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AUTHOR Burgar, Paul
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ABSTRACT

A case study was done of how Total Quality Management (TQM) was used in a Masters in Business Administration program to prevent rule infractions rather than to punish students. The program allowed students to take up to 20 hours of classes under an unclassified status before they took an admissions test. In order to continue, however, students were required to meet test score and grade point standards and change from unclassified to regular admission status. In December 1991 31 students violated the 20 hour limit. The study proceeded to try to find the causes of this rule violation using rigorous TQM analysis in five layers. These five analyses included a run chart to bring the process into statistical control, a measure of linear trend with seasonality, a cause and effect analysis, multiple regression, and a student survey. These examinations found that the administrative process was seriously flawed. Once these process problems were understood, corrections were made. There have been no additional violations of the 20 hour rule through the end of the 1993 academic year. (Contains 24 references.) (JB)

ENFORCING ACADEMIC RULES IN HIGHER EDUCATION -- A TOTAL QUALITY MANAGEMENT APPROACH

Paul Burgar

Assistant Professor, Department of Management

Campus Box 11

Georgia College

Milledgeville, GA 31061

(912) 453-4324

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Abstract

Two key principles of Total Quality Management (TQM) are increasing customer satisfaction and driving out fear. Enforcing academic rules, however, frequently induces fear and lowers student satisfaction. This case study shows how TQM was used in an MBA program to prevent infractions rather than punish students. Prevention became possible only after TQM techniques revealed the causes of rule violation. Techniques included run charts, forecasting, cause and effect analysis, multiple regression, customer surveys, and breaking down barriers between departments. Follow up shows no new rule infractions for several academic terms.

Enforcing Academic Rules in Higher Education -- A TQM Approach

In his call for a better way to manage higher education, Sherr (1989) recommends a customer focus: "People in universities sometimes lack customer focus. This occurs, for example, when faculty teach what interests them rather than what students need to know.... It [also] occurs when registrars think their job is to enforce rules (p. 17)." What's the point here? Is Sherr implying that registrars should not enforce rules? If so, wouldn't that lower the quality of higher education?

There is a rule enforcement dilemma in higher education. On one hand, TQM aims to increase quality and increase customer satisfaction. The goal is to exceed customer expectations of service quality, and then to keep on improving. On the other hand, enforcing rules in a manner that punishes student violators clearly leads to dissatisfaction. This has traditionally been considered an acceptable price to pay, because rules are enforced to bring less variability and better quality control. That, too, is part of TQM.

It may be possible to resolve the dilemma by developing techniques for applying rules without punishing students. In this case study, a TQM approach is used to ensure compliance with an academic rule among students in an MBA program.

Case Study:

A Course Limit Rule for Provisional MBA Students

In the MBA program students are permitted to start taking classes under an unclassified status before they take the admissions test. This makes it easy for prospective students to get started. In order to continue in the program, students must change from unclassified to regular admission as an MBA student. To qualify, students must meet test score and GPA admissions standards. Twenty five percent of applicants do not initially meet the standards. Some students need several attempts on the admissions test to achieve a satisfactory score. If a student continues to take courses beyond a 20 hour limit while attempting to improve his or her test score, that student

violates the 20 hour rule and forfeits credit for courses taken over the limit.

The Traditional Approach to Rule Enforcement

In December 1991, thirty one students were identified as violators of the 20 hour rule. Several of these students had violated the rule more than two years previously, but their infractions were not noticed until improvements in the data processing system brought them to light.

When notified that some of their coursework would not count toward the MBA degree, several students argued that the rule should not apply to them. One reason given was that they were unaware of the rule. They registered for courses in good faith expecting to receive degree credit. A second argument was that the true purpose of the rule was to keep unqualified students out of advanced MBA courses, not to punish students who eventually met admissions standards. The violation was one of timing, not substance.

Over a period of several weeks, a number of angry students appealed their cases up the administrative ladder. After surveying the extent of student dissatisfaction (i.e. nearly 10% of current MBA students were affected), a high level administrative decision was made to grant amnesty to students who had already violated the rule. That decision was accompanied by a policy of very strict enforcement of the 20 hour limit from that point on. This TQM project was born out of the turmoil of those events.

Moving To The TQM Approach

TQM authorities recommend preventing defects rather than detecting defects (Deming, 1992; Huge, 1990; Imai, 1986; Sashkin & Kiser, 1993; Scherkenbach, 1992; Walton, 1986). The traditional approach of inspecting and making corrections late in the process is not acceptable. Quality should be built into the process at such an early stage that defects at later stages are prevented. Processes should be monitored so that defects are not sent through the next steps in processing. As applied to the 20 hour rule, that means

students should be carefully tracked so that none of them enrolls for more than 20 hours of coursework unless he or she qualifies for regular admission.

Deming (1992) claims that more than 90% of defects are not under the control of the workers, but are due to flawed processes implemented by management (Sashkin & Kiser, 1993). Applying this logic to higher education, we expect that more than 90% of rule violations may be due to flawed administrative processes not under the control of individual students or advisers. If that is true, then students who claim the rules are unfair might be right.

Digging for the Causes of Rule Violation

How can the process be structured so that it is easy for students to comply with academic rules? In general, it means finding out what variables are most strongly related to rule violation and figuring out ways to control those variables whenever possible. In TQM terms, we need to find out the special causes of academic policy violation and bring those causes under control.

This turned out to be the most difficult part of the study. Many authorities in TQM and problem solving warn of the natural human tendency to jump to conclusions in problem analysis (Chaffee, 1991; Coate, 1991; Kepner & Tregoe, 1981; Sashkin & Kiser, 1993; Sherr, 1989; Simon, 1977). It is very tempting to begin solutions as soon as problems are recognized without going through the rigorous process of causal analysis. The superiority of a TQM approach, however, is that it integrates rigorous quantitative analysis with the benefits of group problem solving.

In this case study, finding the causes of rule violation required a series of analyses. The first analysis turned up some surprising facts which led to another round. The second analysis answered several questions, but raised even more. The process continued like peeling the layers of an onion until underlying causes of the problem could be verified. As we will see, the

final definition of the problem was quite different from what had been initially expected.

Methodology

Five layers of analysis were required to determine the causes of rule violation.

Analysis 1: Run Chart

Deming (1986), Robertson (1989), Scherkenbach (1992) and others recommend that process improvements be introduced in two stages. The first stage is to bring a process into statistical control by eliminating special causes of variation. Continuous improvement then becomes the focus of the second stage by implementing Deming's PDCA (plan, do, check, act) cycles.

To determine whether the process was in statistical control, the proportion of rule violations by academic quarter was plotted on a Shewhart control chart in Figure 1. As an attribute control chart (Robertson, 1989; Shainin & Shainin, 1988), this chart differs in some ways from the mean and range charts previously reported in the higher education literature (Cherland, 1992). In Figure 1, the horizontal axis represents academic registration quarters for students in the MBA program, ranging from Winter 1987 to Winter 1992. The vertical axis represents the process average of proportion nonconforming (p). This is calculated as the violation frequency for each academic quarter divided by the mean number of students registering per quarter (n = 300). Pbar is the mean probability of nonconforming observations. The upper control limit (UCL) is set at three sigma, with standard deviations approximated by the binomial distribution. The lower control limit (LCL) is set at zero because pbar is low and n is small (Robertson, 1989).

The process shown in Figure 1 is not in statistical control because one of the observations (Spring 1991) is beyond control limits. This indicated that special causes of variation would have to be identified and corrected. Correcting special causes of variation became the first objective of this case

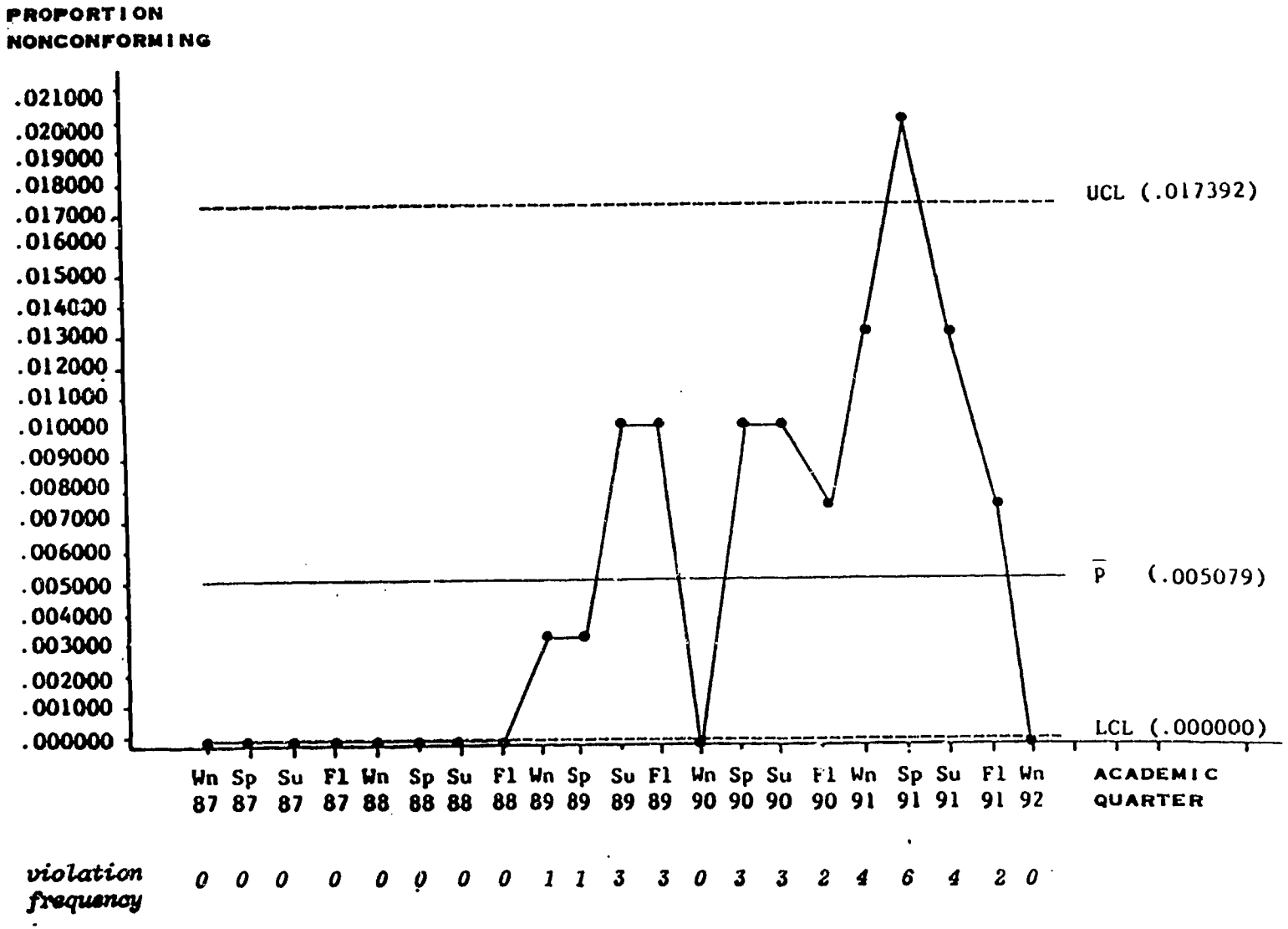

Figure 1: p Chart for Rule Violations by Quarter of Registration

study, followed by reduction of common cause variations under management control.

Analysis 2: Linear Trend With Seasonality

The data reported in Figure 1 suggest an upward trend. A linear forecasting model (Box & Jenkins, 1976) was used to predict violations for each quarter of 1992. Results are shown in Table 1, adjusted for seasonality.

The seasonal effect is most pronounced for winter quarter registration. There is a month long break between fall quarter and winter quarter. During this period, the records office has more time to record student grades, make information available to advisers, and concentrate on registration without having to deal with an influx of new students (as happens in the Fall). As a result, student information is accessible for winter quarter registration which is not always available for other registration quarters. Recognition of this fact focuses attention on the processes which affect violations of the academic rule, rather than on the people involved. If the process itself varies so much that the people who have trouble making it work at certain times are capable at other times, then it makes more sense to try to fix the process than it does the people. After all, the process changed in a seasonal manner; the people didn't.

At the beginning of this case study, it was assumed that the best way to solve the 20 hour rule problem was to punish student violators and replace advisers who were allowing students to break the rules. If a broad range of possible causes for a problem can be identified, however, we can investigate and adjust those factors which provide the most control while minimizing side effects (Ealey, 1988; Taguchi, 1986). An example may be helpful here. Taguchi (1986) found that manufacturing processes could often be improved at low cost if a wide range of possible contributing factors were identified in problem solving. His methods are used to achieve manufacturing targets through adjustment of cost effective variables, rather than through adjustment of the most obvious variables. In a tile plant, for instance, a kiln with

Table 1

Forecast of 20 Hour Rule Violations for 1992

Winter 1992	2.6 violations
Spring 1992	7.3 violations
Summer 1992	7.3 violations
Fall 1992	6.9 violations

Note. Seasonal difference is pronounced for winter quarter.

uneven temperature was identified as the cause of warped tiles. The obvious solution was to replace the kiln. Taguchi methods, however, discovered that additional lime added to the clay resulted in tiles which did not warp, even in the old kiln (Huge, 1990). Adding lime proved to be a more elegant, cost effective solution than replacing the kiln.

We need similar insights to achieve low cost quality improvements in higher education. Insights like these are rarely implemented, however, because quick action is needed and obvious solutions are so seductive. To get beyond the assumption that people were the cause of the 20 hour rule problem, numerous possible causes for the problem had to be identified. Therefore, cause and effect analysis became the next step in the study.

Analysis 3: Cause & Effect (Fishbone) Analysis

The fishbone diagram (Ishikawa, 1972) is used to identify possible causes of undesirable variation (DeCosmo, Parker, & Heverly, 1992; Frost & Beach, 1992; Walton, 1986). The possible causes listed in Figure 2 are based on a series of interviews with 27 administrators, students, faculty, and staff who were familiar with the 20 hour rule problem.

Analysis 4: Multiple Regression

The cause and effect analysis shown in Figure 2 yielded 40 possible causes of rule violation. Only some of these were measurable. Multiple regression analysis was used to find out exactly which measurable variables might reveal an empirical relationship to violation of the twenty hour rule.

Thirty-one students were identified from transcripts who had taken more than 20 hours as unclassified graduate students in the MBA program. A control group of 31 students was selected (using a random number table) from a list of currently enrolled MBA students. The control group was necessary to find out which variables distinguished students who violated the 20 hour rule from those which did not.

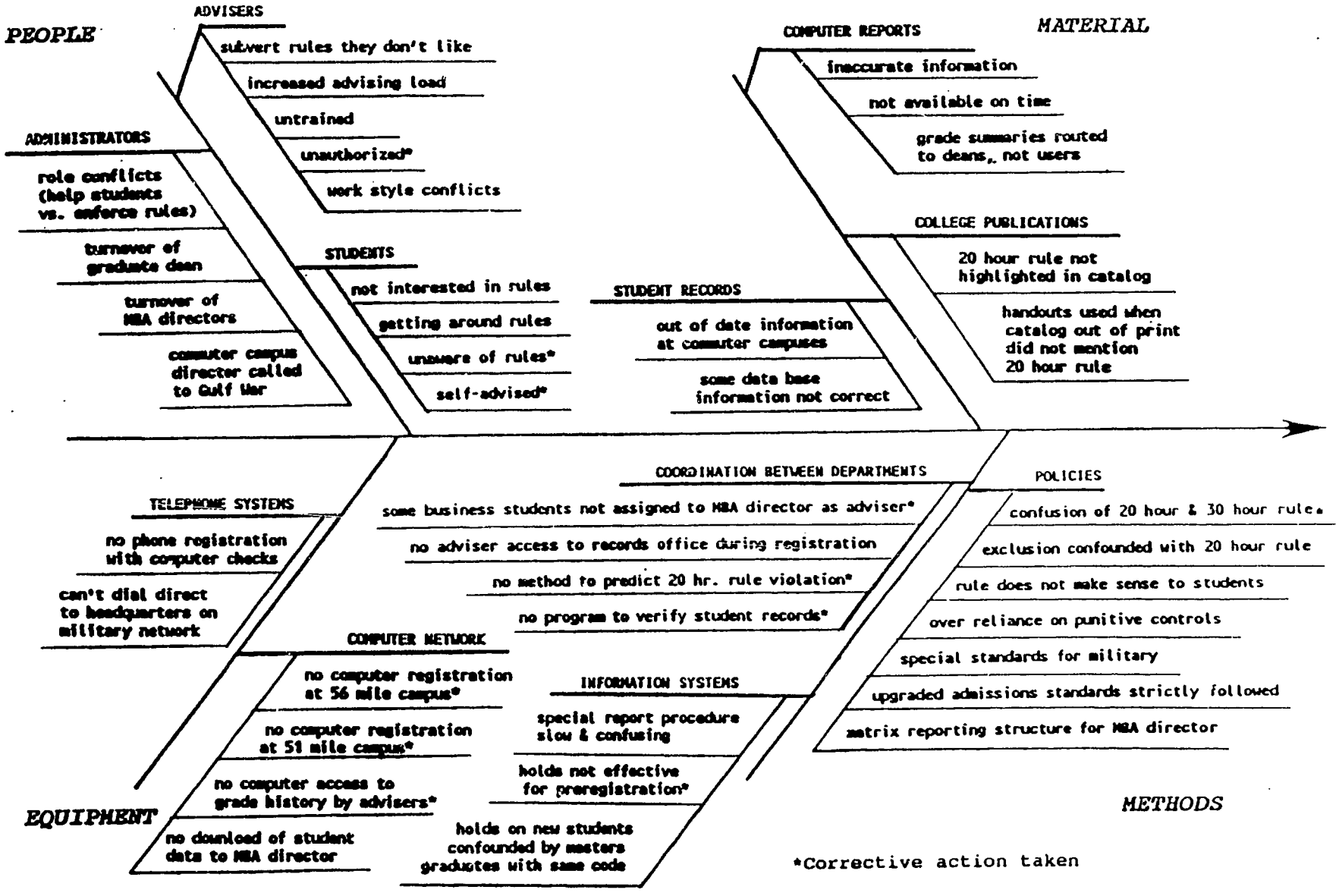

Figure 2: Possible Causes of 20 Hour Rule Violation Through Fall 1991

Data on the 62 students were compiled from student records on four variables: (1) violation of the rule (yes or no), (2) campus location, (3) who signed the registration form permitting the student to register for the 20th hour of coursework, and (4) the first term the student enrolled. Campus location had to be separated into four discrete variables, known as effects coded dummy variables (Cohen & Cohen, 1975).

Table 2 shows the results of the multiple regression study. The dependent variable in this study is violation of the twenty hour rule. Bearing in mind that the small sample size in this study limits power and generalizeability (Cohen, 1988), there is a significant obtained relationship between the probability of violating the 20 hour rule and the predictor variables. For interpretation, the predictors in Table 2 are considered in terms of three main effects: location, advising, and term of entry.

Location effect. Registration for MBA students takes place on four campuses. The headquarters campus is a residential campus. Commuter campuses are located at 39 miles, 51 miles, and 56 miles from the headquarter campus. The empirical relationships between rule violation and the commuter campuses are shown in Table 2. The headquarters campus and the 39 mile campus contributed no variance to prediction of rule violation, but the other two campuses showed the strongest regression weights in column three of Table 2 ($b = .26$ and $b = .24$). Students who registered at these campuses were more likely to violate the 20 hour rule than other students.

What might account for these campus differences? Interviews and participation in registration at each of these campuses made it clear that access to student information and computerized registration were the most pronounced differences. Registration was computerized at the headquarters campus and at the 39 mile campus. If there were a registration hold (due to violation of the 20 hour rule), the student could be blocked from registration by records office staff and sent to the MBA director. At the more distant

Table 2

Variables Predicting Violation of the 20 Hour Rule

	Bivariate Correlations (r)	Regression Weights (b)
Predictors		
56 Mile Campus	.21	.26
51 Mile Campus	.12	.24
39 Mile Campus	.01	.03
Advised by MBA Director	-.36	-.23
Self-Advised	.18	.15
Term of Entry	.28	.01

Note. Students who violated the 20 hour rule (n = 31) were compared with randomly selected students (n = 31) who did not violate the rule ($R = .4694$; $df = 6, 53$; $p < .05$).

campuses, registration forms were collected in batches and processed later, without immediate computer feedback.

In addition, grade history data were usually provided on time for registration at the headquarters campus and the 39 mile campus. Due to early registration schedules and distances involved, however, the other two commuter campuses did not always receive grade summary data on time for registration. Grade history information enables the adviser to count up the number of hours a student has completed and verify that the student has been formally admitted to the MBA program. Without grade summary data, advisers have to rely on student self-reports. Since many students did not understand how the 20 hour rule actually worked, they sometimes provided incorrect information to advisers. One adviser on the 56 mile campus became so apprehensive about his duty to advise students without adequate information that he purchased a rubber stamp which read, "Unofficial -- based on student self-report." This was stamped next to his signature as adviser on a rule violation case. Since he could not control the quality of information, he tried to avoid being blamed for rule violations beyond his control by covering himself with the disclaimer stamp. (Deming disciples might point out here that a person can hardly be expected to take pride in his or her work unless management provides adequate tools.)

Substantial weights in the regression equation indicate that the student information hypothesis and computer access hypothesis were the most serious causes of rule violation in this case study. These are clearly process problems, not people problems. Control systems were simply less effective at distant locations.

Adviser effect. The largest bivariate correlation in Table 2 is the inverse correlation between registration forms signed by the MBA director and violation of the 20 hour rule. If the director signed the registration form (rather than someone else), the likelihood that the student would violate the 20 hour rule was greatly reduced.

To determine who had signed registration forms, records office staff pulled registration forms from prior quarters from their basement archives. Records office involvement at this stage of the project helped break down barriers between departments. Frequency analysis of their data showed that nearly 85% of the 20 hour rule violations did not pass through the hands of the MBA director, who was the official adviser for these students.

By contrast, self-advising showed a positive regression weight (b = .15) in predicting rule violation. Registration forms for these students showed no adviser signature. Under a previous policy, students were permitted to register without advisement on the understanding that they would be held accountable for their decisions. When notified that they would not receive degree credit for these courses, several students threatened legal action. Their protests eventually led to the amnesty window discussed earlier. The policy of self-advisement was withdrawn to prevent this from happening again.

Term of entry effect. This variable was included in the regression analysis to determine if rule violation was related to people and practices which changed over time. In the fishbone diagram, many possible causes are time related, including turnover of the graduate dean, turnover of MBA directors, and changes in the self-advisement policy. The bivariate correlation in column two of Table 2 shows a correlation of r = .28. This fits well with the control chart results in Figure 1 showing that the process moved out of statistical control as time went on. Therefore, some of the variance in rule violations is time related. Several of the time related possible causes in Figure 2 may have contributed to this effect.

How important are these time related factors? Detailed analysis shows they are not very important. Note that column three of Table 2 shows a zero order regression weight for term of entry (b = .01). It does not add predictive variance in the regression equation. That means the variance associated with time in this study is better accounted for by other variables. The weight of evidence in this case study points away from people

as special causes (e.g. dean turnover, director turnover, adviser in Gulf War) to common causes in the process, such as timely and accurate information. Deming's assumptions about looking at the work processes, rather than at people, are supported here as the analysis delved deeper into the underlying causes.

Analysis 5: Student Survey

A survey was conducted of MBA students' knowledge of catalog rules. Survey questionnaires were sent to 278 graduate students. Even with return mailers included, only 47 replies were received. The disappointing response rate of 17% indicates that graduate students were reluctant to demonstrate their knowledge of catalog rules.

Several survey items showed interesting response patterns. When asked what the maximum number of degree credit hours an MBA student is permitted to take prior to being fully admitted to the program, 94% of students gave the correct response of 20 hours. This was the most encouraging result in the survey. It should be noted, however, that the survey was sent out with a letter notifying students of the 20 hour rule.

Another item was more revealing. Students were asked "How confident are you that you know the catalog rules which apply to students in the MBA program?" Fifty percent of these students responded that they were not confident of catalog rules. This was confirmed by responses to another survey item which asked the number of hours permitted before degree candidacy. The correct response was 30 hours, but 54% percent listed the incorrect response of 20 hours. The students knew there was a 20 hour rule, but they didn't really know what it meant!

Why was student awareness of catalog rules so low? One plausible reason is that initial admission of students as unclassified graduate students lowers their concern about whether or not they can qualify as graduate students. A student says to himself or herself, "I would like to become a graduate student; I wonder if I can get in?" We say to them, in effect, "If you have

an undergraduate degree, you can start taking graduate classes. No problem. After 20 hours, we'll get back with you."

Students who take 20 hours and do reasonably well in graduate school then see admission to the MBA program as a mere formality. Once students develop this mindset, it takes a crisis, such as denial of admission or a registration hold, to get their attention.

Currently, the only motivators used to enforce compliance with the 20 hour rule are punitive. The dependence on punitive motivators in higher education is particularly regrettable because our larger purpose is so positive and affirming. Punitive measures sometimes inspire people to expend more effort getting around the rules than would be required to comply with the rules. Well selected and implemented rewards for complying with the rules could be more effective.

(One creative idea for such a reward system involves issuing to provisional students chances for a drawing for passes to the 1996 Olympics in Atlanta. The number of chances would be based on how quickly a student qualifies for regular status in the MBA program. This would be an incentive for students to become regular MBA students well before they reach the 20 hour limit.)

Institutions of higher education often have leverage over students which is not used. When that leverage is positive and builds on their interests, it enhances the institution's standing in the community. By contrast, when the leverage is coercive, a great deal of good will in the community is squandered. It should be noted again that lawsuits were threatened over the 20 hour rule.

Conclusions

Juran, Gryna, & Bingham (1974) identified three criteria which must be met before an employee "can properly be held responsible for deficiencies in performance" (p. 2.13). These are: (a) knowledge of what he or she is supposed to do, (b) knowledge of what he or she is doing (timely

and accurate knowledge of results), and (c) means of regulating what he or she is doing when goals are not met. This case study shows that none of these criteria was met for employees trying to hold the line on the 20 hour rule. Deming (1986) is particularly forceful on the point that employees are often blamed for common cause variation which, by definition, is not under their control. Imagine a ticking time bomb being passed from one work station to another. If the bomb goes off in your hands, then management blames you (Huff, 1993).

It was the process, rather than the people, which needed changing in order to bring the 20 hour rule problem under control. Once process problems were discovered, a series of action steps were taken to correct these problems (see figure 2). As a result, no additional violations of the 20 hour rule have taken place in the MBA through the end of the 1993 academic year. Monitoring should continue, however, to be certain the process remains in statistical control.

Implications For Institutional Research

Although the mission of higher education is to help students, many of us also reason that we must teach students a lesson when they break the rules. Otherwise we think we will lose control. We certainly can't abandon all controls and expect quality.

In manufacturing, quality control is best achieved by replacing less effective control systems late in the process with more effective controls early on. This case study shows how an academic rule can be enforced by fixing the process to prevent infractions rather than punishing students. Can this result be generalized? Can other rules in higher education be upheld through prevention of infractions rather than coercion and punishment? Doing so would certainly help us meet the TQM goal of improved customer satisfaction. In view of growing public disenchantment with institutions of higher education, that goal is certainly worth the effort.

To investigators interested in applying TQM concepts to academic rules in higher education: a word of encouragement. At the beginning of this study

members of the investigative team were not optimistic that infractions could be prevented. Only after persistent digging did it become clear that processes, not students or advisers, were at fault. This is an article of faith among adherents to the Deming philosophy, but it seemed counterintuitive at the beginning of the project. Most of the well meaning solutions offered at the beginning of the project were either coercive or would have lowered academic standards to accommodate student complaints. The TQM model offers hope that both student satisfaction and high rule compliance can be achieved.

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