Online Course Best Practices as Precision Teaching: Case Study of Quality Systems Courses

By John W. Sinn

ABSTRACT

Best practices for online courses are explored as precision teaching (PT) within the context of a case study analysis. The case study focuses on courses taught, 100 per cent online, as part of Quality Systems (QS) at Bowling Green State University (BGSU). PT literature establishes main attributes desired as the basis for best practices. The curricula of these QS courses are explored, with the "mechanics" and infrastructure analyzed to establish their functioning and best practices as main performance attributes, consistent with PT best practices. Attributes identified separately in PT and QS courses are aligned to demonstrate and make the case for best practices in online courses in general. Attributes presented as both PT and QS are explored relationally to demonstrate value-adding potentials as online best practices. Convergence of PT and QS findings are presented as a basis for consideration as broader best practices in online delivery strategies and methodologies.

Introduction

This paper addresses best practices in online courses, as precision teaching (PT), from a case study perspective. The case study focuses on courses taught by the author, 100 percent online, as part of Quality Systems (QS) at Bowling Green State University (BGSU). A brief review of PT-related literature establishes main principles as attributes desired for best practices; these are summarized in Table 1. QS courses developed and taught by the author are explained within an evolutionary backdrop, based on several years of experience. An overview of "mechanics" and infrastructure of the courses is given, and a flow chart is used to explain how the courses work (Figure 1). Best practices for QS courses are further analyzed, identified, and detailed as main attributes and summarized in Table 2, consistent with the approach used to help explain PT and best practices.

Attributes identified separately in PT and QS courses are aligned to demonstrate and make the case for best practices in online courses in general. Each attribute previously presented and discussed, as both PT and QS, was explored relationally and summarized in table 3, which was developed to demonstrate value-adding potentials wherever possible and appropriate, as online best practices. Table 3 shows convergence of PT and QS findings, and relationally as a basis for broader best practices in online delivery strategies and methodologies.

PT Overviewed

PT was born out of the work of B. F. Skinner and others associated with programmed instruction in the 1960s. Originated by Ogden Lindsley, a former student of Skinner's, the focus of PT was to systematize instruction in scientific ways, which then could be studied and analyzed for value adding performance changes with students, based on instruction. West, Young and Spooner (1990), summarized the PT field around a framework of several main principles:

- The student knows best.
- Direct measure of behavior.
- Use the rate of response as a basis for improvement.
- Graphically display and/or chart the process.
- Use descriptors and functional definitions of behavior.
- Conduct ongoing analytical investigations of best instruction.
- Emphasize positive learning and behaviors.

Although much of the work was initially focused on either special education or high-end learners, this approach has been effective in many traditional environments as well (Lindsley, 1991a). The approach is used to monitor and document the learning and behaviors of students over time to show not only that learning has occurred but also to determine the methods that were actually useful in achieving the desired results. PT is a graphically-based system of data and documentation used to assist in making decisions about instructional methods (Lindsley, 1992a).

Lindsley, describing the relationship of PT to Skinner's original work (1991b), discussed

several key attributes of the system. He indicated that rate of response is a fundamental opportunity in learning, but that robust measurements must be conducted to support the rate being defined. Measures must be made continuously using what has been termed celeration charts to demonstrate time and task accomplishment by learners. Significantly and ideally, these measures are conducted by both students and instructors, to document when and how the material under study was learned. Lindsley also indicated that the shape and texture of forms and charts used for recording information were important because acceptance of the systems are critical in their use.

Haughton (1971), identified that precise PT language must be used in all forms and charts, as part of the documentation process. PT was a direct teaching method to be applied systematically and in observable, documentable ways. Haughton also indicated that accurate and continuous data must be collected for analysis in direct, action-oriented, ways by instructors. Fluency, effects on learning, and instructional implications were also addressed by Binder, Haughton, and Van Eyk, 1990. Structurally, as a systemic approach to learning, four areas of growth are generally identified relative to PT: (1) establishing—until the learner has been engaged, learning cannot occur; (2) remembering—the learner must be able to show that he/she can recall the vocabulary in practice; (3) enduring—improvements can be demonstrated at higher levels based on what was learned at lower levels; (4) applying—new environments and applications can be observed based on transference of knowledge that has been gained foundationally (Johnson & Layng, 1992).

Exceptional learners frequently excel with PT based on their independent ability to learn and proceed rapidly through steps and stages while areas other students' learning may become stagnated (Binder & Watkins, 1990). Forms and formats must be designed to best facilitate both the stages of learning, and the comparisons and analyses as output products that engage students incrementally. Although forms and formats must not get in the way of learning, they also must facilitate, in balanced ways, the ability to observe and analyze outputs. Vargas and Vargas (1991) indicated it is key to start with prompts and signals, gradually withdrawing them as learning picks up momentum. They encourage going from easy to fine discriminations, starting with broad concepts, which require further definition and analysis as sub categories, all designed to be intentionally foundational.

Assessment surfaces among the literature on PT in various ways, which was alluded to earlier. Referred to as curriculum-based assessments (CBE), the approach builds on and around PT in various ways that are congruent with the principles being discussed and presented. CBE measurement procedures assess students directly using the materials in which they are being instructed in seemingly integrated ways. CBE sampling items have been structured to allow frequent and repeated measurement which are sensitive to change and documented graphically to allow monitoring of student performance for all to see (Hall & Mengal, 2002).

Binder and Watkins advocated that PT is a scientific approach which causes teachers and learners to assess and analyze ongoing learning and to document all that is done as a basis for making robust and valid decisions for improvement. Documentation that is inherent in PT graphical formats is readily transported and transferred to other persons and environments as examples and approaches, and can be applied for improvement. Need for frequent feedback and interaction, based on data and documentation, to be determined based on specific applications was underscored. Lindsley also provided additional detail on which systems to use in feedback, relative to how best to help communicate with students, teachers, administrators, parents, and others (1995).

The bottom line on PT is that a data and documentation relational system is developed between learners and instructors which forms a basis for optimizing the learning process. The highly organized, readily-managed systems approach to teaching and learning can lead to fluent learners, as they mature and gain knowledge, based on accurate and timely feedback around their improvement. Decision-making rules have emerged to help guide the teaching and learning processes, as standard forms and formats (Binder & Watkins, 1990). PT is a highly disciplined, economical, and "common sense" approach to the improvement process (Lindsley, 1992b).

Table 1 summarizes attributes identified through a literature review of PT. Each attribute is presented, along with author referenced by

Table 1. PT attributes defined and explained in a summary table.

PT Attribute	Reference, Year	Explanation, Definition
Charting, document, data	Lindsley, 1992b	Charting systems are used as basis to monitor progress, to document what is occurring in teaching and learning process. Data is used wherever possible as basis for decisions on method.
Rate of response, fluency	Lindsley, 1991b	Students show improvement by increasing productivity over time, assuming difficulty level constancy. More difficult work may initially slow rate, but with learning, rate should increase.
Writing, word precision	Haughton, 1971	Written communication in forms is significant, and can increase learning if done with precision and accuracy. How wording is done adds value, modeling proper writing performance.
Form and format, fluency	Binder & Watkins, 1990	Students need structure, how forms are designed can add value to the system, better facilitate learning. Like wording, the formats can serve a modeling role for how to organize information.
Simple to complex, fluency	Johnson & Layng, 1992	Stages, or phases, of learning are acknowledged to move learners appropriately. Design is from simple to complex based around establishing, remembering, enduring and applying.
Functional descriptors	Lindsley, 1991a	Outcomes and objectives in courses should be expressed in behavioral action terms to address what should be evidenced learners as changes to evidence learning.
Assessment	Hall & Mengal, 2002	Systemic and scientific approach, with documented evidence learners of work done, learning integrated curricularly, assessment is simplified and fairly straightforward, readily tracked.
Engaged, direct teaching	Vargas & Vargas, 1992	Only after students are engaged in relevant and meaningful instruction can they be expected to learn. Examples and other learners to support systems should be used at first, then gradually removed.
Student knows best	West, Young & Spooner, 1990	Students respond to that which they understand and are able to use flexibly relative to their knowledge, experience. Fluency over time shows flexibility in instruction and assimilation.

year, and sufficient explanation to define and support the inclusion of the attribute as a basis for foundational relationships to courses, particularly thought to lead to best practices in online teaching.

Quality Systems Courses

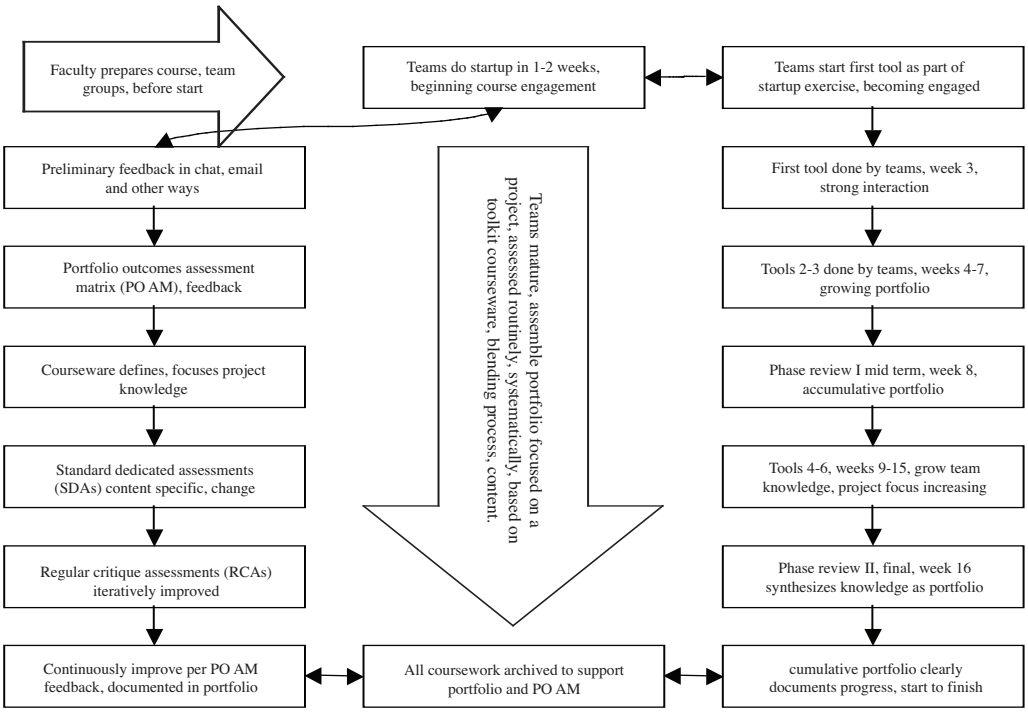
Created in the late 1980s at BGSU in response to quality professionals' demands, quality-related courses have been offered at the graduate and undergraduate levels, 100% online, since the late 1990s. Recently the undergraduate QS curriculum has been proposed as a concentration in a new curriculum titled Engineering Technology. The graduate-level Masters of Industrial Technology (MIT) degree uses four QS classes as a certificate. A Ph.D. consortium with other universities, through Indiana State University, uses three BGSU QS courses.

QS courses are designed and focused around quality improvement principles reflecting ISO 9000 standards and team-based problem solving in various environments, using lean and six sigma concepts. Functionally, course operation is described in Figure 1. The graphic moves from top to bottom, as a traditional 16-week course structure, and the large arrow connotes a portfolio being assembled, across the course, accumulatively synthesizing all student work.

Significantly, the course actually begins with the instructor preparing, or configuring it. Assuming the instructor understands the mechanics of the online environment (regarding configuration), and based around the mechanics of course delivery in the precision-oriented manner being discussed, configuration takes perhaps 10-12 hours, depending on how many teams are being set up per course. Functionalities used are discussion boards, chats, emails, and announcements for communication and management. Course information is used to provide examples, necessary content, and any long-term information for users. Many functionalities commonly used by others in the course shell are built into the courseware, requiring only basic elements of the Blackboard course shell. The course shell is a electronic vehicle for delivery of the course, similar to a traditional classroom.

Students register for courses, and are assigned in alphabetical order to groups/teams. Startup commences and team members become

Figure 1. Main steps in QS courses as flow across 16-week traditional course timeframe.



engaged, communicating via email in the course shells (required). The instructor typically will study this interaction and determine how and when to assist. As startup winds down, a first tool is started. The objective is to have startup done in 1.5 to 2 weeks, and a first tool finished within 3 weeks. During this time, the instructor watches, offers advice, emails, and comments in chats and at discussion boards. This is a very active period because most students are learning how to use the online systems and the instructor's courseware. Courseware is shipped from the BGSU bookstore as a CD when requested online, typically arriving via standard postal delivery within two weeks. First tool content and process information is posted in the course information area, enabling students to proceed.

Beginning with tool 1, and used for all work thereafter, the instructor uses the portfolio outcomes assessment matrix (POAM) as the primary method to communicate feedback to students based on their work. The POAM embodies outcomes and key attributes identified as critical to accomplishing outcomes, also listed. A rating scale is used for outcomes and attributes, assigning points to derive scores, and ultimately a course grade. This is summarized in spreadsheet format and shared with all when each tool is completed.

Chats are also held routinely when each tool is completed, (minimum), and additional chats are encouraged, because it has been observed that better performing teams commonly conduct more chats in the environment under discussion. The one required chat for each tool allows teams to do the minimum, and/or to do more in a fairly empowered manner, similar to traditional physical environments. The instructor does not necessarily participate in all chats, but he or she may request to be invited by teams. If a team is having difficulty with any aspect of the course, the instructor participates in chats for obvious reasons. Also, the instructor "pops" into chats at brief times, unsolicited, because some teams are reluctant to request assistance, sometimes not knowing they need help. Note that chats are required to be archived as teams do them, and this becomes a critical component in what is analyzed for assuring a team is maturing at an appropriate rate.

As the first three course tools are completed, during the first half of the course, functionalities that are identified are refined and mastered by teams, under faculty guidance. At mid-term, a first phase report is conducted (students have the opportunity to go back into the previously prepared work for previous portfolios). Based on earlier feedback, teams are encouraged to go back to the project under development and to

add and delete materials based on their evolving project objectives and focus. The mid-term phase presentation, equivalent to a mid-term exam in traditional courses, is an opportunity for teams to demonstrate their own "best practices" that they have developed and matured. Typically, while most are becoming comfortable with the course at this point, they are only beginning to master the content. The focus at mid-term is definitely shifting from "how do we do the tools and course" to what do we do? Content is taking precedence over process previously of primary interest for obvious reasons. As teams continuously improve, the focus on project objectives become increasingly clear and intentional.

After mid-term, phase I completion, 3 additional tools are completed by teams, and a phase II portfolio is prepared. Phase II exhibits many of the same attributes as phase I, but due to maturation and knowledge gained around a increasingly focused team, the best practices and what is synthesized as portfolio become much more robust. It becomes increasingly clear that progress has been made based on documentation by teams, all built around and within the custom courseware, by design.

Infrastructure Best Practices

Several course attributes are identifiable within the QS curricula as best practices under development; these can be related to PT based on the analysis provided here. Criteria used in the identification process for QS attributes as best practice were whether, and how, value is added. Each attribute is listed, further detailed, and described. Justification and explanation as a best practice is given as part of the discussion.

QS course attribute 1: Startup. A "startup" activity is conducted at the outset of the course; this is done both individually and collectively as team, helping all get started. Familiarity with all key information and systems used in the course, including the syllabus, past course assignments completed by previous teams, and other documents, is key in startup. Startup provides team formation and infrastructure, and it leads to the first full assignment, reinforcing electronic systems and all other key course attributes.

Startup is a best practice because, in a controlled manner, parceled out over time, all key elements of the course are introduced. Teams are formed, going through much of the "normal" team behavior; simultaneously they may be overwhelmed by a fairly complex course infrastructure, one they assumed to be fairly trivial and simple, "easier than real courses." Once startup is successfully completed, the team is moved past "process" issues to be more heavily involved in the content of the course.

QS course attribute 2: Custom Courseware. Author custom-developed courseware provides course content and process as a stand alone system in CD form. Courseware, titled "The Industrial Technologists' Toolkit for Technical Management" (ITTTM) is designed for conducting online technical and professional projects and applying quality system principles by student teams. These courseware systems guide and direct student work, based on a tabular format (template) explaining how forms are used, and they provide a place for written responses. Courseware content is written in 42 tools with six dedicated to each of seven possible courses in the courseware, further organized as long and short forms. Long form text is similar to chapters in conventional texts, and short forms are Power Point presentations.

Custom courseware is a best practice because it positions highly empowered, able student learners to take control of their desired course outcomes, and position their work to demonstrate accomplishment. The value added based on the systems is incremental and not necessarily readily noted on any one independent portfolio of work, but when all portfolios done by a team are noted in total, as students learn and come to appreciate the courseware.

QS course attribute 3: Courseware (SDA) Forms. SDAs, are forms oriented to specific content presented. Since content changes with each ITTTM tool, SDAs change to give examples of tool applications, questions to assist users, and reflection on how to improve the work of the team. This process engages users for collective thoughts, which are documented for future reference and improvement. Students conduct independent SDA work, addressing team project objectives, and they compile and synthesize one or more forms as team research methodology. Individual SDA work is organized and collectively managed to illustrate data and information for the project, and at a more robust level, all students review parts of each other's work as part of the team portfolio presentation. Quality is addressed in an organized way, as well as specific content, and all discussed in

chats and reviewed and analyzed for improvement via the discussion board.

SDAs are best practices because they focus very precisely on exactly what must be taught or engaged in the course, while ongoing dialogue and increased knowledge are "journaled" over time. As portfolio iterations move to phase reviews, student critiques based around SDAs allow all to see others' work, and consider how each fits in a synthesized, cohesive manner focused on the team project. Thus, part of the value-adding key, particularly in SDAs, is how students teach and learn by/with/from each other, by design. SDAs are applications of the content provided in the ITTTM, analogous to traditional lectures in the conventional teaching and learning environment. SDAs are designed to illustrate, in fairly specific ways, the current professional practices, and they engage students in the same as efficiently as possible. This is increasingly being done via MS Project software, particularly using Excel and related documentation tools.

QS course attribute 4: Courseware Required Continuous Application (RCA) Forms. RCAs, are ongoing forms that challenge student teams to consider ways to improve and how to better do the work in process terms, according to four forms, each further detailed as best practices (see following). As a group, however, and as part of the broader ITTTM courseware system, the RCAs make up a template that guides and facilitates the work of teams across the course, built on startup, and interfaced with SDAs.

RCAs intentionally, and systematically, provide a platform for continuous improvement. Teams are required to reflect on what and how to improve; and each portfolio is submitted with written documentation. The written documentation is "pulled" into each next portfolio presentation and modified based on what was learned, and interfaced with all else that is part of the systems (SDAs, chats, discussion boards, emails, and announcements from instructor, etc.). Across the course, RCAs are increasingly directly keyed to the course outcomes as shown in both the POAM and the syllabus. It has become increasingly clear that the repetition provided around outcomes, in positive ways within POAM as well as each RCA, and elsewhere, is one of the keys to tight and precise instructional delivery.

QS course attribute 5: Project Portfolio Assessment, Research Methodology, Plan (PPARMP). This plan describes the details that are under analysis in a student-led, team-based project to assist the team in explaining the project portfolio, driven by continuously evolved project objectives. As part of this plan, the FACR is part of each SDA, to help summarize collective knowledge related to how the SDA was used, and the findings, analyses, conclusions and recommendations. This plan (the PPARMP) and the FACR are ongoing, which help complete a research methodology.

The PPARMP, particularly as reflected in a team-based project is a best practice since real or simulated professional applications of principles under study and investigation are addressed. The system has used both real and simulated work but has moved increasingly to simulations of data and documentation around courseware systems, with students "modeling" their collectively configured portfolio of best professional practices. This has resulted in a tighter, more controlled project, course, and portfolio, driven by empowered students conducting project objectives.

QS course attribute 6: Review Of Literature, Documentation Assessment (ROLDA). This assessment is a review of relevant literature by all on the team, focused on content in each tool, and requiring additional information from external sources. Two separate reviews are conducted, one of the internal sources, the ITTTM tool content, and the external source independently identified by each student. All information, both as content provided in the courseware, and as external sources, are abstracted by users as part of the broader project portfolio.

Students analyze and critique their own and others' information and reflect on it to help demonstrate what is being studied for improvement. As the iterative dialogue increases around the ITTTM tool content, as well as external information, knowledge evolves, and students engage in reflection and analysis. The focus of all this activity, facilitated and guided by courseware, is the delivered project, reinforced by course outcomes. Over the years this has been one of the most positive elements in the courseware system. Students, pretty consistently reaffirm the use of systematic ways to review and document information appropriate to their

professional practices, although finding the appropriate balance between amounts and emphases of external and internal information has been a challenge at times.

QS course attribute 7: Portfolio Presentation Management Team Assessment (PPMTA). This assessment provides internal and external self-assessment systems designed to assist team members as they improve continuously. All members assess each other when each tool is completed, providing numerical ratings, and a grand mean average for the team. The team uses the same scale to assess all other teams in the course, and to provide feedback as a benchmark for improving its own work.

PPMTA is a best practice because these steps afford students the opportunity to improve continuously in documented ways. Also as each portfolio iteration is built toward phase reviews, like most SDAs and RCAs, this assessment provides opportunities for all students to review work processes and management being done by others and to consider how all of this fits together holistically. Both PPMTA systems, internal and external, are fairly tight and controlled criteria in spreadsheet form, which provide robust benchmarks to compare performance and to improve both individuals and teams. PPMTA also includes a "scorecard" to track performance, communicating total team performance as a means for improvement.

QS course attribute 8: Findings, Analysis, Conclusions, Recommendations (FACR). The courseware template provides an integrated research methodology, to be built on and modified per the team's project. Research methodology matures per the team's understanding and gain in knowledge of courseware. As part of PPARMP, the plan is documented and elaborated on, including findings, analysis, conclusions, and recommendations. As each SDA is completed, focused on individual parts of tool content, each person on the team reviews the applicability of the specific part of the tool being used in an FACR tabular format, poised against project objectives and what was found based on use of the tool. When all SDAs are completed via the discussion board, FACR information is compiled in a synthesized format for the portfolio.

FACRs are best practices because, in an increasingly organized manner, objectives are addressed and delivered in a project. This has emerged as a value-adding way to cause students to individually and collectively reflect on their work. As FACR comments grow, matured with each tool, cause and effect relationships emerge, and teams integrate this back into research methods as part of their learning around project objectives delivered.

QS course attribute 9: Portfolio Outcomes and Assessment Matrix (POAM). The syllabus precisely "nails down" course details to reduce ambiguity and increase clarity. Course outcomes are presented in the syllabus, as a POAM, focused on outcomes as key strategies. This matrix not only provides outcomes but also characteristics of course performance further detail behaviors developed and observed in portfolio documentation. Traditional information regarding readings, due dates and other structures of the course are provided in the syllabus, all completed around assessment, driving the course toward precise accomplishments.

This is a best practice because the overall context of the course is presented in a precise and detailed manner in the syllabus. POAM operationally and functionally describes not only outcomes to be achieved, but also characteristic behaviors to be developed and evidenced in courses by students. Courses under discussion do not use tests or exams, nor does the faculty lecture or use most other traditional earmarks of traditional teaching practices. It is asserted that by precisely documenting all work, which improves the portfolio over time around rubrics derived based on professional practice and values inherent in the university community, a true assessment is done. This is a best practice based on efficient use and management of information by all participants.

QS course attribute 10: Chat. Each main course assignment requires a single chat by the team (more are encouraged, and best teams typically discuss more than required). The instructor participates in many of these chats, particularly where it is clear that students are "not getting it" (e.g. work is not being posted, it is not posted in a timely manner, or the quality of the work posted is not up to par). Nine chats are required, each archived for review by team members and the instructor', gradually, the instructor does not, intentionally, participate. Teams develop a culture for decision making, the organization and conducting of meetings, and key communication systems, where students are empowered to

demonstrate positive behaviors that result in successful chats.

The chat is presented as a best practice because the actual behaviors of student teams are analyzed after the fact, both by the students and the instructor. Similar to conventional classes, when verbal discussion is completed, even where effective minutes may have been taken and later distributed, the use of chat provides a "real time" point of action and demonstrable, documented, participation. Interactively via discussion boards, as well as other general communication tools in courses, a chat provides a true opportunity for managing and communicating the culture of the work documented in the portfolio. Final outcomes documented in portfolio demonstrate and correlate to/with the level of quality and satisfaction managed in chats and discussion boards.

QS course attribute 11: Discussion board. The discussion board, instructor configured, further defines what should be completed, when it is due, and so on, reflecting teams' foci, detailed objectives and other expectations. Students on teams successfully post work, on a discussion board, congruent with what is defined and communicated in all course documentation, reinforced via announcements, emails, chats, use of examples, and so on. Individual postings by students, according to defined specifications, demonstrate that they are functioning and learning in appropriate professional ways. At a higher level, students must organize and manage their collective, collaborative affairs by constructing threads where all work is posted logically and precisely. This becomes the basis for one person to compile all work in the portfolio for presentation. The compiling function is generally completed by a team leader, designated on a rotating basis, so that all on the team are afforded this opportunity to lead the work of others.

Discussion board, like a chat, is a best practice because if a student is not present it is a clear, conspicuous signal of a lack of participation or engagement. Comments made in the discussion board are obvious, showing the kinds of participation, writing style, and quality of work, and so on, again clearly reflecting the nature and quality of engagement. Leadership attributes, by students, are traceable in ways related to numbers of messages posted, length of writing, and other detailed elements that can and should be noted by the instructor.

QS course attribute 12: FAQs, SOPs, examples. Frequently asked questions have been organized, written in a standard operating procedure (SOP) type format similar to the way in which SOPs are organized in industrial and technical work. The precisely written FAQs and procedures reflect the values of quality systems and "doing things the right way," detailed explanations, procedures, questions or issues, organized to guide students and others trying to navigate and/or understand the course. The information ranges from common questions to step-by-step work instructions, all developed based on those areas traditionally requested for further explanation over the years. FAQs are presented for all to access, and if used, can aid continuous improvement over time. Course examples provide a baseline of performance based on past best work done by others, acting as a general guide to teams as their portfolios mature.

FAQs, SOPs and examples are best practices, usually identified as a plus by students, regarded as effective and efficient ways to get answers. Instructionally, the time wasted by answering the same questions over and over is virtually eliminated, and instructors are freed up to facilitate a robust course. Moreover, providing information as key answers to issues and circumstances known to be problematic, and thus reducing problems up front, is a key to empowerment.

QS course attribute 13: Communication tools. Communication tools include email, announcements posted and updated routinely around completed tools, and general course information posted at the outset of the course (others are added as course information, for any long-term information needed). This is all conducted within the course shell, because this affords a controlled environment that generally will remain free from viruses and frivolous use. Currently, the changeover rate for most information is driven by the pace of startup, 6 tools, and 2 phase assignments, with diminishing announcements and support information being provided over time (heavy use at outset of course, light toward completion).

Communication tools, contrasted to more specific methods (chat and discussion boards) are important best practices for several reasons. Email and announcements assure that all students have access to the same information as a baseline. This communicates a general guide to

teams, recognizing they will have more questions, to be anticipated in announcements, or responded to in emails as they gain focus and knowledge. Controlled information, both posted and sent, is critical since the alternative is an impediment to timely and meaningful, non trivial focus on course outcomes.

QS Course attribute 14: Empowered team. Key attributes include leadership, empowerment, and management. The course systems, including courseware, Blackboard, and others, put much responsibility squarely on students in ways similar to professional environments. Students take a turn at leading for one of the main assignments, and all rotate through this eventually (thus, nine or ten persons per team). Leading requires configuring threads in the discussion board, organizing chats, and compiling the portfolio, among other responsibilities.

An empowered team is a best practice because this reflects talents that must be embraced by persons wishing to participate fully in the competitive professional workplace today and in the future. Conduct of these types of management and leadership functions in an electronic environment is even more compelling because this is the way teams will increasingly communicate. A empowered team has well-managed, highly organized collective behaviors, well documented to demonstrate best practices it has developed.

QS attribute summary. When all QS attributes are summarized and pulled out from the above presentation and discussion, a list of 14 attributes can be provided (Table 2).

PT and QS Relationships As Online Best Practices

The author identified and explained various attributes related to precision teaching (PT) and quality systems (QS) courses, all in a context of best practices for online delivery methods. Conducted primarily as a case analysis, focused on the author's courses and approach, biases were fairly conspicuous and not hidden. Attributes identified, both as PT and QS, were placed in Table 3. Attributes were used as the

Table 2. QS Course attributes, with value-adding best practices explained in summary form.

QS Attribute	Summary QS Attribute, Value Added As Best Practice
Startup	An overview of, and introduction to, all key course elements, team is built, infrastructure of the course explained
Custom Courseware	Instructor built courseware identifies course process, content, replacing traditional lecture and other elements
Courseware SDAs	forms applying content, examples of main principles, all done in a template which guides student engagement
Courseware RCAs	forms guiding reflective process, journaling comments showing improvement in demonstrable ways over time
PPARMP	Real or simulated team defined project, professional practices as research plan, assessed over time via portfolio
ROLDA	Review author generated readings, externally pursued topics by teams, support research objectives in project plan
PPMTA	Assessment, systematically and in disciplined ways, based on detailed feedback routinely by self, teams, instructor
FACR	Findings, analyses, conclusions and recommendations, research method in project, objectively assesses change
Syllabus, POAM	Syllabus details all key deliverables as POAM, portfolio outcome assessment matrix, showing assessment process
Chat	Chat done routinely, increasingly led by students, to address regularly provided assessment feedback and other
Discussion Board	Blackboard where student postings all work is configured to guide/facilitate team-based project, portfolioed
FAQs, SOPs, Examples	Documentation built over time, FAQs used as SOPs and example work from the past as baseline for improvement
General Communication	General communication in Blackboard course shell to enable all having same information, opportunity to learn
Empowered Team	Tools/information are provided, configured to enable all to learn, lead as they are increasingly able, empowered

basis for convergence of thinking around what became identified as "online best practice rubrics."

Analysis of attributes inherent in precision teaching provided a basis from which to establish legitimacy in methods developed for QS

Table 3. Convergence of PT and QS attributes around online best practice rubrics.

PT Attribute	QS Attribute	Online BP Rubrics	PT, QS Attributes' Relationships Analyzed, Leading To New Online Best Practice Rubric, Convergence
Charting data, documented	SDAs, RCAs, Courseware	Phased portfolio template, development	Charting in forms documents what is occurring, used as basis for decisions on method and work in team, ultimately at e-portfolio. Written documentation is key focus of virtually all functions incrementally developed and grown as knowledge.
Response rate, fluency	Startup, POAM, PPARMP	Course outcomes, syllabus rollout	Improvement in increased productivity and quality over time is documented, demonstrating course outcomes and related procedures in all functions. Based on regular feedback on schedule, systematically improve around phased iterations.
Writing, word precision	RCAs, SDAs, Courseware	Phased portfolio template, development	Documentation in e-portfolio templates, done with precision and accuracy over time, shows model writing and project deliverables. Applied tool theories and principles reflect improvement and learning over time, developed in demonstrable ways.
Form, format, fluency	Startup, PPARMP, SDAs, RCAs	Electronic leadership, management	Structure, in forms is designed to add value, better facilitate learning by example in formats modeling proper organization of information. Templates show research methods, how to follow through to manage and lead all work, as research plan.
Simple to complex, fluency	Team-based project, Startup, POAM	Phased portfolio template, development	Several phases move project deliverables and team as learners, designed from simple to complex based on establishing, analyzing, applying. Communication is precise, accurate, all reflected on systematically, engaged and documented in portfolio.
Functional definition, descriptors	POAM, FAQs, SOPs, examples	Course outcomes, syllabus rollout	Outcomes are addressed as action terms and deliverables evidencing changes, likely as knowledge learned. All information focuses and reflects outcomes for assessment in action-oriented ways, clearly communicating course and project deliverables.
Assessment	POAM, FACR, PPMTA	Research service, engagement, reflection	Systemic, scientific approach and problem solving applications, with documented evidence and learning integrated, readily assessed and tracked. Objective findings, conclusions in service and project clearly based on data, documentation, not opinion.
Engaged, direct teaching	Discussion board, chat SOPs, FAQs	Electronic leadership, management	Students engaged in relevant and meaningful instruction can learn, increasingly done electronically. Electronic support systems, gradually reflect engagement around applications, all information managed, as project to address desired outcomes.
Student knows best, action-base	Empowered team, SDAs, RCAs	Research service, engagement, reflection	Students do best in existing knowledge and experience, as positive service to others. Fluency comes over time, reflective of positive experiences, empowered leadership, other action orientations, demonstrating engaged research and service.

courses and curricula. Objectively, the parallels apparent in PT and QS went beyond interesting and intriguing, and approached astonishing for the author. Based on traditions at a fairly solid conventional university, the revelation that there was an entire field of thinking, a discipline, which had a high degree of similarity to what was being done in QS courses, delivered online, was quite interesting and professionally gratifying.

Convergence of thinking, developed around PT and QS attributes, led to four online best practice rubrics. These rubrics were identified and described in Table 3 around the following four areas:

- Phased portfolio template, development
- Course outcomes, syllabus rollout
- Electronic leadership, management
- Research service, engagement, reflection

The four rubrics deserve additional consideration, particularly for others who may deem them worthy. Based on relationships disclosed, it is suspected that reviews and exploration of other fairly well-established and accepted teaching and learning approaches can help educators to better understand online strategies and methodologies. Several important findings hold promise for improving the courseware and associated course attributes:

1. Use of existing software such as MS Project, integrated around and with the courseware, to make applications increasingly seamless is an important area to be studied.

2. Development of additional content emphasis, and actual tools, around the management and enhancement of information technology and communication systems management.

3. Additional integration of video and other systems and technologies that make the electronic and online world as close as possible to the actual face-to-face physical world.

4. Continued pursuit of one hardware platform, likely a laptop PC, to accommodate courseware and other attributes associated with QS online courses, enhancing wireless use.

Perhaps at a different level, findings and results of this work also appeared to open the doors for application of online courses, tools, and systems into other arenas. This aligned heavily with terms disclosed in the rubrics, and resulted in several additional questions for the future:

1. Are online courses actually superior to traditional face-to-face courses, beyond the obvious advantages of reduced brick and mortar costs and potential efficiencies, based on academic rigor and robustness in online delivery for enhanced quality in teaching and learning?

2. Why are educators not placing more emphasis on online enhancements and value added in general education, engagement and reflection, service learning, leadership and management, requiring some coursework to be done 100 percent online, perhaps in a learning community?

3. Why not use online strategies to add value into the educational environment, using teams of students to electronically analyze, lead, and manage change, with faculty, staff, and others?

Dr. John W. Sinn is a professor in the Department of Technology Systems at Bowling Green State University. He is a member of Alpha Gamma chapter of Epsilon Pi Tau and received his Distinguished Citation in 2002.

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