EU-StORe

Research paper

Research on quality criteria in didactics and pedagogy

Partner 7- University of Malta

Project Titel: European Standard for Open Education and Open Learning Resources

Project Acronym: EU-StORe

Titel of the task: Research on quality criteria in didactics and pedagogy

Activit Code: O1-A2

Partner: Partner 7- University of Malta

Research Paper:

QUALITY CRITERIA IN DIDACTICS AND PEDAGOGY

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August, 2015.

The criteria describing the quality of any educational enterprise emanate from the epistemological and pedagogical perceptions and beliefs characterising any particular era. Didactical and Instructional approaches characterised industrial educational systems so that the common practice in class was learning through teaching. 'Over recent years, learning has moved increasingly centre stage for a range of powerful reasons that resonate politically as well as educationally across many countries. Societies and economies have experienced a profound transformation from reliance on an industrial to a knowledge base. Global drivers increasingly bring to the fore what some call "21st century competences" (Dumont *et al.* 2010, Pg 13). The quantity and quality of learning thus become central, with the accompanying concern that traditional educational approaches are insufficient. For decades, research and discussion in educational circles analysed the strengths and shortcomings of traditional didactical approaches and formulated epistemological frameworks and pedagogical models in an attempt to make education and learning a more effective and efficient personal and collective experience.

The introduction and integration of digital technologies and open education resources both in the formal curriculum and also in our private and professional lives has opened, extended and transformed teaching and learning. The reflection about what is the nature of learning and how it is best promoted brought to the forefront a number of epistemologies beyond the instructional paradigm. Thus Constructivist, Constructionist and Connectivist pedagogical approaches became important in an attempt to equip learners, not only with subject knowledge, but more important, with competences that make them fully functional citizens in a knowledge society.

With the event of Web 2.0, social on-line environments and an extensive range of open educational resources (OERs), the distinction between individualised and collaborative modes of learning faded away in the process creating continuous, coherent technology-mediated learning experiences. Actions, resources, situations and relationships are increasingly becoming distributed between physical and on-line networked contexts transforming e-lifelong-learning into a socio-technical system in which knowledge and learning are both the form and the content as for their social and relational meaning (Pettenati & Cigognini 2007). This evolving digital experience is constantly challenging educators, teachers, students and parents to revise, update and many times radically change their conceptions of the teaching-learning process. According to Hine (2011) the integration of technology with formal learning will demand new teacher roles, new pedagogies, new ways of organising the learning environment to 'develop socially active classrooms, encouraging co-operative interaction, collaborative learning and group work,' (Pg8). In these technology-intensive classes teachers emphasize higher-order cognitive activities, thinking critically and analytically, synthesizing ideas into new interpretations, solving complex real-world problems, engage students in enriching community-based and 'situated' co-curricular experiences, (Laurillard 2012, Pg 32).

UNESCO ICT-CST framework claims that traditional educational practices no longer provide prospective teachers with all the necessary skills for teaching students to survive economically in today's workplace. To develop the necessary frame-of-mind and related portfolio of competences, a shift in the underlying culture, metaphors and policies is indispensable. Hence this framework proposes a developmental trajectory from teacher to student-centred pedagogies taking into consideration the socio-cultural environment in moving from an information to a knowledge economy. The framework proposes three complementary approaches that connect

education policy with economic development, mainly the technology literacy approach, the knowledge deepening approach and the knowledge creation approach. There is a shift in emphasis from instructional approaches, to collaborative, project-based learning activities to constructionist and reflective approaches. This implies a corresponding shift in quality criteria that would be used to evaluate such pedagogical scenarios.

For formal school didactical settings, Tharp *et al.* (2000) and Stoll Dalton, S & Tharp, R.G. (2002) propose a model based on Five Standards for Effective Pedagogy which are considered critical for improving learning outcomes for all students, and especially those of diverse ethnic, cultural, linguistic, or economic backgrounds. The five standards are:

I. Joint productive activity between teachers and students.
II. Developing language and literacy across the curriculum.
III. Connecting school to students' lives
IV. Providing cognitive challenge by teaching complex thinking
V. Teaching through Instructional Conversation.

These quality criteria provide a framework that prioritizes the educational needs and challenges in formal educational contexts. The emphasis is on teacher-driven didactical approaches that determine the type of digital educational resources that will address the instructional needs inherent in these standards. The teacher will decide mainly the ‘what’, ‘how’, ‘when’ and ‘why’ the identified resource will be used. Students will have much less say in the pedagogical decision making and thus will comply with the teacher’s choice.

In reaction to these didactical approaches researchers and educational philosophers promoted more student-centred constructivist and constructionist pedagogies. The active participation of learners through reflection, self-management and individual exploration became important aspects of learning that should complement didactical approaches. The social dimension of learning as promoted by Activity Theory (Vygotsky, Leontev, Engeström) had to be revisited and given its due importance in teaching and learning. As a result learning became a multi-faceted individual and collective endeavour reflecting these different epistemological dimensions.

Building on these epistemologies, Beetham & Sharpe (2007) adopts a learning design approach describing learning from four different perspectives – the Associative, the Individual Constructivist, the Social Constructivist and the Situative. Each perspective presents a set of pedagogical criteria determined by those aspects of learning considered critical for acquisition, sharing and application of knowledge.

The Associative approach focuses on the building of concepts or competences step by step. This perspective claims that people learn by association, initially through basic stimulus-response conditioning, later by associating concepts in a chain of reasoning, or associating steps in a chain of activity to build a composite skill. Associativity leads to accuracy of reproduction exploiting memorized information or skills. Thus mnemonics are essential associative devices used in the retrieval and re-production of ideas. Pedagogical approaches characterising the associative approach include Guided instruction, Drill and practice, Instructional Design and Socratic Dialogue. These are characterised by routines of organized activity designed to develop concepts or skills through clear goals, feedback and

individualized pathways matched to performance. When this activity is organised and managed by a teacher or instructor a didactical context is set up.

The Individual Constructivist approach organises the learning environment to promote understanding through active discovery, based on the premise that people learn by actively exploring the world around them, receiving feedback on their actions, and drawing conclusions. Constructivity leads to integration of concepts and skills into the learner's existing conceptual or competency structures. Learning through experimentation can be applied to new contexts and expressed in new ways. Typical individual constructive learning activities include Cognitive Scaffolding, Experiential learning (based on Kolb's learning cycle), Experimental learning, Problem-based learning and Research-based learning.

Since individual constructive theories are more concerned with how knowledge and skills are internalized than how they are manifested in external behaviour, they are characterised by active construction and integration of concepts. This involves Ill-structured problems, opportunities for reflection, task ownership and interactive challenging environments. Learning activities are designed to encourage experimentation and the discovery of principles, adapt teaching to existing concepts/skills, coach and model meta-cognitive skills especially reflection during and after learning activities. The emphasis is on conceptual understanding, especially through application of knowledge and skills, on extending performance, on processes as well as outcomes and on developing self-evaluation and autonomy in learning.

The Social Constructivist approach attempts to achieve understanding through dialogue and collaboration so that individual discovery of principles is heavily scaffolded by the social environment. Thus peer learners and teachers play a key role in conceptual development by engaging in dialogue with the learner, developing a shared understanding of the task, and provide feedback on the learner's activities and representations. In learning through collaborative work the emphasis is on how emerging concepts and skills are supported by others, enabling learners to reach beyond what they are individually capable of learning (in the zone of proximal development). Thus attention is paid to learners' roles in collaborative activities, as well as the nature of the tasks they undertake. Examples of learning by collaboration include Reciprocal teaching, Conversational approaches and Computer-supported collaborative learning.

Social constructivist learning is characterised by activities that promote conceptual development through collaborative activity involving Ill-structured problems that provide ample opportunities for discussion and reflection. In collaborative learning environments tasks are co-shared by learners who are encouraged to experiment and share discovery. Drawing on existing concepts and skills, the pedagogical strategy adopted focuses on coaching and modelling skills, including social skills, on conceptual understanding through application of knowledge and skills which will lead to extending performance beyond the given task. Besides task-related learning outcomes, the collaborative process itself is considered important so that peer-evaluation, shared responsibility and variety of excellence are considered as important success criteria.

The Situative approach focuses on learning as the development of competences in relation to a particular role within a Community of Practice. Through participation in such communities,

a learner progresses from novice to expert through observation, reflection, mentorship and participation in community activities. Like social constructivism, situativity emphasizes the social context of learning, but this context is likely to be close – or identical – to the situation in which the learner will eventually practice (authentic contexts). Thus Work-based learning, continuing professional development and apprenticeships are typical examples of situated learning. The authenticity of the environment is significant especially due to the situated support it provides. Much less attention is paid to formal learning activities.

Situative learning is thus characterised by participation in social enquiry and learning through which habits, attitudes, values and skills are acquired in authentic contexts. This process develops relevant identities together with learning and professional relationships. This authentic learning context must create a safe environment for participation, support the development of identities, facilitate learning dialogues and relationships, and elaborate authentic opportunities for learning by extending performance in a variety of contexts. Situated learning is assessed by accrediting participation, by evaluating context-related performance, especially through involvement of peers. It is also assessed through authenticity of practice considering changes in values, beliefs and competencies.

A further elaboration of the concept of learning emerged with the introduction of the internet. The Connectivist perspective (Siemens 2004) claims that learning manifests itself in different interactive learner-managed experiences mediated by the existing technological infrastructure that includes the internet, digital devices such as personal computers, electronic tablets and smart phones, together with the myriad of on-line educational resources. In this context learning is the outcome of different dimensions and levels of interaction. Interaction through technology with the physical and social environment is characterised by *multi-channel, multi-objective and multi-context learning* (Pérez-Sanagustín et al., 2013).

Such ubiquitous pedagogical approach is emerging as a key mode of learning within the knowledge society increasingly establishing itself as a life-long and life-wide enterprise. It is complementing the initial formal education which has also been radically transformed by these emerging digital technologies. The integration of a range of learning technologies in formal and non-formal education creates a need for a different models and frame-of-mind to conceptualise the learning experience. It demands detachment from models that emphasis learning as a process of content transmission and acquisition to a process-oriented pedagogy that reconceptualise learning and knowledge building in terms of dimensions and levels of interaction. Developments in various fields of research point to the importance of adopting process-oriented approaches in analysing such technology-enhanced learning contexts.

Bonanno (2011) proposes a process-oriented methodology to analyse and manage connectivist learning systems. Inspired by a Constructionist epistemology the model categorises interactions along the domain, technology and community dimensions, and across three pedagogical levels. In line with UNESCO model (Hine 2010) these levels progress in emphasis from ‘Acquisition’ learning, to learning by ‘Participation’ and ultimately by ‘Contribution.’ The model is summarised in the table below:

Mode of interaction	*Focus of Interaction*		
	Domain	**Technology**	**Community**
Acquisition	Knowledge and skills	Knowledge & skills in use of tools	Interactional skills
Participation	In subject-dedicated spaces and CoPs	Learning with others in use of tools for communication, group management and sharing	Experiencing different roles in contiguous & virtual communities
Contribution	Creating, designing & evaluating subject content	Developing / using tools for mediation & knowledge building	Managing, leading, facilitating, evaluating contiguous & virtual communities

The first row considers interactions within the physical and digital world characterised by acquisition learning (Learning *From* others), mostly through imitation of psychomotor, cognitive and social skills during apprenticeship. Along the domain dimension learners acquire domain-related declarative, procedural and conditional knowledge in relation to a wide range of topics. Besides this experiential level, reflection about learning interactions is captured as metacognitive activity involving monitoring and organisational interactions while systemizing knowledge around domain core themes. It also involves developing an awareness of natural propensities in information processing and controlling for domain-related personal beliefs. Acquisition along the technology dimension includes developing a working competence based on knowledge and skills related to the use of different digital tools. Typical interactions will include identifying tool options, testing tool features and imitating use of tool. Metacognition involves rationalising belief system about the digital tools, controlling attitude to digital technologies and developing affective strategies to manage anxiety. Competence along the community dimension means acquiring interpersonal skills leading to affiliation and adoption of particular roles within the learning community. The main metacognitive activity within this dimension involves rationalisation and control of individual propensities related to perception, beliefs and reactions to social interactions including those mediated by technology.

The middle row describes participatory learning (Learning *With* others) in contiguous and on-line groups, and in any domain-related 'Communities of Practice'. Participation in learning and knowledge building, involving negotiation and argumentation, widens the 'zone of proximal development' (Vygotsky 1978) along the domain and technology dimensions that leads to the joint construction of distributed knowledge and skills through task and person-oriented interactions. The group serves as a forum for discussing issues in any of the dimensions and provides apprenticeship in developing advanced forms of competence and understanding. Through such dialogues understanding of the deep structure of the digital tools used for technology-mediated communication and knowledge sharing is elaborated. Participation within

the learning community refines the mode of interacting on-line with the other members through the development of formal and informal rules, thus providing learners with the opportunity to share their technology-mediated experience and expertise in specific areas of knowledge.

At this level of competence metacognition would involve monitoring interactions in the process of developing distributed knowledge and skills along the three dimensions. Group monitoring skills are identified and practiced through mentalising (mind reading).

The third row represents interactions with the world of ideas and artefacts characterised by contributory and mediational forms of learning and knowledge building (*Mediating* others' learning). Domain experts and knowledgeable persons communicate their highly refined knowledge and skills while mediating learning for less competent learners through discourse enhanced by digital tools. Mentoring, modelling and evaluation of domain models and of skilful use of digital technologies are all expressions of leadership arising from one's expert standing in a field. Along the community dimension contribution implies monitoring and managing group interactions by challenging behaviours, impressions and beliefs, evaluating group goals and suggesting alternative roles. Metacognition involves developing insight into domain models and the structure of the digital artefact with the necessary skills for using these models as conceptual artefacts. Insight into community functioning is shown by interactions to nurture group affinity, ability to anticipate others' behaviour and proposing alternative relationship models for the group.

The OECD document about 'The Nature of Learning,' (Dumont *et al.* 2010) integrates these learning dimensions in a framework for effective pedagogical approaches and efficient learning environments. According to this report the learning environment:

- Recognises the learners as its core participants, encourages their active engagement and develops in them an understanding of their own activity as learners.
- Is founded on the social nature of learning and actively encourages well-organised co-operative learning.
- Involves learning professionals who are highly attuned to the learners' motivations and the key role of emotions in achievement.
- Is acutely sensitive to the individual differences among the learners in it, including their prior knowledge.
- Devises adaptive programmes that demand hard work and challenge from all without excessive overload.
- Operates with clarity of expectations and deploys assessment strategies consistent with these expectations; there is strong emphasis on formative feedback to support learning.
- Strongly promotes "horizontal connectedness" across areas of knowledge and subjects as well as to the community and the wider world.

The criteria that make such pedagogical approaches and learning environments effective and efficient are:

- **Learner-centred**: the environment needs to be highly focused on learning as the principal activity, not as an alternative to the critical role of teachers and learning professionals but dependent on them.
- **Structured and well-designed:** to be "learner-centred" requires careful design and high levels of professionalism. This still leaves ample room for inquiry and autonomous learning.
- **Profoundly personalised**: the learning environment is acutely sensitive to individual and group differences in background, prior knowledge, motivation and abilities, and offers tailored and detailed feedback.
- **Inclusive:** sensitive to individual and group differences, including the weakest learners, defines an educational agenda that is fundamentally inclusive.
- **Social:** The principles assume that learning is effective when it takes place in group settings, when learners collaborate as an explicit part of the learning environment and when there is a connection to community.

Conclusion:
Quality criteria are determined by the epistemological and pedagogical principles advocated by an educational system as recommended by research and literature. The epistemologies inspiring whole pedagogical approaches can be considered as first-order criteria that serve as frameworks to organise sets of second-order pedagogical criteria. The following table summarises these categories of criteria. The last section of the table identifies the generic first order criteria common to all epistemologies.

First-order criteria	Second-order criteria
Didactical – Emphasis on learning by instruction	Routines of organized activity Identified goals and learning outcomes Structured content broken down according to type of learning Structured tasks broken down into sequence of steps Structured feedback Individualized pathways matched to performance.
Individual Constructivist – Emphasis reflection and autonomous learning	Emphasis is on: • Conceptual understanding. • Application of knowledge and skills. • Processes as well as outcomes • Task ownership • Developing self-evaluation and autonomy in learning. Designed around inquiry-based activities Based on Ill-structured problems. Provides opportunities for reflection Promote coaching and modelling of meta-cognitive skills. Involve interactive challenging environments.
Social Constructivist – Emphasis learning through collaboration	Promotes conceptual development through collaborative activity. Involves:

	• Ill-structured problems that provide ample opportunities for discussion and reflection. • Co-sharing of tasks. • Coaching and modelling skills, including social skills. • Conceptual understanding through application of knowledge and skills. • Extension of collaborative activity beyond the given task. • Peer-evaluation Rewards variety of excellence Considers the collaborative process itself as an important learning outcome.
Situative – Emphasis on learning in authentic tasks	Involves: • Authentic context within 'Communities of Practice.' • Learning dialogues and relationships. • Extension of performance in a variety of contexts • Assessment based on accreditation of participation, evaluation of context-related performance, involvement of peers, authenticity of practice considering changes in values, beliefs and competencies. Focuses on development of: • Profession-related habits, attitudes, values and skill. • Learning and professional relationships • Profession-related Identities
Connectivist – Emphasis on learning by creating connections.	Involves: • Interactions along the subject (domain), technology and community dimensions. • Interaction modes including acquisition, participation and contribution. • Interactions at the experiential and metacognitive level.
Generic first order criteria common to all epistemologies	
Learner-centred	The environment is highly focused on learning as the principal activity. This: • Encourages students to become "self-regulated learners". • Focus on developing the "meta-cognitive skills" for learners to monitor, evaluate and optimise their acquisition and use of knowledge • Trains learners in regulating one's emotions and motivations during the learning process
Structured and well-designed	Involves inquiry and autonomous learning activities. Based on a network of learning activities Based on clear goals and learning outcomes. Is technology-enhanced.

	Provides formative and summative feedback.
Profoundly personalised	The learning environment: • Is acutely sensitive to individual and group differences in background, prior knowledge, motivation and abilities. • Offers tailored and detailed feedback. • Provides customised learning paths. • Demand hard work and challenge from all without excessive overload.
Inclusive	Addresses: • Diversity in ability • Diversity in language, cultural background, religious beliefs, socio-economic status. • Minority groups. Exploits technology to address diversity. Promotes different modes and levels of assessment.
Social	Is based on the processes of interaction, negotiation, co-operation and collaboration. Involves: • Group settings organised in collaborative activities and cooperative tasks. • Connections to the wider community.

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August 2015