Standardization as a management tool to assure quality in e-Learning: The case of the Portuguese standard NP 4512

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ABSTRACT

It is widely accepted that standardization plays an important role in quality assurance and quality management, by stabilizing processes in order to allow the production of more consistent, reliable, efficient and sustainable outputs and outcomes. But when we think of applying it to e-learning, which is all about student centred learning, information technology and innovation, the question is unavoidable in our minds: Is it possible to reconcile the personalization and dynamics of e-Learning with the steadiness of standardization?...

Furthermore, although nowadays there are billions of published documents that seem to be standards, not all of them are, as they were not developed under the strict rules and principles of international standardization and, some of them, can even contribute to confuse the market. A clarification is therefore needed to help users distinguish between “real” standards and other types of documents, such as private technical specifications from particular stakeholders. This paper will discuss the concept of standardization - as defined and accepted by most international standardization bodies - its rules and principles and the challenges and benefits they bring. Using examples from the development of the recently published Portuguese Standard "NP 4512 - Training management system, including technology enhanced learning - Requirements", this paper will also show how standardization and innovation are perfectly compatible, can complement and enhance each other and be used as a strong management tool to boost, assure and continuously improve the quality of e-learning services.
PREAMBLE

This paper uses concepts that may have different definitions according to the sector and technical context in which they are used. Also, even in a given context, some terminology used in this paper doesn’t have one worldwide consensual definition.

Therefore, and to avoid ambiguity, an alphabetically organized glossary is provided at the next section, and the reader should take into account that, for the purpose of this paper, those are the definitions that apply.

To alert the reader, the first time each one of the defined concepts is used along the text, it is written in **bold**.
GLOSSARY

Consensus
General agreement, characterized by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process that involves seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments.
NOTE: Consensus need not imply unanimity.

(e-Learning
Short for Electronic Learning. Any learning assisted by technology. Can mean enhanced learning through online instruction. Can mean web based learning. Can mean powerpoint slides that are sent to the students via e-mail.

Innovation
Implementation of a new or significantly improved solution for a firm, a new product, process, organizational or marketing method, with the aim of reinforcing the firm’s competitive standing, improving its performance or its know-how.

Management System
System to establish policy and objectives and to achieve those objectives.
NOTE: A management system of an organization can include different management systems, such as a quality management system, a financial management system or an environmental management system.

Process
Set of interrelated or interacting activities which transforms inputs into outputs
NOTE 1: Inputs to a process are generally outputs of other processes.
NOTE 2: Processes in an organization are generally planned and carried out under controlled conditions to add value.

NOTE 3: A process where the conformity of the resulting product cannot be readily or economically verified is frequently referred to as a “special process”.

(ISO 9000:2005, page 11)

Quality
Degree to which a set of inherent characteristics fulfils requirements.
NOTE 1: The term “quality” can be used with adjectives such as poor, good or excellent.
NOTE 2: “Inherent”, as opposed to “assigned”, means existing in something, especially as a permanent characteristic.

(ISO 9000:2005, page 7)

Quality Assurance
Part of quality management focused on providing confidence that quality requirements will be fulfilled.

(ISO 9000:2005, page 9)

Quality Control
Part of quality management focused on fulfilling quality requirements.

(ISO 9000:2005, page 9)

Requirement
Need or expectation that is stated, generally implied or obligatory
NOTE 1: “Generally implied” means that it is custom or common practice for the organization, its customers and other interested parties, that the need or expectation under consideration is implied.
NOTE 2: A qualifier can be used to denote a specific type of requirement, e.g. product requirement, quality management requirement, customer requirement.
NOTE 3: A specified requirement is one that is stated, for example in a document.
NOTE 4: Requirements can be generated by different interested parties.
NOTE 5: This definition differs from that provided in 3.12.1 of ISO/IEC Directives, Part 2:2004:

3.12.1 requirement expression in the content of a document conveying criteria to be fulfilled if compliance with the document is to be claimed and from which no deviation is permitted.

(ISO 9000:2005, page 7)

**Standard**

Document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.

NOTE: Standards should be based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits.


**Standardization**

Activity of establishing, with regard to actual or potential problems, provisions for common and repeated use, aimed at the achievement of the optimum degree of order in a given context.

NOTE 1: In particular, the activity consists of the processes of formulating, issuing and implementing standards.

NOTE 2: Important benefits of standardization are improvement of the suitability of products, processes and services for their intended purposes, prevention of barriers to trade and facilitation of technological cooperation.


**Technology Enhanced Learning**

Includes all learning which, on the initiative of the organization or its students, uses or is supported by technological means such as hardware and software, the internet, intranets and other networks, among others, with the aim of improving the teaching/learning process and the transfer/acquisition of skills to and by the students.
STANDARDIZATION AS A MANAGEMENT TOOL TO ASSURE QUALITY IN E-LEARNING: THE CASE OF THE PORTUGUESE STANDARD NP 4512

“We are what we do repeatedly. Excellence then, is not an act, but a habit”

(Will Durant)

Quality in e-Learning and Standardization

What are we speaking of, when we speak of quality in e-Learning? Considering the definitions stated at the glossary of this paper, we are speaking about the degree in which the inherent characteristics of a given learning product or service that is provided to the students through any electronic mean (Rothwell, 2006), fulfil the needs and expectations of the students and other interested parties in that learning context. That degree can be poor, good or excellent (ISO, 2005), and this variation is directly related with the way in which we identify and manage the critical control points in the e-Learning process, or better said, processes, as the complexity of the learning contexts usually require more than one process to support its operations. One of the ways to do this is through standardization and the use of standards (ISO, 2004), which provide, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context and are already based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits.

But of which processes and inherent critical control points are we talking about? According to IPQ (2012) and to other authors (Kirkpatrick & Kirkpatrick, 2009; Mirbach, et al, 2009; Phillips & Phillips, 2010; Salmon, 2011), these can be related to the learning cycle (diagnosis of learning needs, design, development and innovation of learning products, planning and organization of courses, realization of courses and assessment and/or certification of learning), but also to the management cycle, which includes not only the processes of the learning cycle but also processes related to management responsibilities such as costumer communication interfaces, strategic planning, management of resources and measurement, analyses and improvement (IPQ, 2012; ISO, 2008).
Given the complexity of the learning contexts, increased, in the case of e-Learning, by the technology associated with it, management system standards can be particularly useful, as they make use of a process approach (ISO, 2005), a systematic identification and management of the processes employed within an organization and particularly the interactions between such processes. That helps the organization to function effectively and empowers it to improve continuously, through the implementation of self-assessment activities. These will provide the organization with the answers to four basic questions that should be asked in relation to each of its processes: Is the process identified and appropriately defined? Are responsibilities assigned? Are the procedures implemented and maintained? Is the process effective in achieving the required results? The collective information collected through these questions can support factual based decisions to improve the organization efficacy and efficiency and, therefore, the overall quality assurance of its e-Learning products and/or services.

"Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skillful execution; it represents the wise choice of many alternatives.”

(William A. Foster)

NP 4512: Contribution for Quality in e-Learning

A good example of a management system standard that can help enhance the quality assurance of e-Learning products and services by increasing the level of quality control over them, is NP 4512:2012 (IPQ, 2012). Published by the Portuguese Standardization Body (IPQ - Portuguese Institute for Quality) in June 2012, this standard is a deliverable of Q-Cert-VET, a Life Long Learning Leonardo da Vinci Transfer of Innovation project, funded by the European Commission and contains the requirements for a vocational training management system, including technology enhanced learning. It was developed by IPQ/CTA 25 - a ad-hoc technical Committee established at IPQ – following the principles of standardization, such as willingness (voluntary work; voluntary use), representativeness, parity, transparency, simplification and consensus.

But why is NP 4512 a standardization contribution for quality assurance in e-learning? And what distinguishes it from other standardization contributions?
The aspects that distinguish NP 4512 from other standards can be divided in two categories: The aspects related to the method of its development and the structure and content of the standard itself.

In what concerns the first category, the fact that its development was done under the principles of standardization marks one point of distinction of NP 4512, at least in Portugal, where there were other standard-like documents - public technical specifications for vocational training such as Ordinance 851 (Portuguese Government, 2010) - but that have not been developed following these principles. The same has probably happened in many other countries. Also, the method used to develop NP 4512 was innovative – and was recognised as such by the ISO/TC 176 Chair (Gary Cort, personal communication, November 11th, 2012). At IPQ/CTA 25, we applied what we affectionately called “the LEGO® concept” and developed a new standard based on carefully chosen specific parts of previously existing standards, technical specifications and excellence or quality models. Based on the principle that one should not reinvent the wheel, we selected both the structure and specific requirements of other documents that have already proved their value in the market and made something new out of it, the same way children do use a LEGO® base and LEGO® blocks to construct, de-construct and re-construct new toys. This method of work fits the definition of innovation (IPQ, 2007a) and enables outputs of past work to be incorporated in present work, serving the purpose of flexibility, incremental development and continuous improvement.

In what concerns the second category, the first point of distinction is that the contents of NP 4512 include requirements for technology enhanced learning – which were not covered by the pre-existing Portuguese public technical specifications for vocational training – and therefore, with the publishing of NP 4512, this gap was overcome. Again, the same has probably happened in many other countries and that explains the great curiosity and interest NP 4512 has generated internationally, even before being published (CEN, 2012; ISO/IEC, 2012a and 2012b), with successive invitations for its submission as a contribution for the development of on going and new international and/or European standardization work items. The second point of distinction is the added value of its structure and overall content: NP 4512
incorporated management system requirements from ISO 9001\(^1\) (ISO, 2008), NP 4457\(^2\) (IPQ, 2007a), ISO/IEC 27001\(^3\) (ISO, 2005), ISO/IEC 20000-1\(^4\) (ISO, 2011); other technical specifications, such as the German QPL\(^5\) (Mirbach et al, 2009), and the Portuguese Ordinance 851/2010\(^6\) (Portuguese Government, 2010); and also from other documents, such as Kirkpatrick’s\(^7\) (Kirkpatrick & Kirkpatrick, 2009), Phillips’s\(^8\) (Phillips & Phillips, 2010) and Salmon’s\(^9\) (Salmon, 2011) models. This approach ensured the best possible integration with other management system standards and made NP 4512 a very useful tool to resolve many known compatibility problems felt by the users, such as the difficulty to integrate requirements from several different documents in one management system only, or to translate, for the vocational training context, many requirements from more generalist management system standards. Also, the carefully chosen content incorporated, enabled NP 4512 to cover, in only one standard, important management areas, such as innovation, risk assessment and quality assurance, going beyond the concept of efficacy and adding the concept of efficiency.

Structured in alignment with ISO 9001 (ISO, 2008), NP 4512 (IPQ, 2012) is divided in nine sections, numbered from section 0 to section 8. These sections are dedicated to the introduction (section 0), scope (section 1), references (section 2), terms and definitions (section 3) and requirements for the vocational training management system, including technology enhanced learning (sections 4 to 8).

The requirements included in the last four sections cover processes and critical control points such as Information and documentation - including security of information, control of documents and control of records (at section 4 and annexes F and G); management responsibilities - including management commitment, customer focus, leadership and organizational culture (mission, vision, beliefs and values, vocational training policy), planning objectives and targets related to the vocational

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1.“Quality management system. Requirements”
2.“Management of Research, Development and Innovation (RDI) - RDI management system requirements”
3.“Information technology – Security techniques – Information security management systems – Requirements”
4.“Information technology – Service management – Part 1: Service management system requirements”
5.“Quality Platform Learning”
6.“Portuguese certification system for training organizations”
7.“Evaluation Model”
8.“Return on Investment (ROI) Model”
9.“e-Moderation Model”
training products and services, responsibilities and authorities and internal communication (at section 5); resource management (both for face to face and e-Learning) - including human resources (competence, training and awareness), infrastructure and work environment (at section 6 and annexes A, B and C); realization of both the face to face and e-Learning vocational training product and/or service - including planning, determination and review of requirements, costumer communication, design, development and innovation, selection and evaluation of suppliers, purchasing information and verification, control of the production and provision of both face to face and e-Learning vocational training products and/or services – including validation of processes, identification and traceability, customer property, preservation of the product and assurance of service continuity, and control of monitoring and measuring instruments (at section 7); measurement, analysis and improvement – including customer satisfaction, internal audit, monitoring and measurement of processes and of the vocational training products and/or services, control of nonconformities, analysis of data, management review, and corrective, preventive and improvement actions (at section 8 and annexes D and E).

If an organization that provides face to face and or e-Learning vocational training services, implements a management system that is compliant with all of the above mention requirements, the critical control points of their learning cycle and management cycle get covered by the methodology known as “Plan-Do-Check-Act” (PDCA), which can be briefly described as follows (ISO, 2008):

- **Plan**: establish the objectives and processes necessary to deliver results in accordance with customer requirements and the organization’s policies.
- **Do**: implement the processes.
- **Check**: monitor and measure processes and product against policies, objectives and requirements for the product and report the results.
- **Act**: take actions to continually improve process performance.

This approach allows the organization to identify any nonconformities as they arise and to immediately implement appropriate actions to correct the problems and to investigate and eliminate their root causes to prevent its recurrence. In other words, it allows continual improvement.

Regardless to say, NP 4512 is a management system standard and, therefore, does not standardize the vocational training products and/or services, but
only the underlying management processes that assure the excellence of their design, development and delivery. As any management system “ISO-like” standard, its requirements are not prescriptive and allow the organizations to respond to them in different ways, according to their dimension, internal culture and type of face to face or e-Learning vocational training products and/or services provided to their costumers.

"Creative people will always create… but innovation requires both creative people and a sturdy process”

(Lyn Heward)

NP 4512: Reconciling Standardization and Innovation

It is widely accepted nowadays that standardization plays an important role in quality assurance and quality management, by stabilizing processes in order to allow the production of more consistent, reliable, efficient and sustainable outputs and outcomes. As said, the nearly twenty thousand standards published by ISO alone so far, leaves no space for doubts in this matter. Nevertheless, there is still a myth that the concept of standardization conflicts with other important concepts of our era, such as the concept of innovation. Statements such as “What society needs today is not standardization, but to recover curiosity, creativity, innovation and continuous improvement” (Deming Collaboration, 2012) are the evidence that some people tend to look at the steadiness given by standardization and the dynamics inherent to innovation as clashing characteristics. Nevertheless I believe the above mention citation to be a paradox in itself, as one of the most efficient ways to recover curiosity, creativity and innovation, is, precisely, to implement a standardized process that considers all these in the operations of a given organization, assuring none is skipped and that all become part of the organizational environment and culture (Heward, 2009). And this is part of what NP 4512 can do for an organization, through the requirements of section 7.3 - Design, development and innovation” (IPQ, 2012).

Also, when you standardize the basics of any process, you free people’s minds from immense little operational details, allowing mind space – and peace of mind - for the creative process to happen spontaneously. Agostinho da Silva, a Portuguese philosopher of the XX century, argued that the primordial human purpose was to create (Silva, 1990a) and idealized a future world where machines would do all the work so human beings could be free to dedicate all their time to create (Silva,
1990a and 1990b). Examples of similar theories have populated science fiction in literature and movies for centuries. And all of us have experienced or witnessed practical examples of these phenomena: Simple stuff, such as when we have a good idea to solve a problem while driving or doing any other standardized activity that frees our minds from immediate earthly worries; or more complicated situations, such as when Captain Sullenberger ditched US Airways flight 1549 on the Hudson river in 2009: Haven’t the Airbus fly-by-wire system (a system made of highly standardized processes) freed him from worries and tasks to stabilize the aircraft during the three minutes gliding descent, would have him been able to take the “right” decision when faced with other options – later proved by simulators to have been all deadly for everyone on board (Langewiesche, 2009)? Fortunately, we will never know the answer to this question. But, the odds are, he might not.

So, maybe standardization and innovation are not conflicting nor incompatible concepts. Maybe they’re actually complementary. And, the way I see it, these too concepts do not only perfectly complement each other, but have become interrelated and interdependent in the exponential times we are living in nowadays. We reached a pace of change never seen before by humanity. To face the inherent challenges of this pace of change, we need to innovate continuously. It is a question of survival. But to do it continuously, we need also to do it efficiently – maximizing the results with the least possible resources. A standardized process can therefore be of great help in this matter, by assuring the necessary conditions that will enable the continuous flow of innovation, based on the abilities of imagination and creativity of all members of a given organization. Standardization will stabilize the grounds and the organizational environments, allowing the creative nature of the human beings involved to flourish freely, although in a coordinated way and within a framework of unity of purpose. Creativity managed this way leads to incremental innovation and to a culture of holistic approach and continuous improvement, leading to organizational excellence.

Therefore and If correctly implemented, a management system based on NP 4512 can also do just that for any e-Learning provider, liberating the minds of their personal to do what they are meant to do (Silva, 1990a and 1990b; Heward, 2009; Robinson and Aronica, 2010): imagine, create and innovate – in this particular case,
the e-Learning products and services provided by the organization they belong to, contributing to its quality assurance, continuous improvement and excellence.

**NP 4512: Current status**

Since its publishing in Portuguese, in June, 15th, 2012, and due to the many international interest demonstrated by the European and international standardization bodies and its members and liaison organizations (CEN, 2012; ISO/IEC, 2012a and 2012b), IPQ has now published NP 4512 also in English, French, German, Spanish and Romanian. Under the framework of the Q-Cert-VET project, four official and nine voluntary partners of the Q-Cert-VET Consortium have been developing vocational training management systems, including technology enhanced learning, in their organizations, serving as controlled pilots to validate the contents of the standard and to provide feedback to allow its continuous improvement. As the standard is published and available, the Q-Cert-VET Consortium cannot keep track or control implementations being done by other vocational training organizations that do not approach us, but the odds are that the implementation of many more management systems based on NP 4512 is on going and the number will keep growing in the upcoming years. This is even more expectable to happen, due to the fact that on November 23rd, 2012, the Portuguese Accreditation Body (IPAC) has published an accredited certification scheme based on NP 4512 (IPAC, 2012). It is now possible to any certification body to apply for accreditation by IPAC and to be able to certify vocational training organizations according to this standard; and to any vocational training organization to request accredited certification for a management system implemented in accordance with the requirements of NP 4512. At the time this paper is being completed – December 2012 - three of the thirteen controlled pilots have already been subjected to an audit by a certification body and one has already been certified, which is an awesome result considering we are speaking of a standard that is six months old and of an accredited certification scheme that is one month old.

"The illiterate of the 21st century will not be the ones who cannot read and write, but those who cannot learn, unlearn and relearn"  
(Alvin Toffler)

**NP 4512: Future expectations**
In the international arena, both CEN and ISO invitations (CEN, 2012; ISO/IEC 2012a and 2012b) are still up and IPQ has formally accepted the second. This means that the content of NP 4512 will be submitted to ISO as a contribution to the further development of the ISO/IEC 36000 series of standards. It does not mean the CEN invitation has been refused by IPQ - only delayed - as under the Vienna Agreement (ISO/CEN, 2001), CEN may ratify an ISO standard on its final stage of development, allowing for a co-publication as an “ISO EN” standard. Also, considering there are currently three ISO and one CEN Technical Committees and Work Groups – ISO/IEC JTC1 SC36 WG5\(^\text{10}\), ISO/TC 176 WG05\(^\text{11}\), ISO/TC 232\(^\text{12}\) and CEN/TC 353\(^\text{13}\) - developing standardization work in the area of quality management for the education sector, the odds are that in a near future, these four groups choose to do collaborative work towards a more thorough standard, taking advantage of their joint different, but complementary competences. If this happens, NP 4512 will certainly cease existing, allowing for a better standard, with a wider scope, both technically and geographically, and an improved content, reached through international consensus, to take its place.

That is the real beauty of standardization: The ability to continuously renovate itself and improve its outcomes, bridging past and present and opening the doors to the future.

\(^{10}\) “Information Technology” – Sub-Committee “Learning, Education and Training” - Work Group “Quality Assurance and Descriptive Frameworks”

\(^{11}\) “Quality Management and Quality Assurance” - Work Group “Requirements to Education Organizations”

\(^{12}\) “Learning Services for Non-formal Education and Training”

\(^{13}\) “Information and Communication Technology for Learning, Education and Training”
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