Chapter 1
An Instructional-Learning Model Applying Problem-Based Learning Enabled by ICTs

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Introduction

We are increasingly confronted with complex, interconnected, social, economic and environmental problems locally and globally. Humanity is living a crisis of sustainability that includes not only environmental issues such as climate change, ozone depletion, biodiversity loss, but also economic and social issues, such as poverty, social inequalities, violation of human rights, gender inequalities, loss of indigenous knowledge, etc. (Makrakis and Kostoulas-Makrakis 2013). The sustainability crisis is not just our biggest environmental, economic and social challenge; it is also a cultural challenge, a personal and moral one due to its anthropogenic cause. There is, thus, need for a shift of consciousness that alters: our way of being in the world (learning to be), our way for discovering others by discovering ourselves (learning to live together), our way of learning how to learn as well as appreciating all sorts of knowing (learning to know) and our way of putting knowledge into action (learning to do). It is above all, learning to "transform problematic frames of references–sets of fixed assumptions and expectations (habits of mind, meaning perspectives, mindsets)–to make them more inclusive, open reflective and emotionally able to change" (Mezirow 2003: 58).

Such a transformation can be significantly promoted through instructional and learning methods that focus on reflection and action to generate problem solutions, such as problem-based learning (PBL). Problem-Based Learning is not solely regarded as an

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instructional technique, but as an educational philosophy or approach for designing curricula that "empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem" (Savery 2006 p. 12). Focusing on sustainability problems, PBL provides learners with opportunities to move beyond surface learning and content consumption and compartmentalised knowledge to critically and reflectively examine problems to generate change. PBL is confronting learners with problems of everyday life. The 'real-life' sustainability problems are often tackled or solvable within disciplinary frontiers and not through interdisciplinary and more holistic perceptions of knowledge and problems. Thus, the epistemology of PBL is based on critical constructivism, a postmodern view of knowledge and learning, which has influenced teaching, learning and curriculum significantly in the past two decades. It is also based on transformative pedagogical processes that help to develop critical consciousness and knowledge construction that in turn can lead to individual and societal transformation. Such PBL processes are inextricably connected with certain critical skills that can be enabled by ICTs (Buus 2015; Ravitz and Blazevski 2014; Liu et al. 2012).

From the 4Cs to the 10Cs Enabled by ICTs

In the second half of the 20th century, much of the discussion on skills needed was centred on the 3Rs—reading, writing and arithmetic. In the last decade, there is a shift to what has been termed as the 4Cs for workforce readiness in the 21st century —critical thinking & problem solving, communication, collaboration and team building, creativity and innovation (AT21CS 2012; Partnership for 21st C. Skills 2011; American Management Association 2010).

However, in a world of rapid change highly driven by ICTs and expansion of human knowledge, along with the current sustainability crisis that threatens the very existence of humankind, education must go beyond the focus on the 4Cs to what we term 10Cs enabled by ICTs (Fig. 1.1).

Although there is some overlap among the 10Cs, each one has its own role in teaching and learning for problem solving. For example, critical thinking and problem solving refers to the ability to make decisions, solve problems and take appropriate action, using learning processes such as conceptualizing, applying, analysing, synthesizing and/or evaluating information gathered by multiple means. Communication refers to the ability to synthesize and transmit ideas in both written, oral and virtual formats. Collaboration refers to the ability to work effectively with others using multiple communication means. Creativity and innovation refers to the ability to apply new ideas in developing innovative applications and solutions. Wikis, such as Wikispaces, WikiQuESD (Makrakis 2010, 2012), and the latest versions of Pixie, Frames and Share include collaboration options that allow synchronous collaborative learning. Blogging is another means for virtual communication (e.g. Edublogs, Blogger and WordPress).

Fig. 1.1 ICTS as enabling tools for the 10Cs

Mind-mapping and concept mapping tools can become a great collaborative way in reflecting, conceptualising, constructing and assessing knowledge (e.g. SpidrerScribe, Wise Mapping, ChartTool, Cmap, Creately). These tools can boost learners' creativity and provide them with different ways to interconnect their thoughts as well as to accomplish metacognitive reflection skills. Similarly, tools for creating infographics (e.g. Wordle, Tableau and Inkspace) engage students in actively discovering connections and develop creativity. Connectivity addresses the complexity of the human-society-nature interaction, that can be significantly enabled by ICT-driven networking means. Critical reflection refers to a complex process that strongly engages learners to critically reflect upon their reality, personal and social, and to transform it through action and reflection (Stanlick 2014). Cross/inter-cultural competence addresses learners' capacity to communicate, collaborate and work in multicultural and global

environments. Co-responsibility refers to a culture of sharing that necessitates shifting to less ego-centric principles and practices. Critical consciousness or concientization in Freire's (2000) terms denotes the process of developing a critical awareness of one's social reality through reflection and action. Constructing knowledge represents an attempt to shift from consuming information to constructing knowledge. All these critical 21st century skills enabled by ICTs merged with the 21st century learning pillars are used to advance a new methodological approach to PBL that can lead to personal and social transformation.

21st Century Learning Pillars and PBL

In its 1996 report to UNESCO, Learning: The Treasure Within, the International Commission on Education for the 21st Century argued that education should be based on four fundamental pillars of learning–learning to know, learning to be, learning to do and learning to live together, which "provide maps of a complex world in constant turmoil" as well as "the compass that will enable people to find their way in it" (Delors et al. 1996, p. 85). At a later, stage, the 5th pillar of learning to transform oneself and society was added by UNESCO. We feel the need to add a 6th pillar of 'learning to give & share' in order to respond to the quest for merging volunteerism, social activism and learning (Fig. 1.2) as defined in Table 1.1.

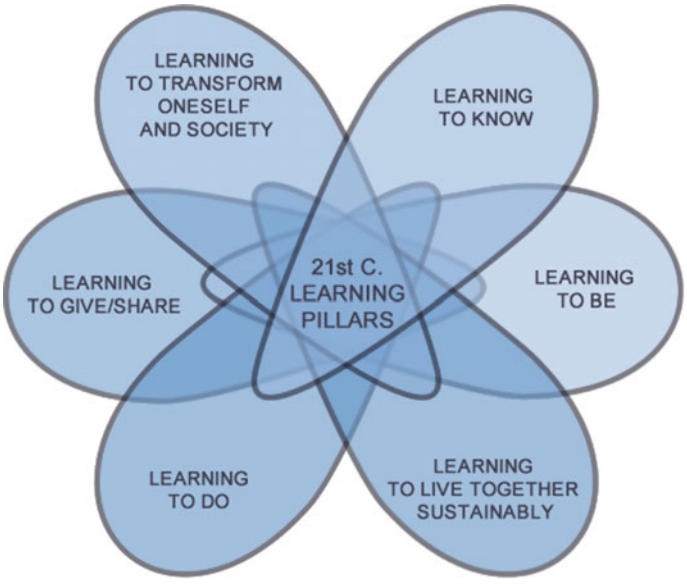

Fig. 1.2 21st century learning pillars

Table 1.1 Definition of the 21st century learning pillars

Learning to know	This type of learning concerns all the processes and practices that lead people to construct and transform knowledge to making sustainability a mode of life and being
Learning to be	This type of learning concerns all the processes and practices that lead to human self-actualisation, self-regulation and cultivating a sense of being versus a sense of having
Learning to live together	This type of learning concerns all the processes and practices that lead to a peaceful and non-discriminatory society and human co-existence with the natural world
Learning to do	This type of learning concerns all the processes and practices that lead to merging knowledge with action for building a sustainable future
Learning to give and share	This type of learning concerns all the processes and practices that promote solidarity, generosity and caring to meet human needs as learners gain a sense of purpose and meaning for their learning and civic engagement
Learning to transform oneself and society	This type of learning concerns all the processes and practices that lead people to transform their unsustainable values, behaviours and actions and collectively engage to change oneself and society towards sustainability

A Conceptual Framework of PBL Based on the 10Cs and the 6LPs

The proposed PBL framework consists of a number of key interacting processes which facilitate the theoretical and methodological clarification and understanding of the PBL as an instructional and curricular approach. Each interacting process integrates various skills drawn from the 10Cs (Fig. 1.3). Furthermore, it takes into consideration the contribution of the problem-solver and the potential impact that he/she brings to the outcome of problem solving process. It also gives primacy on a practical and emancipatory knowledge interest (Habermas 1971). The practical domain identifies human social interaction or 'communicative action' grounded on intersubjectivity (the understanding of meaning rather than causality) to determine what is appropriate action while the emancipatory domain goes further to identify 'self-reflection' leading to a transformed consciousness or 'perspective transformation'. The importance of the practical and critical reflective knowing is embedded in constructing knowledge and meaning merged with personal and social action.

The processes represented into the PBL model are re-conceptualised into a methodological framework depicted in Fig. 1.4. This framework functions as an organiser for designing, developing, applying and assessing a PBL approach contextualised in the area of education for sustainability. We expect that our approach provides a means towards building learning-based change that will ultimately contribute to building a more sustainable society.

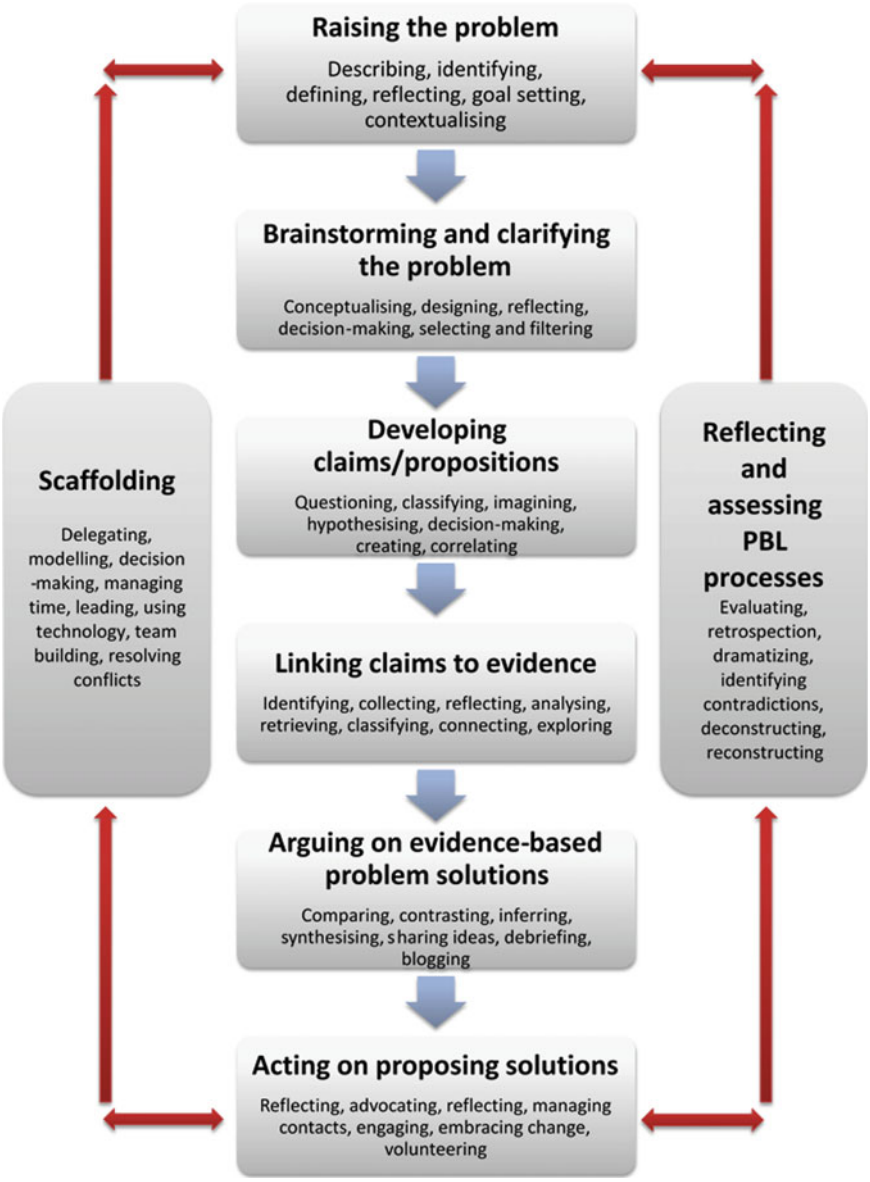

Fig. 1.3 The key skills integrated into the PBL processes

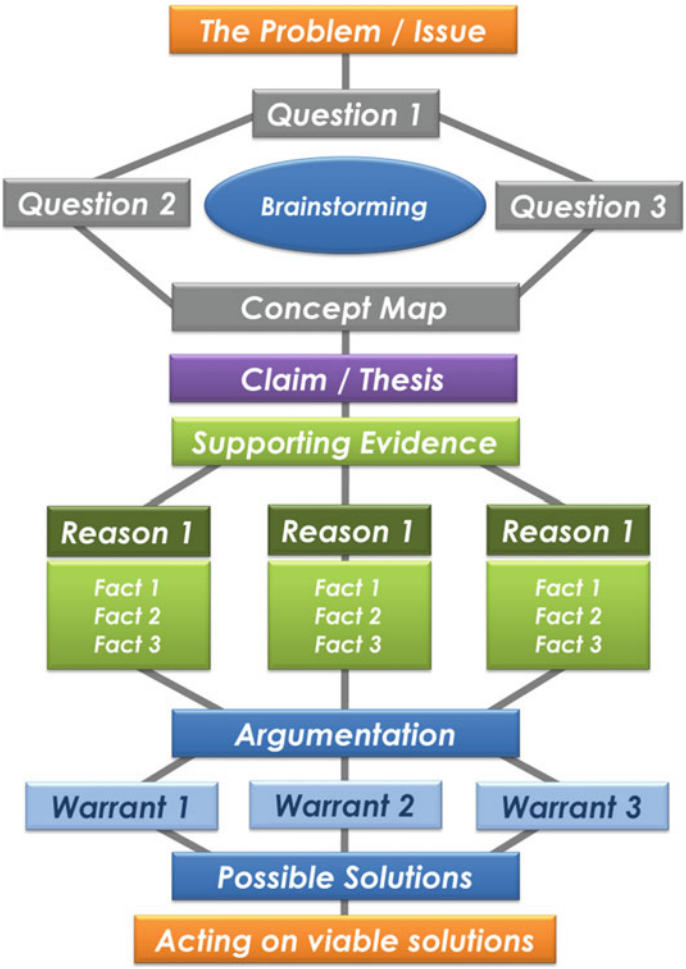

Fig. 1.4 The PBL organising framework

Raising a Problem

The focus of the PBL process is a real-life or authentic problem. Being able to craft good PBL questions becomes a critical skill for both learners and educators. The problem must be formulated in a way that motivates and challenges learners to think and reflect, to search and discover, to build on prior knowledge and promote transfer of what they have learned to other contexts. Problems raised through meaningful questions should motivate and challenge learners. To fully understand complex social problems, learners must also be able to account for and understand competing and multiple perspectives regarding a problem. For example, there has been an ongoing

debate for years about whether or not to ban smoking in public places. Smoking is a social problem as it affects peoples' health. Introducing issues that convey controversial meaning such as smoking ban is expected to raise learners' interest in studying the issue and develop various skills and competencies related to PBL, besides raising awareness about the consequences of smoking to human health. This is an authentic ill-structured or controversial question since ban of smoking in public spaces could be interpreted from various perspectives. Ill-structured or controversial problems are presented as open or unresolved. Any problem-based issue raised requires a collaborative and communicative learning space that encourages learners to exchange ideas, search for evidence and apply multiple ways of thinking.

Brainstorming About the Problem Issue

Brainstorming is a creative thinking process that can help learners generate ideas, access prior knowledge, construct and reconstruct knowledge. Taking up the issue of smoking ban, the teacher, for example, can draw or show a picture of a no smoking sign on the board and ask students to contribute any related vocabulary to this picture. In other words, learners are motivated to brainstorm this key problem-based question using a concept mapping technique. To elicit learners' known vocabulary associated with the concept conveyed by the picture, the teacher could pose some question prompts, such as: "Is smoking healthy?", "Does everybody agree with banning smoking from public places?". Words that may come out could be: tobacco, smoke, ash, odor, inhale, breathe, cough, lung cancer, give up/quit, lighter, cigar, butt, etc. Concept mapping is a good technique to be used in eliciting prior knowledge in the issue, especially if an ICT-enabled concept mapping tool is used. Through the brainstorming process, learners also start defining learning objectives by means of identifying what they actually know about the problem and what they presumably need to know to formulate claims, link claims with evidence and develop effective argumentation on proposing solutions. Learning to know about the controversial issue of smoking ban is very critical at this process.

Developing Claims/Propositions

During this process, problem solvers elaborate the initial state of the problem and identify debatable claims. A claim or thesis/proposition is an expected opinion that conveys the problem solver's interpretations of or beliefs related to the problem. Claims are not facts but rather conclusions or assumptions that the problem solver draws from facts. In other words, a claim is characterized by its controversiality and challenge. If a claim conveys something that is generally agreed upon or accepted as fact, then there is no reason to try to persuade people. A disputable claim allows confrontation, which can be expressed as a counterclaim. In general, claims typically fall into one of four

Table 1.2 Types of claims and supportive evidence

Type of claim	Evidence supporting the claim
Factual	Cigarettes contain arsenic, formaldehyde, lead, hydrogen cyanide, nitrogen oxide, carbon monoxide, ammonia and 43 known carcinogens
Cause and effect	Cigarette smoke contains over 7,000 chemicals, 69 of which are known to cause cancer. Smoking is directly responsible for approximately 90 % of lung cancer deaths and approximately 80–90 % of COPD (emphysema and chronic bronchitis) deaths
Value-laden	Most smokers take up the habit in their mid teens, well before the legal age for purchasing them, and is seen as a right of passage towards adulthood
Policy claim	In 1970, President Nixon signed the law that placed warning labels on cigarettes and banned television advertisements for cigarettes

categories: (1) factual claims; (2) cause and effect claims; (3) value-laden claims and (4) policy claims (Weida and Stolley 2014). Bringing the controversial issue of smoking ban from public spaces, a factual claim might be expressed as "Cigarettes contain many and dangerous substances". A cause and effect claim might be expressed as "There is an association between smoking and lung cancer". A related value-laden claim might be expressed as "Youth start smoking to show a passage to adulthood". Lastly, a policy claim related to smoking ban is issuing regulations about smoking or imposing special or heavy taxes to smoking products in order to reduce smoking.

Linking Claims to Evidence

Claims have to be linked to supportive evidence, which is consisted mostly of objectified measured facts. In this process, learners decide about what data and information is needed to support, modify or even reject their initial claims. The amount of evidence needed depends on the claim. Usually, there are two types of evidence based on the source: (1) primary source evidence and (2) secondary source evidence. The first type may include data collection techniques, such as: interviews, experiments, surveys, or personal experience, while the second type of data collection may include books, periodicals and websites. Table 1.2 presents an example of linking claims to evidence based on the four categories identified through a web-based review.[1]

[1] http://www.cancerresearchuk.org/about-cancer/causes-of-cancer/smoking-and-cancer/smoking-facts-and-evidence. http://listverse.com/2009/01/11/30-fascinating-cigarette-smoking-facts/.

Arguing on Evidence-Based Problem Solutions

It is not enough to link claims with facts, it is also essential to develop sound and persuasive argumentation on the claims grounded on evidence and supportive facts or conjectures (Makrakis and Kostoulas-Makrakis 2014; Jonassen 1997). This is, in fact, the PBL process that synthesizes all the previous ones. In particular, it encourages learners to further explore and integrate knowledge and artifacts gathered through the previous PBL processes. Evidence-based arguments are discussions that present and provide support for claims with evidence and premises (Eemeren and Grootendorst 2004). Being able to produce convincing (i.e., logical and evidence-based) arguments is central to solving ill-structured problems (Cho and Jonassen 2002).

There are three major elements to persuasive argumentation: claims, evidence and warrants. Based on Toulmin model for analysing arguments (cited in Hitchcock and Verheij 2006), warrant is the logical connection between a claim and a supporting fact. Sometimes, the logical connection, the way in which a fact logically supports a claim, might be obvious. However, more often, there is need to explain how and why a particular piece of evidence is good support for a specific claim. In this case, a warrant is needed that will provide an underlying assumption which clarifies the evidence that supports the claim. For example, based on our web review we found that about 8.6 million people in the U.S. have at least one serious illness caused by smoking, which that for every person who dies of a smoking-related disease, there are 20 more people who suffer from at least one serious illness associated with smoking. Taking the issue of smoking ban, one can argue that as smoking is associated with significant health problems, documented with measured evidence depicted in Table 1.2, it has to be banned from public spaces. However, another could argue that "although smoking is associated with health problems, other measures than smoking ban should be applied". This counterclaim could be justified by reasons such as a general smoking ban restricts smokers' freedom and individual rights. Thus, instead of smoking ban from all public spaces, alternative policies such as smoking and non-smoking places should be established in public areas. The harm caused by smoking can be also reduced by educating smokers about safer options. Punishing smokers "for their own good" is repulsive to the basic libertarian principles that ought to limit the use of government force.[2] Effective and persuasive argumentation emphasizes logic and reason, which provide a rational link between the evidence and the claim. However, there is often a place for emotion as well. Emotional appeals can use subjective or inter-subjective sources such as interviews and individual stories that could illuminate objectified evidence or provide a more legitimate picture of reality. For example, presenting a video-clip that shows an individual story of a heavy smoker

[2]https://www.heartland.org/ideas/smokers-rights.

who died from lung cancer because of smoking may lead to a more persuasive argument than simply showing the percentage of deaths caused by smoking each year. Such examples could not only enrich persuasive argumentation, but possibly empower people towards direct action.[3]

Acting on Proposing Solutions

One of the key attributes of PBL, that has been misunderstood or ignored, is action competence (cf. Mogensen and Schnack 2010). This brings to the issue of turning problem solver's acquired and constructed knowledge, meaning, understandings and concerns into responsible action. There is, thus, need to merge knowledge with action and construct ways of thinking and acting that have an emancipatory knowledge interest. To this end, young learners should be encouraged to develop the capacity to envision sustainable futures, to think critically and reflectively of current unsustainable practices, to plan and evaluate alternative courses of actions, and to transform their attitudes, knowledge and concerns into individual and collective action for building a sustainable society. There is, thus, need to empower young learners to be seen as a resource in their communities with the potential to act as catalysts for and agents of change (Wallerstein et al. 2005; Holden et al. 2004). Finding solutions to reduce smoking is a very important process. However, one can propose that any smoking restricting regulation has to balance reducing risks with reducing potential benefits. Learning to transform oneself is a critical process that needs to be integrated into any learning process if we envision a change as a direct outcome of our instructional-learning intervention.

Scaffolding

Scaffolding is generally regarded as support for learners while they are engaged in activities just beyond their own capabilities. As learners become more autonomous, scaffolding is gradually withdrawing. Scaffolds may take many forms to guide students through the PBL task. Saye and Brush (2002) identified two types of scaffolds to illustrate the important role of the teacher in guiding students to solve ill-structured problems: (a) hard scaffolds and (b) soft scaffolds. Hard scaffolds refer to "static supports that can be anticipated and planned in advance based on typical student difficulties with a task" (p. 81). This type of scaffolds could be also referred to conceptual, metacognitive, or strategic hard scaffolds (Ge and Land 2004; Hannafin et al. 1999). In recent decades there has been a concurrent growth in the availability of online technologies for teaching and learning and interest in

[3]https://www.youtube.com/watch?v=CO0qwl5k9R4.

advancing project- and problem-based learning (Ravitz and Blazevski 2014). Hard scaffolds (computer or paper-based cognitive tools) can also serve the same scaffolding roles as soft scaffolds (Simons et al. 2004) and are meant to augment, not replace, soft scaffolding (Saye and Brush 2002). Examples of hard scaffolds include expert modelling, question prompts, computer-based tools, concept mapping etc. In contrast, soft scaffolds include human beings, such as teachers, students or adults, who can provide dynamic and situational support.

Reflecting and Assessing PBL Processes

Reflecting and assessing activities in authentic and ill-structured problem solving are important constituents of the PBL process. Giving students the opportunity to reflect on their own learning is a key element in PBL. Student reflections should be more than just commentary on what the students have done–they should used by students to highlight what they have learned, explain important decisions they have made, and articulate plans for incorporating feedback and moving forward. Traditional assessment techniques such as multiple-choice and true-false examinations do little to assess such processes. The PBL framework advanced here emphasizes that assessments should be a continuous and integral part of the learning process and not be viewed as a compartmentalized activity. Whatever assessment technique is used, it must be viewed by learners as an active part of the learning process.

Concluding Remarks

As pointed in the introduction, there is need of an instructional design framework that helps teachers at any education level better understand the theory and methodology of PBL and enable them to adapt it as needed for their own teaching and learning environments. There is need to help learners realize that it is critical to their lives to be self-reflective and critical, be able to question their own and others' beliefs, the knowledge presented to them as an "objective reality", as well as societal structures and conditions. In other words, PBL entails developing young learners as critical thinkers and active citizens.

The proposed PBL model is aimed to fill this gap. In such kind of learning environment, learners tackle authentic problems, develop debatable claims and linked them with supportive evidence, interacting with a wide variety of learning resources, and develop argument-based solutions to those problems. Further, they develop action competence as a means for engaging learners in problem solving and provide with a framework that enables learners to take individual or collective action to the proposed solutions. Learners in the 21st century live in a technology and media rich environment where they have access to a plethora of ICTs that can

function as enabling tools across all 10Cs to facilitate the PBL processes (Stanlick 2014; Mayo 2012; Makrakis 2010). However, simply providing learners with new powerful and interactive ICTs will not develop these skills and enhance their learning. What it matters is not how to use technology or even teaching with ICT tools, but more using ICTs as enabling tools to support communication, reflection and knowledge construction related to real-life problems (Makrakis 2014). Accordingly, the proposed PBL model driven by critical, reflective and transformative theories to teaching, learning and curriculum envisions learners as active participants both in the learning process and in the construction of social reality. In such a process, reflecting on the six pillars of 21st learning and properly contextualised in the learning process is of critical importance for transformation.

References

American Management Association. (2010) *Critical skills syrvey*. Retrieved April 13, 2012, from http://www.amanet.org/organizations/2010-survey-critical-skills.aspx.

AT21CS. (2012). "What are 21st-century skills?" Retrieved November 8, 2012, from http://atc21s.org/index.php/about/what-are-21st-century-skills/.

Buus, L. (2015). Supportting teachers integrating web 2.0 in a problem based learning approach. file:///C:/Users/Vassilis/Downloads/004635284d2702b1cf000000.pdf.

Cho, K.-L., & Jonassen, D. H. (2002). The effects of argumentation scaffolds on argumentation and problem solving. *Educational Technology Research and Development, 50*(3), 5–22.

Delors, J., et al. (1996). *Learning: The treasure within*. Paris: UNESCO.

Freire, P. (2000). *Pedagogy of the oppressed*. New York: Continuum International Publishing Group Inc.

Ge, X., & Land, S. M. (2004). A conceptual framework for scaffolding ill-structured problem solving processes using question prompts and peer-interaction. *Educational Technology Research and Development, 52*(2), 5–22.

Habermas, J. (1971). *Knowledge and human interests*. London: Heinemann.

Hannafin, M., Land, S., & Oliver, K. (1999). Open learning environments: Foundations, methods, and models. In C. Reigeluth (Ed.), *Instructional design theories and models* (Vol. II, pp. 115–140). Mahway, NJ: Erlbaum.

Hitchcock, D., & Verheij, B. (Eds.) (2006). *Arguing on the Toulmin model. New essays in argument analysis and evaluation*. Dordrecht: Springer.

Holden, D. J., Messeri, P., Evans, W. D., Crankshaw, E., & Ben-Davies, M. (2004). Conceptualizing youth empowerment within tobacco control. *Health Education & Behavior, 31*(5), 548–563.

Jonassen, D. (1997). Instructional design models for well-structured and ill-structured problem-solving learning outcomes. *Educational Technology Research and Development, 45* (1), 65–94.

Liu, M., Wivagg, J., Geurtz, R., Lee, S., & Chang, H. M. (2012). Examining how middle school science teachers implement a multimedia-enriched problem-based learning environment. *Interdisciplinary Journal of Problem-Based Learning*, *6*(2), 46–84. http://dx.doi.org/10.7771/1541-5015.1348.

Makrakis, V. (2010). The challenge of WikiQESD as an environment for constructing knowledge in teaching and learning for sustainable development. *Discourse and Communication for Sustainable Education, 1*(1), 50–57.

Makrakis, V. (2012). Reorient teacher education to address sustainable development issues through the WikiQuESD. In A. Jimoyiannis (Ed.), *Research on e-Learning and ICT in education* (pp. 83–94). London: Springer.

Makrakis, V. (2014). Transforming university curricula towards sustainability: A Euro-Mediterranean initiative. In K. Tomas & H. Muga (Eds.), *Handbook of research on pedagogical innovations for sustainable development* (pp. 619–640). Hershey PA: IGI Global.

Makrakis, V., & Kostoulas-Makrakis, N. (2013). Sustainability in higher education: A comparative study between European Union and Middle Eastern universities. *International Journal of Sustainable Human Development, 1*(1), 31–38.

Makrakis, V., & Kostoulas–Makrakis, N. (2014). An instructional-learning model applying problem-based learning enabled by ICTs. In A. Anastasiadis et al. (Eds.), Proceedings of the 9th Panhellenic Conference on ICTs in Education (pp. 921–933), October 5–7, 2014, University of Crete.

Mayo, J. (2012). Technology's role in constructing meaningful knowledge. *Pedagogy and the Human Sciences, 1*(2), 8–21.

Mezirow, J. (2003). Transformative learning as discourse. *Journal of Transformative Education, 1* (1), 58–63.

Mogensen, F., & Schnack, K. (2010). The action competence approach and the 'new' discourses of education for sustainable development, competence and quality criteria. *Environmental Education Research, 16*(1), 59–74.

Partnership for 21st Century Skills. (2012). Retrieved 13 April, 2012, from http://www.p21.org/index.php.

Ravitz, J., & Blazevski, J. (2014). Assessing the role of online technologies in project-based learning. *Interdisciplinary Journal of Problem-Based Learning, 8*(1), 65–79.

Savery, J. R. (2006). Overview of problem-based learning: Definitions and distinctions. Interdisciplinary Journal of Problem-based Learning, 1(1). http://dx.doi.org/10.7771/1541-5015.1002.

Saye, J. W., & Brush, T. (2002). Scaffolding critical reasoning about history and social issues in multimedia-supported learning environments. *Educational Technology Research and Development, 50*(3), 77–96.

Simons, K. D., Klein, J. D., & Brush, T. R. (2004). Instructional strategies utilized during the implementation of a hypermedia, problem-based learning environment: A case study. *Journal of Interactive Learning Research, 15*, 213–233.

Stanlick, S. (2014). Leveraging technology for critical reflection and service learning. Retrieved July 4, 2014 from http://www.elon.edu/docs/eweb/org/nccc/Leveraging%20Technology.pdf.

van Eemeren, F.H., & Grootendorst, R. (2004). A systematic theory of argumentation. The pragma-dialectic approach. London: Cambridge University Press.

Wallerstein, N., Duran, B., Minkler, M., & Foley, K. (2005). Developing and maintaining partnerships with communities. In B. Israel, E. Eng, A. Schulz, & E. Parker (Eds.), *Methods in community based participatory research methods* (pp. 31–51). San Francisco: Jossey-Bass.

Weida, S.. & Stolley, K. (2014). "Developing strong thesis statements". Purdue OWL resources. Retrieved July 4, 2014 from https://owl.english.purdue.edu/owl/owlprint/588/.