



ANOTHER ISO 10000 + APPLICATION: TWO COURSES, YEARS AND STANDARDS

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Abstract

Integrative augmentation with ISO 10004- and ISO 20488- standardized subsystems of an ISO 10008 system for the delivery of two online graduate courses offered once-a-year in 2020 and 2021 is illustrated. Videos with theory and examples related to quality and other management systems were recorded using lightboards and posted on the course sites, which contained various forms for the provision of student feedback regarding the videos through ISO 10004 student satisfaction surveys, ISO 20488 video reviews and ISO 10008 overall feedbacks.

Generally, such augmentation with two standardized subsystem levels and beyond ISO 10000 customer satisfaction- or quality- focused standards should be interesting and can be applicable to engineering education. Student feedback through all three systems repeatedly indicated usefulness of the videos, but the ISO 20488 component and total ratings decreased from 2020 to 2021, albeit with relatively small number of student responses.

The intention is to continue research on integrative augmentation with additional standardized systems and applications.

Keywords

Standards; ISO 10000; Integrated Management Systems; Engineering Education

1. Introduction

When presenting this integrative augmentation – related topic in Visby, there will probably be at least six questions stemming from the title alone. For instance: (1) “Why ‘another’ application?”, (2) “What does the ‘+’ after ‘ISO 10000’ stand for?”, (3-5) “Which ‘courses’, ‘years’ and ‘standards’ exactly are being referred to?”, (6) “Is it just ‘two courses’, or also ‘two years’ and ‘two standards’?”. Short answers would be, respectively: because of Karapetrovic (2021); indicates standards beyond the ISO 10000 series; graduate-level courses in quality management and standardized systems; 2020 and 2021; ISO 10004 and ISO 20488; the latter.

For some (longer) context, at the last year’s EISIC in Salerno, a single-year engineering education application of three augmenting quality standards, namely ISO 10004: 2018, ISO 10008: 2013 and ISO 10017: 2021 for customer satisfaction monitoring, electronic transactions, and statistical tools, respectively, where the corresponding subsystems were integrated to augment each other in pairs, was discussed by Karapetrovic (2021). Here, a similar integrative augmentation deployment is illustrated, nevertheless with an extension to two years, as well as a change of a subsystem to the one related to the ISO 20844: 2018 “*online consumer reviews*” standard due to, in part, a continued “remote delivery” of, this time, exclusively graduate engineering courses. Furthermore, an augmentation of two subsystems of the overarching ISO 10008 system is illustrated only.

Therefore, the goal of this short paper is to continue the demonstration of diverse ways to perform integrative augmentation of standardized quality-related management systems, which was started at EISICs six years ago with a keynote on the same topic. In the next section, the methodology of the particular augmentation applied in 2020 and 2021 for teaching two sections of two different online graduate engineering courses, i.e., one section of each course each academic year, is discussed. Subsequently, the related ISO 10008 + ISO 10004 + ISO 20844 application results are presented, followed by a brief conclusion on the sustainability of such integrative augmentation.

2. Methodology

Since integrative augmentation by definition implies that standardized subsystems to be integrated are at different levels, as opposed to say “inter-augmentation” (e.g., see Karapetrovic, 2021), where augmentative systems are mutually supported, the main notion of the current application was to integrate one standardized subsystem, namely for student satisfaction monitoring (ISO 10004), into another such subsystem, this time for student reviews (ISO 20844), which in turn would augment the overarching electronic course delivery system (ISO 10008). Thus, another example of integrative augmentation with three system levels and all three augmentative standards would be provided.

The application illustrated here included two graduate courses, specifically ‘Course A’ and ‘Course B’ on quality and standardized management systems, respectively. In 2020, a total of 66 students took these courses (with 10 students more in ‘Course A’), while the year after, the enrolment decreased slightly to 58 (33 in ‘Course A’). A university-supported Moodle platform was used to deliver all four sections of these completely-online courses, thus through an ISO 10008 system implemented as the main underlying framework (e.g., see Vargas Villarroel and Karapetrovic, 2018), and with various other ISO 10000 subsystems, such as ISO 10002 / ISO 10004 for unsolicited / solicited student feedback, augmenting it.

Course sites, which were separate for ‘Course A’ and ‘Course B’, had multiple parts. The scope of this augmentative integration encompassed video files called “ISO 10008 Videos” that contained explanations of concepts and examples related to quality and standardized systems.

The videos were filmed by the course instructor during the COVID-19 pandemic and under the corresponding restrictions, deploying the “lightboard” technology. ‘Course A’ had a total of eight “video examples”, three of which consisted of multiple parts, while ‘Course B’ contained five videos (one “concept” and four “examples”). The duration varied, for instance the full example on “ISO 9000 Principles” lasted close to 18 minutes. In both courses and in both years, the videos were used to support lectures, i.e., more as tutorials than lecture segments, and were provided in a course site section named “Learning Tools”. The students could review each or all videos (following ISO 20844: 2018) using an “ISO 10008 Videos Feedback” subsection. Student satisfaction surveys (as per ISO 10004: 2018) and overall comments (ISO 10002: 2018) were available in the “Quality Assurance” section. The Moodle “feedback tool” was applied for the reviews, surveys and comments alike.

The ISO 10004 subsystem was implemented to augment ISO 20488 student feedback, including through survey questions (e.g., for ISO 20488: 2018, sub-clause 5.4, regarding video examples / tutorials in “term” and “final” surveys, as well as the “lightboard” method in “final” surveys), links to the “ISO 10008 Overall Feedback” (e.g., for ISO 20488: 2018, sub-clause 5.5), and repeated inquiries of student opinions (e.g., facilitating improvement mentioned in ISO 20488: 2018, sub-clause 4.3, first item). In turn, the ISO 20488 subsystem augmented the ISO 10008 course delivery system (e.g., related to 6.1.2, 6.1.3.1, 6.2.2 and 7.1.5 of ISO 10008: 2013 with questions soliciting reviews of the videos, thus providing a part of course “content”).

The augmentation encompassed both the underlying ISO 10004, ISO 20488 and ISO 10008 system foundation and components. Examples related to the former include integrative augmentation of “(guiding) principles”, for instance 4.3.9, 4.1.c and 7.2.3 of ISO 10004: 2018, ISO 20488: 2018, and ISO 10008: 2013, respectively, which were integrated into the course delivery with the “initial”, “term” and “final” surveys, feedbacks, as well as video reviews set to be anonymous. Other examples corresponding to the “principles” are 4.3.5, 4.1.g and 4.9 (“responsiveness”), where the “ISO 10008 Overall Feedback” link was available to students throughout each course for all three systems, as well as 4.3.6, 4.1.a and 4.6/4.15 (“integrity”), since only students registered in the courses could access the surveys, videos (e.g., through an additional Google Drive login) and reviews. For the latter, an instance of augmentation was the application of “ISO 10008 Overall Feedback” tool again, related to ISO 10004, in conjunction with the review subsystem in line with sub-clauses 4.2, 4.3 and 5.5 of ISO 20488: 2018. Another such example would be a question on the potential usefulness of “videos with worked quality (‘Course A’) and standardized (‘Course B’) systems – related examples” in the ISO 10004 “initial” survey, which were then generated in the ISO 10008 system and for which ratings were asked through the ISO 20488 subsystem (e.g., see sub-clause 5.7 of ISO 20488: 2018).

As is typical in integrative augmentation, not all guidance from all three standards was implemented, for instance due to being inapplicable (e.g., with respect to ISO 20488: 2018 and ISO 10008: 2013, clause 6 from the former and sections 6.2.4-6.2.7 from the latter were not deployed, with no “*moderation*” or “*payment*” in place, respectively) or unnecessary (e.g., sub-clause 4.2 of ISO 20488: 2018 had a fairly limited use, since only the professor and teaching assistants could read the reviews, while other students attending the course could not). Nevertheless, selected outcomes from this particular application of integrative augmentation are discussed next.

3. Results

While the ISO 10004 monitoring occurred at discrete time intervals (i.e., the three course delivery system surveys were open for about a week to ten days each), the ISO 20488 reviews of videos and the overall ISO 10008 feedback were available continually throughout the term

in which the courses were offered. Therefore, the output from the ISO 10004 subsystem in the form of “initial”, “term” and “final” survey results could augment the videos review subsystem, e.g., connected to sub-clauses 4.3 and 4.5 of ISO 20488: 2018, which would then also support the overall ISO 10008 course delivery system, e.g., with respect to sub-clauses 8.3 and 8.5 of the corresponding standard.

In the 2021 “initial” ISO 10004 survey, 100% of the respondents (10 in ‘Course A’ and seven in ‘Course B’), indicated that having videos with worked examples related to quality / standardized systems would be useful. Nevertheless, that same year, when evaluating posted videos on a 1 (“not useful”) to 5 (“extremely useful”) scale during the term, the mean was 4.33 in ‘Course A’ and 4.50 in ‘Course B’, albeit with fewer students responding. The results from the end of the 2021 term for both courses are provided in Table 1 (third column). As can be seen in the table, with the means in the 4-5 range throughout the term, it seems that the students steadily considered these videos to be useful.

Table 1. ISO 10004 Final Survey Results for Usefulness of Video Examples

Year	2020		2021	
<i>Course</i>	Mean (out of 5)	Responses (Number)	Mean (out of 5)	Responses (Number)
<i>A</i>	4.00	1	4.33	6
<i>B</i>	4.75	4	5.00	4

Source: Author’s study files

While the “initial” survey had not been conducted in 2020, the “term” survey showed 4.83 and 4.80 in courses ‘A’ and ‘B’, respectively, thus with consistent results between the two courses at the time, with some difference visible in Table 1 (second column), however with a much smaller response rate for ‘Course A’. The feedback received in these ISO 10004 surveys was available for augmenting the preparation, recording and posting of additional video examples, for instance from a ‘Course B’ student’s suggestion to have “[...] *more detail of the content explained verbally in the lecture*”. It could also be contrasted with the student comments from the “ISO 10008 Videos Feedback”, e.g.: “[...] *Your videos have plenty of information that supports to understand various concepts. It also helps as a reference for doing assignments and projects [...].*”

For the ISO 20488 subsystem, as per sub-clause 5.4 of the standard, students were “invited” to provide evaluations and comments of the videos through a link called “ISO 10008 Videos Feedback”. Whereas the related form started with an overview explaining that the feedback would be anonymous and voluntary, and included the “collection” purpose being course site, overall course and teaching improvements (see ISO 20488: 2018, section 5.4.2, for the specific guidance followed here), the underlying “terms and conditions” (ISO 20488: 2018, sub-clause 4.3) were provided in the “ISO 10008 Study (Information) Letter”, stemming from the research ethics guidance. As per ISO 20488: 2018, sub-clause 5.3 and section 5.7.3, the videos feedback form included a “total rating”, in difference to the “review dates” (5.3a), which were not available due to the lack of the corresponding feature in the course site platform.

In ‘Course A’, one and six respondents provided the feedback in 2020 and 2021, respectively, while in ‘Course B’, only one and two students sent their reviews. The “ISO 10008 Videos Feedback” form contained questions on the scope of the evaluation (videos reviewed), as well as the components and total rating. Feedback was given for all video examples in all responses (i.e., never for a single specific video). In ‘Course A’ taught in 2021, 60% of the respondents viewed the videos once only, while in the other three course offerings they saw the posted video examples multiple times. The component ratings, evaluating the effectiveness of

video examples for learning and their efficiency in terms of time spent for viewing, are illustrated in Table 2. Evidently, the related ratings fell slightly from 2020 to 2021, which, together with the student comments received in the same “ISO 10008 Videos Feedback” form (e.g., that the videos were “*too [long], did not understand the point*”), could indicate that streamlined video examples for both quality and standardized management systems topics are needed (e.g., for augmenting ISO 10008: 2013, 6.1.2, 7.1.5, and 8.5 – related processes of the course delivery system).

Table 2. ISO 10008 Video Examples Component Ratings (Out of 5)

<i>Component / Course (Year)</i>	A (2020)	A (2021)	B (2020)	B (2021)
<i>Effectiveness</i>	5	3.5	5	4.5
<i>Efficiency</i>	4	4	5	4.5

Source: Author’s study files

The “total ratings” are provided in Table 3. Similarly to the component ratings, these also decreased from 2020 to 2021. Therefore, although the opinions included with the video ratings commended their usefulness even in 2021 (e.g., “*The video examples were very helpful*” from ‘Course A’ and “[...] *Helping to understand with examples*” from ‘Course B’), this ISO 20488 subsystem application finding may prompt changes in the content (ISO 10008: 2013, 6.1.2), and perhaps also the context (ISO 10008: 2013, 6.1.3), of edited or future videos within the ISO 10008 system.

Table 3. ISO 10008 Video Examples Overall Ratings (Out of 5)

<i>Course / Year</i>	2020	2021
<i>A</i>	5	3.5
<i>B</i>	5	4.5

Source: Author’s study files

Finally, consistent with the other feedbacks related to the ISO 10004 and ISO 20488 subsystems, selected comments provided by the students using the “ISO 10008 Overall Feedback” link (e.g., see sub-clause 5.5 of ISO 20488: 2018) were:

- “*Good examples that were applied on day-to-day activities [...]*” (‘Course A’ – 2020),
- “[...] *The videos on E-Class are very helpful*” [...]” (‘Course A’ – 2021), and
- “*All videos [...] super cool and easy to understand*” (‘Course B’ – 2021).

4. Conclusion

Although ISO 10000 and other augmenting quality management system standards can be useful in services, ISO 10004, ISO 10008 and ISO 20488 perhaps do not come immediately to mind when discussing applications in public postgraduate education generally or even in engineering courses specifically, due to their primary emphases on “customer satisfaction”, “commercial transactions” and “moderated / published reviews”. Nevertheless, it was interesting to attempt augmentative integration of the corresponding management subsystems in multiple online courses taught during the COVID-19 pandemic.

Overall, it seems that the results coming from this particular two-year, two-course, ISO 10004 – ISO 20488 – ISO 10008, integrative augmentation suggest a continued such application in graduate course delivery, albeit with improvements in the recorded video

examples provided. The scope of the application illustrated at the EISIC in Visby encompasses medium-sized graduate courses only, with consequently lower numbers and rates of student responses through the related augmentative standardized system resources. In addition, the coverage was limited to two subsystems and video examples as a single course output. However, a broader application with additional undergraduate courses, standards and course outputs has also been performed and is ongoing.

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