, they will tell you their preference based more on how a specific college positively changed their lives. They may be emphatic about the greatness of a college where they became life-wiser and not necessary job-wiser. And this is that we have to note, even though we may not be able to measure it quantitatively.

**IV.A.2. Perceived Quality of Educational Outcome by Society (Respectability):**

Quality of Educational Outcome as perceived by society is Respectability of a school and its diploma. Respectability in the society is based on multiple factors: Objective Quality of Outcome as the graduates contribute to their workplace organizations and clients, Objective Quality of Resources as publicly known, and Perceived Quality by graduates projected to friends and community, among others. Ultimately, Respectability synergistically reinforces measures of Objective Quality, since by hiring respectable graduates to high and challenging positions workplaces give those graduates opportunities to prove themselves and subsequently to be influential in their society.

The question is posed here: *Which UUP is your School: University of Unlimited Prestige or University of Unfulfilled Potential?!*

Examples of indicators that may be scored in this category are:

- a. It may be a result of temporary economic situation; however, the ratio of graduates hired within 30 days post-graduation is one of the signs of Respectability, as we discussed that before.
- b. More stable and strong indicator of Respectability is the starting salary offered to this school graduates compared to graduates of other schools.
- c. However, a tricky but very symptomatic indicator of the school Respectability is the rise in the salary between pre-college experience and a hire without the diploma but with some college experience of this school – a near-graduate is believed (or not) to have learned important skills just by belonging to the culture of this school. Is our culture (and/or network) so valuable that we can sell it in the form of un-graduated “alumni”?
- d.

**Perceived Quality of Educational Outcome = Graduates and Society**

**Perceived Quality of Outcome by Society = Respectability**

#### **IV B. Perceived Quality of Educational Process:**

Perceived Quality of Educational Process, as scored by students, should be divided into Quality of Education *per se* (Academic Quality) and Quality of Life secured on campus. Although Perceived Quality of Process may be scored mostly by the students, faculty scores are also important, as following examples may show. The scores may be compared to internal benchmarks, and followed and improved by achievement of more challenging annual goals.

- a. Student and faculty satisfaction with educational facilities (size of buildings, size of classrooms, parking lots, distances in-between).
- b. Student and faculty satisfaction with educational process (scheduling, audiovisual support, online class opportunities, handouts, library).
- c. Student satisfaction with faculty (lecture presentations, leading work-groups, exam complexity/simplicity, known faculty when booking the classes, full time/adjunct faculty instruction, availability of faculty advisors).
- d. Student satisfaction with job-placing assistance.
- e. Student satisfaction with quality of other students – this would include cooperation during college years but also future business potential and outcomes. Student satisfaction with variety of student associations and clubs should be taken into account. Marital potential may also be considered - anecdotal stories are published about students entering tough technical or medical schools just to meet high quality down-to-earth future spouses.
- f. Student satisfaction with housing and food quality/access on campus and in the area, including entertainment possibilities.
- g. Faculty satisfaction with intellectual and ethical quality of students; this may serve to modify processes related to Access.
- h. Faculty satisfaction with university administration. It was observed that the patients’ Perceived Quality correlated with nurses’ satisfaction with administrative leadership in healthcare organizations. It may be inferred that student satisfaction with educational process may reflect the faculty satisfaction with university administrative and scientific leadership.

Perceived Quality of Process (like of Outcome) should be scored during and after the educational period (after graduation, transfer to another college, termination or interruption). Any scores of Perceived

Quality of Process may be compared to internal benchmarks for trends and shifts, but should be possibly immediately improved.

#### **IV.C. Perceived Quality of Healthcare (Patient Experience of Care, Quality of Service)**

Objective Quality in healthcare is called Quality of Care, the Perceived Quality in healthcare is called by a federal institution a Patient Experience of Care, and I call it Quality of Service (Godyn 2009). Quality of Service is measured by different means and many organizations establish their individual ways to analyze it. One of the ways to score Quality of Service is a questionnaire offered by a private national-wide company that asks patients a number of questions, mostly related to Quality of Process. Some physicians have questioned its logic, but they have to consider it seriously for the results' implications.

Patients' evaluation of some of those measures indicates that real opportunities for improvement of Objective Quality of Outcome and Process may be identified as a result. One of the indicators is an assessment of communication with doctors and nurses – proper communication is critical in both correct decision-making process and subsequent compliance of patients that definitely influences outcomes. Other measures are pain management, cleanliness of the hospital, and discharge instructions. Scores in Patient Experience of Care are compared to the national top 10%, state highest achievers, and peers and competitors.

It was shown that improvement in hospital's food being warm and on time was one of the factors which more strongly correlated with patient satisfaction with a hospital (Perceived Quality) than improvement in measurable medical outcomes (Objective Quality). Therefore, it may be that the scores of Perceived Quality are overrated and given a not-proportional weight compared to Objective Quality scores. It appears that the weight of Perceived Quality scores (Quality of Service, Patient Experience with Care) is possibly diminishing as you can see in the future trending presented below (VI. Value).

#### **V. Cost.**

There is a cost of conducting any business, fixed and operational. It is an additional cost to providers to achieve higher Quality. There is a cost for clients (patients, students, society) to buy the business product: healthcare and education. The clients buy Value of this product based on how high is Quality and how low (cost-effective) is the Cost. As the Value formula indicates, higher Cost decreases Value and lower Cost increases Value for the same Quality (although some client may be trapped in an assumption that a higher price suggests a better product). The clients' cost will influence Affordability and, therefore, Access. Moreover, the Value will determine if the organizations contribute to the society as an Economic Engine.

Since the affordability and access to healthcare has been currently a national policy issue in the United States, I will not attempt to provide further analysis of the healthcare aspect of Cost. Also, a quantitative measurement of Cost (or cost-effectiveness) is not presented in this article. But I will provide a few comments on the cost of Education. As I mentioned before, although Value is defined as a ratio of Quality over Cost, the numerator may be modified by the denominator and *vice versa*.

The education is frequently obtained by securing student or family loans. Students' debt of a specific university can be understood from four different points.

1. Point related to Quality is the starting salary after graduation:

If graduates were hired with top salaries in the Nation, debt burden by itself might be relatively lower than for those with less debt but with significantly lower salaries. Therefore, the Quality question here is: do we sell education for a high price but is it of such high quality that graduates can resell it to industry for much

higher prices? And what is really the ratio of our college cost to future earnings compared to other college graduates?

2. Question related to Access is:

Are our students, especially from a local geographic area, prepared to assume such a high debt up front, or do we lose potentially excellent students/graduates because they look for less expensive education (even though they could afford paying back our expensive one, after they start to work)?

3. Real Affordability is in another question:

What is the debt burden of and percentage of students who could not graduate? Since they were admitted they represented some intellectual strength; moreover, they were enriched by our educational process and they will add that wisdom and experience to their communities. So, non-graduating students are still an investment to the society, but they may not afford to pay back for that education since they have not obtained the higher-earning diplomas. Our job here is two-fold:

- a. assist students in successful completion of the study; and finally, in conclusion of my quick thoughts and brief remarks here:
- b. lower the cost of our education to make it also affordable for students who tried hard, got more sophisticated, entered network of faculty-recommendation and network of graduates, will improve our society (may contribute to Economic Engine), but could not graduate.

4. Several aspects are related to heating up the Economic Engine:

- a. Saturating society with university graduates will certainly accelerate the Economic Engine, by bringing knowledge, innovation and new energy, to improve productivity.
- b. Establishing new physician practices brings few more jobs to the area, but more importantly, raises health standards, improves not only treatment efficiency but also health awareness and better prophylaxis. Therefore, by improving the health wellness in the society, more physician practices improve working ability of the population.
- c. However, the student debt burden, if significant, may cripple the potential of accelerating the Economic Engine. Young people focused on paying off the loans reportedly do not spend money to heat the economy; they may live with parents instead of renting or buying houses, they may not plan to buy new cars or home appliances, they may limit their entertainment expenditures. They may even limit their plans for family expansion that normally imposes new expenses but enriches society most. Therefore, strategic measures have to be applied to lower the Cost while keeping Quality high.

## **VI. Value**

The final question is what should be the significance of scores of different types of Quality and what should be the weight of different entities in the Value equation.

We can observe the evolution of Quality evaluation and gradual shift to Value evaluation in healthcare by federal authorities during these coming years. Below, there are formulas of Value Based Purchasing constructed based on quality of multiple indicators, which impacts hospital payments by U.S. Centers for Medicare and Medicaid Services ([www.cms.gov/Medicare](http://www.cms.gov/Medicare)).

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 In 2014:

Objective Quality (Quality of Care)	70%	
of which      Quality of Process		45%
Quality of Outcome		25%
Perceived Quality (Patient Experience of Care, Quality of Service)	30%	

Total	100%
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In 2015:

Objective Quality (Quality of Care)	50%	
of which      Quality of Process		20%
Quality of Outcome		30%
Perceived Quality (Patient Experience of Care, Quality of Service)	30%	
Efficiency (Cost-effectiveness)	20%	

Total	100%
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In 2016:

Objective Quality (Quality of Care)	50%	
of which      Quality of Process		10%
Quality of Outcome		40%
Perceived Quality (Patient Experience of Care, Quality of Service)	25%	
Efficiency (Cost-effectiveness)	25%	

Total	100%
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The following trends can be observed:

1. Appearance and increase of Efficiency (Cost-effectiveness) in the formula, making it Value assessment, a switch from Quality assessment only.
2. Objective Quality (Quality of Care) was once dominated by Quality of Process, which intended to improve and unify care in the hospitals based on practicing evidence-based medicine; now the dominant part of Objective Quality score is Quality of Outcome.
3. Perceived Quality (Patient Experience of Care, Quality of Service) is getting slightly reduced in its importance, rightly so.

## VII. Conclusion

The quality scores should preferably reflect the best fit to purpose (fulfilling the mission) instead of being adjusted to a peer rank, since every organization works hard now to improve their scores and an individual organization's real improvement may not be transparent in this dynamically changing comparison. In conclusion, the Value Based Purchasing scoring by Medicare for 2016 may serve as the model for weighed scoring of Quality in Value assessment, and it may be applied to both healthcare and education. It does not

include scores of Quality of Resources since it focuses on performance; however, high Quality of Resources forms a foundation on which Processes and Outcomes are built. The Medicare proposed scoring for 2016 is structured as follows and it is recommended as the conclusion of this article until new analysis shows a better approach:

**Value = Total Quality 75% / Cost 25%.**

**Total Quality = Objective Quality 50% + Perceived Quality 25%**

**Objective Quality = Quality of Outcome 40% + Quality of Process 10%**

This means, that for total assessment and calculations, Objective Quality is considered twice more important than Perceived Quality and Objective Quality of Outcome is four times more important than Objective Quality of Process (and Quality is three times more important than Cost-effectiveness for Value assessment). Therefore, a formula for quantitative measurement of Quality, where each type is scored separately with a possible maximal score of 1.0 (100%), is offered as follows:

**Quality = 2 x Objective Quality + Perceived Quality**

**Quality = 2 x (4 x Quality of Outcome + Quality of Process) + Perceived Quality**

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