

## **How Could Blended Learning Promotes Education for Sustainable Development in Higher Education?**

---

Omar Aly Ramzy

Director of the Center of Education for Sustainable Development  
Dean of Faculty of Business & Economics  
Heliopolis University for Sustainable Development

Mohammed Anwar

Assistant Lecturer – Humanities Department  
Heliopolis University for Sustainable Development

## **Abstract**

In The first section of this paper, we demonstrated the importance of sustainable Development and the role of Education for Sustainable Development (ESD) as an essential factor for achieving sustainable thinking and living. We are living in the age of the internet. Therefore, every single issue in our life is connected with Information Communication Technology (ICTs). The last two decades have witnessed significant expansion of ICTs and online learning. However, the dilemma remains between the advantages and disadvantages of online learning versus face-to-face learning. This creates a call for new educational approach and pedagogy that can blend the advantages of both methods which is called “blended learning”. In the second section of this paper, we differentiated between online, face-to-face and blended learning with emphasis on the components of blended learning. Moreover, we gave more space for the possibilities of blended learning components in promoting ESD.

## Contents

Table of figures .....	2
1 Introduction .....	3
2 What is sustainable Development? .....	4
3 Education for Sustainable Development (ESD).....	5
3.1 Key characteristics of ESD: .....	6
4 Blended Learning.....	8
4.1 Blended learning definition .....	9
4.2 Components of blended learning .....	10
4.3 Six offline component groups: .....	10
Work place learning: .....	10
Face-to-face tutoring, coaching or mentoring .....	11
Classroom .....	11
Distributable print media .....	12
Distributable electronic media .....	12
Broadcast media.....	12
4.4 Six online component groups: .....	12
E – Learning content .....	12
E-tutoring, e-coaching or e-mentoring .....	13
Online collaborative learning .....	13
Online knowledge management .....	14
The web .....	14
Mobile learning .....	14
5 ICTs and ESD. ....	15
5.1 Wiki QuESD as Web 2.0 environment for promoting ESD .....	15
5.2 MSc in ICT for Education for Sustainable Development .....	16
6 Conclusion .....	17
7 References .....	18

### Table of figures

Figure 1 Integrating ESD in Curriculum .....	7
Figure 2 Characteristics of online, offline and blended learning courses.....	8
Figure 3 E- Learning Skills .....	13
Figure 4 WikiQuESD Template .....	15

## 1 Introduction

We have progressively challenged, locally and globally, by multi-faceted social, economic and environmental problems. The globe is currently facing significant crises, not only environmental issues such as climate change, animal distinction and loss of biodiversity, but also social and economic ones such as poverty, increasing of discrimination, violation and gender inequalities.

In short, the sustainable development challenges based on the following aspect as stated by Makrakis (2010) are:

- Production and consumption are growing massively in an unsustainable manner
- The military expenditures growing immensely
- Inequalities increased among nations and within the same country
- Regulating the world through Globalization of the market economy

These global complex problems mainly The Situation of the World's Children today as stated in (UNICEF, 2016) that unless the world tackles the inequality today, in 2030 :

- 167 Million Of children will live in extreme poverty.
- 69 Million Of the children less than 5 years will die 2016 and 2030.
- 60 Million Of children in primary school age will be out of the school.

These challenges require immediate actions to be taken by all the developed and developing countries. Education for sustainable Development will provide all the peoples by the needed skills and capabilities to shape their future in a sustainable way as researches and studies stated that even in the developed countries with the high level of education they didn't act in a sustainable way (Makrakis, 2010).

Makrakis 2013 demonstrates the learning process within the approach of ESD as following:

- *Learning to ask critical questions*
- *Learning to clarify one's own values*
- *Learning to envision more positive and sustainable future*
- *Learning to think systematically*

- *Learning to respond through applied learning and,*
- *Learning the dialectic between tradition and innovation*

Embedding ICTs and blended learning approach to these learning processes toward ESD will provide immense opportunities to spread these values and norms toward the sustainable future locally and globally. All these components are discussed in details in the next few pages.

## **2 What is sustainable Development?**

Sustainable Development (SD) is a central concept that emerged in our epoch, it mainly focuses on the holistic understanding of the globe and how we can overcome the universal challenges (Sachs, 2015). All the people on the earth are looking forward to their portion in the world economy. The extremely poor people are struggling for their basic needs like food health care and shelter, those who are above the poverty line are searching for the improvement of their live conditions and for their children as well; those with the high income and super rich push for the better ranking. As the world economy is not purely equal and the result is people with extraordinary wealth and people with extreme poverty and in the same time the negative impact on the earth is really dangerous to sustain the economic growth for the future (Sachs, 2015)

From this point, which is affecting badly on earth and the unfair distribution of wealth, the concept of SD was emerged to overcome such multidimensional challenges. The incorporation of the economic, social and environmental dimension is essential for sustainable Development, this integration is not an aspiration; it is vital to protect the ecosystems, assure eradication of poverty and improve economic growth (Nations, Nations, Escap, & Delhi, n.d.).

SD is based on the needs of the humans to develop and improve for better future. This prosperous future has to assure that the future generations who have the same right for development will find the earth as we found and obtain the needed resources for development (Brundtland, 1987). This intergenerational approach lead us to question of managing the development process to be sustained, this process should include the three dimensions of SD economic, environmental and social (UN, 2002).

In short, SD concept characterized by the non-descriptiveness approach

which from one side considered as a deficiency of the concept and became to be a vague term, from the other side the concept gives more space for the different interpretations as diversified cultures and environments are existing even within the same country. It is a stand for the equilibrium that all as human beings together strive to achieve, this balance between the development and the environmental protection, the balance between the economic growth and the fair distribution of the wealth. This process should keep in mind and plan for the fact that our next generations will not be distressed during their journey of development.

To assure that the concept and the values behind SD are acquired by the people, institutions and countries, the globe needs to work in different dimensions. One of these dimensions is the education which is one of the goals of SD and at the same time the key element to achieve the entire goals. This education that based on the concepts of SD will provide the knowledge, skills and values to achieve SD is called Education for Sustainable Development (ESD).

### **3 Education for Sustainable Development (ESD)**

The concept of ESD was mentioned for the first time in the 1992 UN Conference on Environment and Development (UNCED) in Rio de Janeiro (Agenda 21). The invitation for the education to promote sustainable Development was mentioned in the article no. 36 *“Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues”* (UNCED, 1992). The indispensable requisite to reorient education to promote sustainable development was the first action to be taken and the first time to mention the term (ESD). Education here means formal and non-formal education, thus education is necessary to change people’s attitudes and behavior to able to realize the relation between the development and the environment and address the concerns of SD (UNCED, 1992).

In 2005 the UNESCO launched the decade for Education for Sustainable Development (DESD) from 2005 to 2014. The main goal for this decade is to reorient the current learning systems to encourage the learners to change their behaviors and attitude. They do that by being more aware of the challenges that the globe is facing currently and in the future and to be more sustainable agents for the future.

This could be achieved only by combining the Sustainable Development values to be intrinsic in all the different forms of learning (UNESCO, 2005).

The decade of ESD 2005- 2014 followed the global vision of ESD which is *“a world where everyone has the opportunity to benefit from quality education and learn the values, behavior and lifestyles required for a sustainable future and for positive societal transformation”* (UNESCO, 2005).

ESD is considered as a transformative education and learning which promote the quality for the education and convey it to all in inclusive manner. It is based on enhancing the skills and promoting the values to be the principles that help the learner to act effectively towards the future challenges. This education urges gender equality, social inclusion, tolerance, sufficiency, responsibilities, integrity and honestly. ESD emphasizes on the interdisciplinary approach to connect the economic, social, cultural and environmental dimensions from local to global and vice versa, considering yesterday, today and tomorrow challenges (UNESCO, 2014).

### **3.1 Key characteristics of ESD:**

ESD should be associated with the features of any high quality learning experience assuring in the same time that the values of SD are embedded into the learning process. ESD should be differentiated from environmental education. The later focuses only on the relation of the human with the nature and how it should be organized. ESD provides a broader sense including the different dimensions of socio-cultural and socio- political aspects of SD (UNESCO, 2014).

ESD demonstrate the following features as it was stated in the international implementation scheme 2005:

**Interdisciplinary and holistic:** ESD should be embedded in all subjects and curriculum and not provided as separate discipline. Figure 1 demonstrates this interdisciplinary relation between ESD and the different disciplines.

**Critical thinking and problem solving:** as the concept of SD is debatable and the practice that supports SD are multifactorial designed, this requiring thorough approach of thinking and problem solving. This approach provides confidence that can help to clarify the dilemma of the SD challenges.

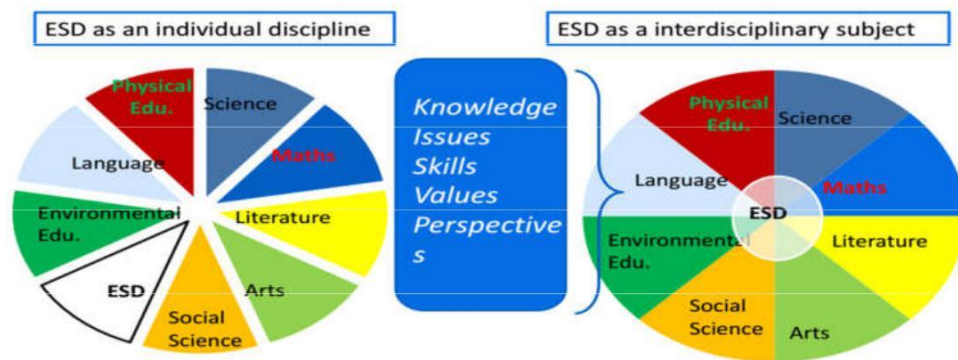
**Multi-method:** diversified teaching methods and different approaches of teaching that tackle the simplification of knowledge to be acquired are crucial for ESD. These methods should be reoriented to assure the integration between learners and instructors to be able to shape their future according to the SD approaches.

**Participatory decision making:** The integration of learners to participate in the design of what they will learn is essential for ESD to provide such holistic approach towards SD challenges.

**Applicably:** the school and the curriculum should provide practices that enhance the student’s skills. These skills should be matching with the daily life practices. ESD is part of the learner’s and teacher’s life.

**Locally relevant:** think globally and act locally, ESD should address both issues local and global. The local language is better to present ESD topics as it reflects the cultural and social aspects of each local community. This polymorphous approaches provide creative viewpoints of expressing SD concepts

**Value Driven:** Values and norms that support SD should be explicit into the different disciplines. This explicitly assures the pertinent understanding for SD through debates and applied educational practices.



**Figure 1 Integrating ESD in Curriculum**

Source: UNESCO (2006) Education for Sustainable Development Toolkit, UNESCO, Paris



#### 4 Blended Learning

The trend toward online education increased especially after the widespread of the internet components. The efficiency of the online courses versus Face to face courses (offline courses) was the topic of many studies. Blended learning is the approach that takes the advantages of both sides. Figure 2 demonstrate the main characteristics of the three approaches; online, face to face

	Offline Courses	Online Courses	Blended learning Courses
<b>Concept</b>	<p>Offline learning means that learners are face to face with the teacher inside the class room. This is the traditional way of learning. It seems to be costly than the online courses.</p> <p>Endless methods of teaching are developed to enhance the learners' capabilities to learn and to be developed.</p>	<p>Online learning is a method of delivering educational information via internet instead of in a physical classroom.</p> <p>Online courses are one of the educational methods that provide information and knowledge via internet instead of being attending in the campus. It enable learners to learn from anywhere at any time once they have an access to the internet, the learner don't have to attend physically in location of the organization that provide the course. It gives the learner the chance to learn and quire knowledge without travelling overseas</p> <p>Online courses are convenient in some cases that you can't access to normal classes as the time in transportations for instance</p>	<p>Blended learning is the formal education that combines online and face to face learning methods to be aligned together in a structured way.</p> <p>This because the trend towards online course is increasingly noticed even with the disadvantage of this type , the blended learning is a new approach to take the advantages of both; The online and the face to face course.</p>
<b>Learners' Engagement</b>	<p>Face to face courses are the suitable arena for the Learners' engagement Where the teacher scan communicate directly with learners and an create such an interactive atmosphere that helps the learners to be engaged effectively.</p>	<p>Learners' engagement is likely in the online course as the teachers can't read the face expressions and can't attract learner by any kind of the body language techniques</p>	<p>Learners' engagement in the blended learning is considered one of the advantages because the learner meets with the instructor in all cases and can be available all the time while face to face courses only in classroom.</p>
<b>Learning Fees</b>	<p>Face to face is the most costly in terms of the learning fees and cost. As the locations, facilities and my maybe transportations that add more and more cost for the entire process</p> <p>If the university you are studding is located outside your home country you have to travel but the online</p>	<p>Online courses considered the inexpensive courses in terms of the learning fees among the three types of learning</p>	<p>Learning fees in the blended learning are moderate comparing o the offline courses where the learners are not required to attend all the time in the campus</p>
<b>Accreditation</b>	<p>Mostly are accredited courses and helps to go further in your academic progress</p>	<p>Rarely accredited</p>	<p>Likely accredited</p>

Source: <https://study2u.com/online-learning>

Figure 2 Characteristics of online, offline and blended learning courses

(offline) and blended learning.

#### **4.1 Blended learning definition**

Blended learning arises as a new trend in transferring knowledge in higher education, businesses and governments. This emphasizing the concept required to be defining in concrete way and explain the possibility of using it and in which context (Bonk, Graham, Cross, & Moore, 2012). The concept itself was emerged in the late 90s with development of internet applications. It is like all internet buzzwords that changed and developed over the time and successively congregated and stabilized (Friesen, 2012).

Donald Clark (2010) highlighted that blended learning is like most of the leaning terms takes some time to be a clear concept and will take time to reduce the ambiguity toward the understanding of it. He provided two of the most relevant definition in this realm. The first one is Roger Schank's definition:

*“Blended learning seems to mean, if I understand it right, that there will be some e-learning and some classroom learning. It is in vogue for a simple reason. No one wants to spend that much on e-learning and people in general want to preserve what they have, so they have made up this nice name for not changing much and called it blended learning.”*

He provided another definition for Elliot Masie:

*“Blended learning is the use of two or more distinct methods of training. This may include combinations such as: blending classroom instruction with online instruction, blending online instruction with access to a coach or faculty member, blending simulations with structured courses, blending on-the-job training with brown bag informal sessions, blending managerial coaching with e-learning activities.”*

As it obvious from the two previous definitions that the emphases on the multiple ways of delivering the knowledge were considered the core of the concept. People don't like to learn by one single method as they are classified into many styles of learners. Each one has his own way of learning, the technology became part of our life and being embedded in the education is crucial mandate. So to blend both, face to face and distance learning provides a new approach to satisfy all different learners' styles.

The Inosight institute defines Blended Learning (BL) as: “*A formal education program in which a student learns at least in part through online learning, with some element of student control over time, place, path, and part in a supervised brick-and-mortar location away from home*” (Innosigt Institute, 2016).

As this definition of Inosight Institute is broad and gives more space for interpretation. Another definition from the side of Bailey, Ellis, Schneider, & Vander Ark (2013) gave some determinations for the concept of BL “*Blended. Learning is a shift to an online delivery for a portion of the day to make the students, teachers and schools more productive, both academically and financially*”

#### **4.2 Components of blended learning**

As Donald Clark in the BL Guide (2010) demonstrate the importance of stating the components of the blended learning to make this approach concrete and visible. He provided such a nice example of a *receipt without the ingredients is useless*. It is the same with blended learning; we have to define which component will be used and help in delivering the knowledge in the learning context. All the definitions of blended learning focused on the two main arenas; online and offline (Face to face). The two main components have some sub components with six components in each part.

#### **4.3 Six offline component groups:**

The BL Guide (2010) mentioned six offline components for BL as following:  
“1. Workplace learning 2.Face-to-face tutoring, coaching or mentoring, 3.Classroom 4. Distributable print media 5. Distributable electronic media 6. Broadcast media”

##### **Work place learning:**

In higher education institutions the work place is an educational place where providing the service of education is main goal for that institutions. All the projects that are running in the work place considered as a vital added value to the learning process. In this context I will provide an example of my home organization Heliopolis University for Sustainable Development (HUSD). In the realm of ESD which is the topic of our article, HUSD took part in many projects providing the skills, values and knowledge to blend ESD in the different disciplines. One of these projects funded by TEMPUS was entitled “*Education for Sustainable Development beyond Campus (EduCamp)*”.

This project was the first initiative in Egypt to promote ESD in the Egyptian curriculum and bring the universities and the schools together in a structured mechanism. The outcomes of the project were establishing seven centers of excellence for ESD in seven different universities. These centers of Excellence provided with cooperation with the school teacher development training programs to enhance their capabilities to be able to deliver the ESD concepts (Sewilam, McCormack, Mader, & Abdel, 2015). ESD tool kits were developed as another outcome of the project. The teaching staff in the different universities joined TOT on the basis of ESD in various universities in Europe. As we noticed that the workplace activities can provide a real learning process particularly from the ESD perspectives.

### **Face-to-face tutoring, coaching or mentoring**

The personal direct contact in the face to face learning environment provides such a great help to transfer such complicated issues. Many learners need this approach of teaching and learning to overcome obstacles of learning. In the context of ESD, the part of promoting the values of ESD is suitable for the face to face tutorial. Having said that this approach is costly and provided in such limited situations (Clark, 2010).

### **Classroom**

Classroom considered the back bone of the teaching and training and will remain for that. Classroom is essential for blended learning, but which classroom? Is it the classroom with the traditional teaching methods? Is it classroom with the dominant teachers who considers himself the owner of the knowledge? Of course not. In the blended learning approach, the diversified teaching methods is essential and fundamental, hands on activities is a necessity. The chalk and take delivery should be changed to problem solving situations; interactive practices should be designed from the side of the teacher.

To deliver ESD concepts in higher education's classroom, this requires what we mentioned above since the ESD topics are multidisciplinary that require different methodology of teaching and learning. Promoting ESD is challenge and blended learning provides huge alternatives components for that; interactive classrooms are one of the offline components.

### **Distributable print media**

Books and printed materials were and will stay one of the main components of the learning devices. Text books are one of the main devices in higher education practices. Not only books but also magazines, newspapers and work books. Text books are available at libraries, book shops, book clubs or ordered from Amazon. Most of learners prefer to print the online materials to be easier for them to read others prefer the online version and paperless consuming (Clark, 2010).

### **Distributable electronic media**

As Clark (2010) stated that the distributable electronic media is the best way to overcome the poor internet connections. For example, videotape and audio cassette which are cheap and available all the time. One of the promising projects that promote most of the blended learning components both online and offline is OPEDUCA project.

OPEDUCA is an initiative that the youth can learn anytime, anyplace with anybody and through any device on the topics that addressing the future challenges and tackling the challenges of SD. The idea of the project is to go outside the school from the side of the students to learn more about their society challenges. The other part is to bring the people into schools to integrate the knowledge they have with the schools learning environment. In both cases the distributable electronic media has an enormous added value in knowledge transferring and sharing. More information about the project is available on the project official website <http://www.opeduca.eu>.

### **Broadcast media**

Broadcast media include TV and radio; we spend too much time in front of TV and listening radio while driving. This time is really precious and we can use it as a learning time that can help to spread the values and norms of ESD.

## **4.4 Six online component groups:**

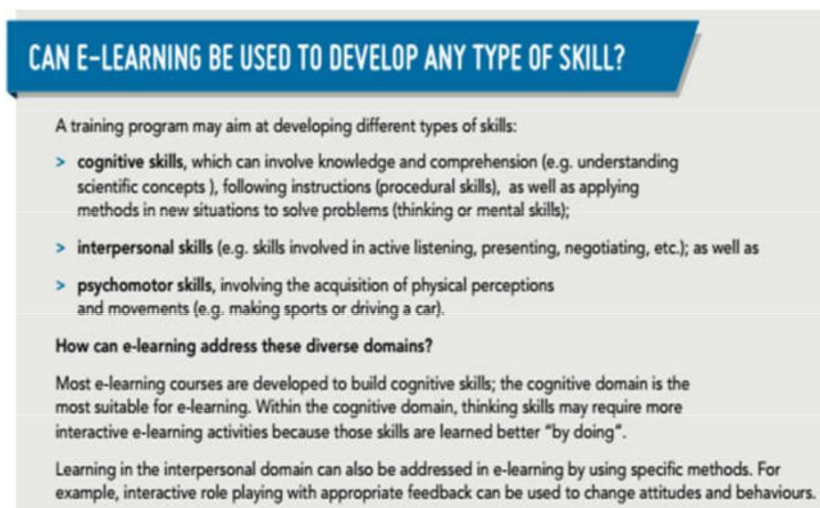
### **E – Learning content**

Ghirardini (2011) defined E-learning as *“the use of computer and Internet technologies to deliver a broad array of solutions to enable learning and improve performance”*. As Kaewkiriya (2013) stated that *“e-learning means learning and teaching through the internet network. Learner and teacher can learn by using*

*resources in the internet system for learning and teaching effectively*". Online learning content as Clark (2010) stated includes all the materials that are structured in digital way and can be available online for learners. The simple resources like power point presentations and documents considered as E-Learning content. The widespread of these approaches will provide a real added value to promote the ESD and the needed skills to be learned as it shown in figure 2.

### **E-tutoring, e-coaching or e-mentoring**

One to one electronic support is essential when we targeting the blended learning to promote ESD. As ESD is mainly addressing the values and norms of SD, these



**Figure 3 E- Learning Skills**

values require more explanations and interpretations. E-tutoring is similar to face to face tutoring which provide support to the learner from the instructor. This support helps the learner and facilitates the process of learning in terms of constructivism approach of learning. In this approach the instructor just acts as a facilitator to the learning process. This essential for ESD as it should respect the local circumstances which is the learner will adopt.

### **Online collaborative learning**

Curtis (2001) indicated that the contribution to the online discussions provides and proves the effectiveness and the success of the online collaborative learning. Choua and Chen (2008) employed a web 2.0 to promote the online collaborative learning, they confirmed that this tool motivated the students to engage in the collaborative learning and supported their learning process. In this realm the Asynchronous

collaboration like email, bulletin boards, and the synchronous collaboration like text chat, application sharing, audio conferencing, weblogs, Cmap, Hot potatoes, video conferencing, and virtual classrooms, these tools could be a real support to tackle a multidisciplinary themes.

### **Online knowledge management**

Ubon and Kimble (2002) stated that Online Knowledge Management would improve teaching and learning processes in online distance education. Learners need access to knowledge to learn and improve. If they have this valid access to knowledge they can depend less on remembering and focus more on the higher cognitive level. These higher cognitive processes could help in finding solutions for complicated issues which is the core of ESD. The multidisciplinary themes like the gender equality, climate change, poverty reduction, ending hunger and good governance are the themes of ESD. The online knowledge management could provide access to this knowledge anytime anywhere and by any device.

### **The web**

The future of the education becomes more and more reliable on the internet. The main features of the internet as stated by Clark (2010) are search engines, websites, user groups, e-commerce sites etc.... All these features are reachable via internet and can spread all the values and norms of ESD via internet. Green life style, green E-marketing, Eco-friendly products and organic production could be hot topics in all web 2.0 features.

### **Mobile learning**

Mobile devices include, laptops, I pads, IPods and mobile phones. As we now in the age of wireless, these devices became essential in leaning. They are available to use on air, rail and motor way. These places that we feel free off distraction and can concentrate. ESD as stated before is long life learning process include formal, non-formal and informal education. Most of people have mobile phones and less have laptops. All these items will be the tools of communication and provide a real learning environment to promote ESD (Clark, 2010).

## 5 ICTs and ESD.

Makrakis (2014) stated that ICTs from instructional and learning perspective can transform education toward SD as following:

- ESD holistic themes like social, economic and environmental issues can provide a worthwhile context for ICTs skills to be elaborated.
- ICT- based learning tools such as concept mapping, social networking, and wiki quests will work perfectly with ESD methods.
- ICTs provide immense opportunities to the deprived groups and marginalized communities to construct significant learning environments by engaging ESD themes into their local sustainability themes.
- ICTs through multiple media tools like ecological foot print, visual graphic organizers, and notebooks helps learners to engage in problem based learning. ICTs tools provide voice to the voiceless groups and give them chance to contribute in the public issues.
- Online students can team up by sharing their individual perceptions, thoughts and personal experiences, thus deepening their understanding with cumulative higher cognitive skills and grander personal gratification (Makrakis, Vassilios, 2014).

### 5.1 Wiki QuESD as Web 2.0 environment for promoting ESD

The concept of Wiki QuESD was developed by Makrakis (2010). It combines the wiki platform, the idea of Quest and ESD approach and became Wiki QuESD.



Figure 4 WikiQuESD Template



*“WikiQuESD Web 2 environment in an undergraduate education course entitled: Design and Develop Web-based Instructional Material, at the Department of Primary Education, University of Crete during the fall of 2009 semester”* (Makrakis, 2010b). WikiQuESD is based on theoretical perceptions from critical or liberal constructivist research and transformative/reflective learning with particular reference to education for ESD.

Knowledge is constructed in WikiQuESD by the discussions between teachers, reflections within peers’ dialogues that lead to learning-based change. The main idea behind WikiQuESD is that the real learning emerges from the real life experience. The learners centered approach of WikiQuESD gives the learner the chance to provide solution to the problem that their community is facing.

The template of WikiQuESD in figure 3 divided into three parts: The first part on the left demonstrates five main nodes:

- 1- Activation
- 2- Learning tasks
- 3- Learning process
- 4- Reflective feedback
- 5- Extensions, these extensions can be used for planning and constructing WikiQuESD.

The second part on the right holds the Hyper Text Markup Language (HTML) content with the relevant information in each node. The third part on the top is the title of the project to be developed which is in this case (Help Water) as a crucial topic for ESD.

## **5.2 MSc in ICT for Education for Sustainable Development**

This master program was developed within the ICTeESD project 2010-2011 and offered by Frederick University, Cyprus. The entire master program is equivalent to 120 ECTs. The main objective of this master was to respond to the increasing demand of the practitioners in the field of ESD to enhance their capabilities in the terms of ICTs enabled tools (Makrakis, 2010).

The pedagogical outline of the program integrated four learning strategies as Makrakis (2010) stated: 1) Learner centered instructional design 2) Transformative use of ICTs 3) Problem based learning 4) Online student-tutor-peers interaction. The

themes of the study focused on the interdisciplinary approach addressing the four pillars of SD (environment, society, culture and economy)

The program aims at:

Integrating SD challenge and themes into formal and non-formal education through problem based learning approach.

Raising the awareness of the informal decision making towards ESD challenges.

Providing a comprehensive understanding of ESD planning and the educational policy, ESD should be supported by policy makers and the awareness of that approach should be increased.

Increasing critical, logical and integrative skills for developing ICT-enabled ESD curricula and training programs.

Creating qualified experts on ICT-enabled ESD having the capability to become agent of change toward SD locally and globally.

Providing ICTs tools within a virtual leaning environment to address the themes of SD (Makrakis,2010).

## **6 Conclusion**

How could Blended Learning promote ESD in higher education? As Blended learning is the trend that has been witnessed a significant demand in the last two decades. This trend combines the advantages of both online and offline (face to face) leanings. The ESD approach is characterized by the interdisciplinary subjects and problem based learning methods which requires diversified sources of construct knowledge. This paper provides two real examples for the efficiency of blended learning components to promote ESD and give significant diversified components to that can help in spreading the values and norms of ESD in higher Education. The first example was WikiQuESD that endorse the main ideas of ESD which are the real life concerns and the constructivist approach of knowledge in participatory and collaborative methods. The second example was the Master program on ICT for ESD and how it provided a comprehensive understanding of ESD for the expert in the field of Education.

## 7 References

- Bailey, J., Ellis, S., Schneider, C., & Vander Ark, T. (2013). Blended Learning Implementation Guide. *Digital Learning Now!*, 43.
- Bonk, C. J., Graham, C. R., Cross, J., & Moore, M. G. (2012). The Handbook of Blended Learning: Global Perspectives, Local Designs. *Higher Education*, 624. <https://doi.org/Book Review>
- Brundtland, G. H. (1987). Our Common Future: Report of the World Commission on Environment and Development. *Medicine, Conflict and Survival*, 4(1), 300. <https://doi.org/10.1080/07488008808408783>
- Chou, P., & Chen, H. (2008). Engagement in Online Collaborative Learning: A Case Study Using a Web 2.0 Tool. *Journal of Online Learning and Teaching*, 4(4), 574–582.
- Clark, D. (2010). Blended Learning. *Epic Group Plc*, 44(0), 16. <https://doi.org/10.1093/elt/ccq043>
- CURTIS M., D. y L. (2001). Exploring Collaborative Online Learning. *Journal of Asynchronous Learning Networks.*, 5(1), 21–34. Retrieved from <http://www.webformacion.net>
- Friesen, N. (2012). Defining Blended Learning. *Learning Spaces*, (August), 10. Retrieved from [http://learningspaces.org/papers/Defining\\_Blended\\_Learning\\_NF.pdf](http://learningspaces.org/papers/Defining_Blended_Learning_NF.pdf)
- Ghirardini, B. (2011). *E-learning methodologies*.
- Innosigt Institute. (2016). Retrieved December 30, 2016, from <http://www.christenseninstitute.org/blended-learning-definitions-and-models/>
- Kaewkiriya, T. (2013). A Design and Development of E-Learning
- Makrakis, Vassilios, G. (2014). ICT in Education in Global Context, 101–115. <https://doi.org/10.1007/978-3-662-43927-2>
- Makrakis, V. (2010a). ICT-enabled Education for Sustainable Development Progress Report Public Part, 1–12.
- Makrakis, V. (2010b). ICT-enabled reorienting teacher education to address sustainable development: a case study. *Proceedings of the 7th Pan-Hellenic Conference with International Participation «ICT in Education»*, <http://korinthos.uop.gr/~hcicte10/proceedings/119.pdf>
- Makrakis, V. (2010c). MSc in Information & Communication Technologies in Education for Sustainable Development. Retrieved January 8, 2016, from

- <http://dl.frederick.ac.cy/en/ict-in-esd-program-profile>
- Nations, U., Nations, U., Escap, T., & Delhi, N. (n.d.). No Title.
- Sachs, J. D. (2015). *The age of Sustainable Development*. New York: Columbia University Press.
- Sewilam, H., McCormack, O., Mader, M., & Abdel, M. (2015). Introducing education for sustainable development into Egyptian schools, 221–238. <https://doi.org/10.1007/s10668-014-9597-7>
- Ubon, A. N., & Kimble, C. (2002). Knowledge management in online distance education. *Proceedings of the 3rd International Conference Networked Learning 2002*, 465–473.
- UN Doc. A/CONF.199/20. (2002). Report of the World Summit on Sustainable Development, (September). Retrieved from <http://www.un-documents.net/jburgdec.htm> \n <http://www.un-documents.net/jburgpln.htm>
- UNCED. (1992). Earth Summit'92. The UN Conference on Environment and Development. *Reproduction, Rio de Jan*(June), 351. <https://doi.org/10.1007/s11671-008-9208-3>
- UNESCO. (2005). UNESCO-UN Decade of Education for Sustainable Development 2005-2014. *Unesco*, 53. Retrieved from <http://unesdoc.unesco.org/images/0013/001399/139937e.pdf>
- UNESCO. (2014). Bonn Declaration 2014, (November 2013), 1–5.
- UNICEF. (2016). State of the World's children. Retrieved January 9, 2016, from <https://www.unicef.org/sowc2016/>