

# Handbook of Research on Pedagogical Innovations for Sustainable Development

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## Chapter 32

# Transforming University Curricula towards Sustainability: A Euro–Mediterranean Initiative

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### ABSTRACT

*The UNESCO Chair ICT in Education for Sustainable Development in cooperation with the RCE Crete (Regional Centre of Expertise) on Education for Sustainable Development responding to the UN Decade of Education for Sustainable Development (DESD 2005-2014) took the initiative to establish a North-South Network for embedding sustainability in higher education institutions. A Consortium with 12 universities (six from Europe and six from Middle East) led by the UNESCO Chair and the RCE Crete at the University of Crete prepared a proposal submitted to the Tempus- European Commission programme for funding. The RUCAS (Reorient University Curricula to address Sustainability) project, studied in this chapter, has initiated various activities in the partner countries' institutions, which seem to exert significant curricular changes. The changes include the revision of courses, building the appropriate infrastructure, the development of an online community of practice and the RUCAS Toolkit that are being used as drivers for reorienting university curricula to address sustainability. As a result, a growing number of academics in the partner institutions are concerned with the current sustainability crisis and claim for a transformative shift in what they teach and how teaching is practiced.*

### ORGANIZATION BACKGROUND

The RUCAS project is initiated by the RUCAS Consortium of 12 Universities and three NGOs financially supported by the European Commission for a three-year period (2010-13) and it is

coordinated by the University of Crete, Greece. More specifically, the project aims to:

1. Support the development of Education for Sustainable Development (ESD) in the Higher Education sector in Egypt, Jordan and Lebanon.
2. Build capacity amongst university staff to embed ESD in curricula and pedagogy.

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3. Review and revise undergraduate curricula to address ESD in line with Bologna and Lisbon processes.
4. Assist the coordination and dissemination of ESD policy, research, curriculum reform and practice relating to ESD in the partner institutions that are expected to function as role models in the region.

It adopts a multi/inter-disciplinary and systemic approach contextualized in the three partner countries, namely Egypt, Jordan and Lebanon. The approach entails the following key outcomes:

- Establish continuous dialogue with university faculties regarding directions and means of education for sustainability.
- Develop ESD competences for university students contextualized to the European Union and Arab region.
- Evaluate ESD student competences in the participating Higher Education Institutions (HEIs).
- Establish and apply a Virtual Learning & Management System for running a community of practice in reorienting university curricula to address sustainability.
- Develop an ICT-based training Toolkit on ESD curriculum reform and innovation in Higher Education, reflecting the ESD student competences framework.
- Establish Virtual Training Centers in each partner university to support the process of reorienting university curricula to address sustainability.
- Build capacity amongst university staff to review, revise, infuse and embed ESD in undergraduate university curricula; and institutionalize and disseminate ESD curriculum reform.

- Apply and evaluate the revised university curricula with respect to the ESD student competences.
- Bridge the gap between HEIs and society through the placement of at least 100 students from each of the six partner institutions (600 in total) in the Arab partners in local stakeholders dealing with ESD local/regional issues.
- Promote reorienting HE towards ESD as a viable avenue for “whole institution” curriculum reform, research and teaching across all HEIs in the Arab region and the other member institutions.

Transforming university curricula towards sustainability is defined as a process that integrates ecological integrity, social and economic justice and human wellbeing into course content and instructional methodologies. This definition places faculty at the center in curriculum transformation. It has been argued that learning processes which can enable transformative changes largely depend on academic staff and their capabilities and willingness to support such processes (Hegarty, 2008; Ceulemans & De Prins, 2010; Barth & Rieckmann, 2012). Embedding sustainability in the university curricula is therefore seen as a process and praxis in transforming faculty perspectives and increasing their active global competence and sustainable citizenship. Sustainability does not simply require an ‘add-on’ to existing structures and curricula, but implies a change of fundamental epistemology in our culture and hence also in our educational thinking and practice. Seen in this light, sustainability is not just another issue to be added to an overcrowded curriculum, but a gateway to a different view of curriculum, of pedagogy, of organisational change, of policy and particularly of ethos (Sterling, 2004, p.50).

## **SETTING THE STAGE**

### **Who is Involved in the RUCAS Initiative?**

The RUCAS Consortium consists of 12 universities, six from European Union (EU), namely: University of Crete, Greece, Dublin City University, Ireland, University of Athens, Greece, University of BordeauxIII, France, University of Stockholm, Sweden & University of Padova, Italy and six from Egypt (Heliopolis University & Suez Canal University), Jordan (Hashemite University & University of Jordan) and Lebanon (Notre Dame University & La Sagesse University), as well as three NGOs (SEKEM, MIO/MEdIES & IndyACT). The University of Crete, as the leading University supported by the other EU Universities has the task to coordinate all the processes and practices to achieve the set objectives and outcomes in the six Middle Eastern Universities.

### **Challenges Identified for the RUCAS Initiative to Consider**

- The great challenge of the 21st century for institutions of higher learning is to train professionals who are critical of, and capable of acting in transforming their frames of reference to achieve sustainable development goals and objectives.
- Although, interdisciplinary teaching and learning is highly prioritised in the participating institutions, in practice, there is lack of interdisciplinary perspective and motivation among teaching staff. Interdisciplinary collaboration is essential for modernizing higher education and it is a necessary condition for any transformation to meeting the challenges of climate change and sustainable development in the region.
- Reorienting university curricula to address sustainability (RUCAS) is very urgent and

necessary to equip graduates with knowledge, skills, perspectives and values of sustainability so as to assume responsibility for creating a sustainable future and lifestyle.

- The greatest educational impediment to facilitating inquiry and asking critical questions may well be the linear way of viewing course content and pedagogy. Reflective inquiry is thus needed for engaging learners in dealing with complex sustainability issues and constructing meaning.
- A division of knowledge into fields of specialization continues to characterize modern educational systems, which challenge the RUCAS participating institutions.
- Lack of staff readiness to address sustainability issues from a transformative perspective is observed.
- Existing administrative and other infrastructures were not ready to respond to and support the transformation of university curricula to address sustainability.

The emphasis here is placed on the role of academic staff and staff capacity building programmes as one potential catalyst for transforming university curricula to address sustainability considering four main questions. The first main question is a “*What*” question, and focuses on which competences a student graduating from a university should have in relation to sustainable development. The second main question is a “*How*” question that focuses on how can the pedagogical processes make the sustainability competences achievable. The third main question is a “*Where*” question that looks at the perspective of the curriculum for promoting a ‘transition from transmissive education to transformative education. The fourth and last question is a “*Whom*” question that focuses on the roles and readiness of academic staff to implement curriculum and pedagogy transformation towards sustainability. In this context this paper describes the case of a Euro-Mediterranean initiative and

analyses the extent to which this programme has contributed on transforming curricula changes in partner universities.

## CASE DESCRIPTION

### Defining Sustainability Competences: The “What” Question

The term “competency” or “competence” echoes everywhere and it has generated hot debates in terms of its definition and application (Barth et al., 2007; Rauch & Steiner, 2013). Drawing on the OECD DeSeCo work, Rychen and Salganik defined competence as

*the ability to successfully meet complex demands in a particular context through the mobilisation of psychosocial prerequisites (including cognitive and non-cognitive aspects) and as the ‘internal mental structures in the sense of abilities, dispositions or resources embedded in the individual’ in interaction with a ‘specific real world task or demand’ (Rychen and Salganik, 2003, p.43).*

The concept of Gestaltungskompetenz in Germany is characterized in particular by key competencies that are required for forward-looking and autonomous participation in shaping sustainable development (Seitz & Schreiber, 2005; De Haan, 2006). The Gestaltungskompetenz concept can be viewed as a combination of the emancipatory and the instrumentalist approach to ESD, as it emphasizes both individual autonomy and active participation in societal transformation.

### Measuring Sustainability Competences

A framework consisted of three levels has been developed to be used as a guide for the design and validation of ESD-related competences for students at the university level (Makrakis et al.,

2012). The first level refers to the process of identifying the initial corpus of generic and disciplinary ESD competences (conceptualisation). The second level leads to the development of a consensus-based corpus of generic and disciplinary ESD competences and its refining through measuring construct validity and reliability analysis (validation). The third level goes further with the verification and possible refinement of competences (implementation). Implementation concerns the effort to verify the piloted scale in the previous step through re-testing its reliability with the target group (Makrakis, 2011a; 2011b). Through consensus reached by 32 panellists, sustainable development was defined as

*to making informed, contextual and conscious decisions driven by the principles of solidarity, justice, accountability, equity and transparency for the good of present and future generations, locally and globally and to act upon those decisions for advancing social, economic and environmental wellbeing (Makrakis, 2011b, p. 411).*

Education for sustainable development was defined as

*the learning needed to maintain and improve our quality of life and the quality of life of generations to come. It is about equipping individuals, communities, groups, businesses and government to live and act sustainably, as well as giving them an understanding of the environmental, social and economic issues involved (Makrakis, 2011b, p. 411).*

These definitions were important to panellists in order to generate sample competence items classified as generic (interdisciplinary) and discipline-specific competences. The first may be described as a combination of knowledge, understanding, skills and abilities that all graduates should have and the second related to a specific field of knowledge within a certain academic discipline.

*Table 1. Clusters defined in the context of education for sustainability*

Cluster	Definition
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 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 know	This type of learning concerns all the processes and practices that lead people to experience, construct and transform knowledge for making sustainability a mode of life and being.
Learning to do	This type of learning concerns all processes and practices that lead to merging knowledge with action for building a sustainable future.
Learning to transform oneself and society	This type of learning concerns all the processes and practices to transform their unsustainable values and behaviours and collectively engaged to change society towards sustainability.

The clusters adopted for the generic competences were based on Jacques Delors' UNESCO report *'Learning: the treasure within'* (UNESCO, 1996), which recognizes four pillars for education of 21st Century: 1) learning to know, 2) learning to do, 3) learning to be and 4) learning to live together. We also added the fifth cluster of 'learning to transform oneself and society' that has been later introduced by UNESCO as the 5<sup>th</sup> pillar. These five pillars were conceptualised and contextualised to address sustainable development issues (Table 1).

### **Validation of the Sustainability Competences**

Cronbach's alpha was computed to examine the internal consistency of the sustainability competence items composed in each of the five clusters that were piloted in one of the partners' institutions. The alpha values for the five clusters ranged from 0.77 (learning to be), to 0.74 (learning to live together), 0.77 (learning to know), 0.79 (learning to do) and 0.76 (learning to transform oneself and society). Reliability tests suggested that screening the data would improve reliability levels. We screened the collected data by discarding items that showed very low corrected item-total correlations, i.e. <0.25. The constructed sustainability competences implemented through a survey in 11 universities that participate in the RUCAS project

(Makrakis et al., 2012). The aim of the survey was: 1) to further redefine the items included in each generic competence cluster and discipline-specific competence items and 2) to identify, among other things, the knowledge students get from their courses in relation to sustainable development, the sources of sustainability knowledge, the teaching methods, the attitudes towards learning to live sustainably, the sustainability actions and the perceived functions and roles of universities. The results of this survey would be used for developing the strategy and the capacity-building programme for reorienting university curricula to address sustainability. The study population was set to include all final year students of six academic disciplines, namely: educational sciences, social sciences, applied sciences, business/economics sciences, technical sciences and health sciences. In total, 3757 replies were collected among the 11 university partners: 54% females and 46% males. In terms of student geographic composition, 62% come from the three Middle East countries (Egypt, Jordan and Lebanon) and the remaining 38% from Europe (Greece, France, Ireland, Italy and Sweden). There were variations among the country samples, with the higher response from Jordan (39%) and the lowest from Ireland (1%). The variation is mainly due to the number of disciplines involved in each country and the size of institutions. After several screening



attempts, 54 items remained in our final pool of items. Reliability levels for the reduced clusters of sustainability competences came as 0.86 (learning to be), to 0.85 learning to live together), 0.87 (learning to know), 0.88 (learning to do) and 0.86 (learning to transform oneself and society). Table 2 summarizes the correlation matrix along with variables' means and standard deviations. The five clusters of perceived sustainability competences correlated significantly with each other and with the overall index of perceived ESD competence. The highest correlation between the variables comprising the four dimensions perceived ESD competence quality was between learning to know and learning to live together (Pearson's  $r = 0.90$ ,  $p < 0.01$ ), whereas the lowest correlations were those between learning to live together, learning to know, learning to transform oneself and society and learning to be (Pearson's  $r = 0.58$ ,  $p < 0.1$ ). In addition, the five clusters of perceived sustainability competences correlated significantly with the total sustainability competence scale, ranging from  $r = 0.80$  to  $0.88$ , at  $p < 0.1$ . Similarly, Table 3 summarises the correlation between the five generic clusters of education for sustainable development competences with the six discipline-specific competences for applied sciences, economics/business sciences, educational sciences, health sciences, social sciences and technical sciences.

The correlations range from 0.45 to 0.71 at  $p < 0.01$  level. The results clearly give further credence to the sound psychometric properties of the sustainability competence instrument.

### The RUCAS Approach: The “How” Question

The RUCAS survey revealed that, 30% of the 3.757 students have taken courses directly related to sustainable development, 50% have taken courses including some aspects of sustainable development and 21% have done a course assignment or project that concerns sustainable development. Comparing European and Arab students, the corresponding results for Arab students are 20%, 48% and 12%, while for European students are 23%, 50% and 19% respectively. In terms of academic disciplines, the survey shows that the most active in embedding sustainable development in their curricula are the disciplines of Business/economics followed up by Educational Sciences. The least active ones are those of Health Sciences and Technical Sciences. When students were asked to rank the key sources of information about sustainable development, the Internet was ranked first by 37% among EU students and 63% among Arab students and even higher than university courses (20% for EU students and 16% for

Table 2. Correlation matrix among the clusters and the total competence scale

	Ltobe	Ltlt	Ltknow	Ltodo	Lttrans
Learning to be	1.00				
Learning to live together	0.58**	1.00			
Learning to know	0.58**	0.90**	1.00		
Learning to do	0.64**	0.74**	0.74**	1.00	
Learning to transform	0.58**	0.63**	0.63**	0.72**	1.00
Total	0.81**	0.83**	0.83**	0.88**	0.80**
Mean	4.4	3.9	3.9	4.1	4.2
S.D.	0.80	0.88	0.88	0.85	0.85
N	3519	3570	3570	3450	3410

\*\* $p < 0.01$  (2-tailed)



*Table 3. Correlations between generic ESD competences and discipline-specific ESD competences*

Generic Competences for S.D.	Mean (1- 6)	Discipline-specific Competences for Sustainable Development					
		App. Sc.	EconSc.	Edu.Sc.	Health Sc.	Soc. Sc.	Tech Sc.
Learning to Be	4.4	.45**	.38**	.47**	.57**	.57**	.60**
Learning to Live Together	3.9	.46**	.50**	.48**	.56**	.65**	.45**
Learning to Know	3.9	.62**	.56**	.44**	.62**	.66**	.66**
Learning to Do	4.1	.60**	.61**	.56**	.57**	.67**	.70**
Learning to Transform	4.2	.59**	.70**	.60**	.71**	.66**	.67**
Mean		3.7	4.0	4.0	3.9	3.6	3.7
Standard Deviation		1.0	.81	.95	.86	1.0	.83
Number of students		880	611	773	306	594	130

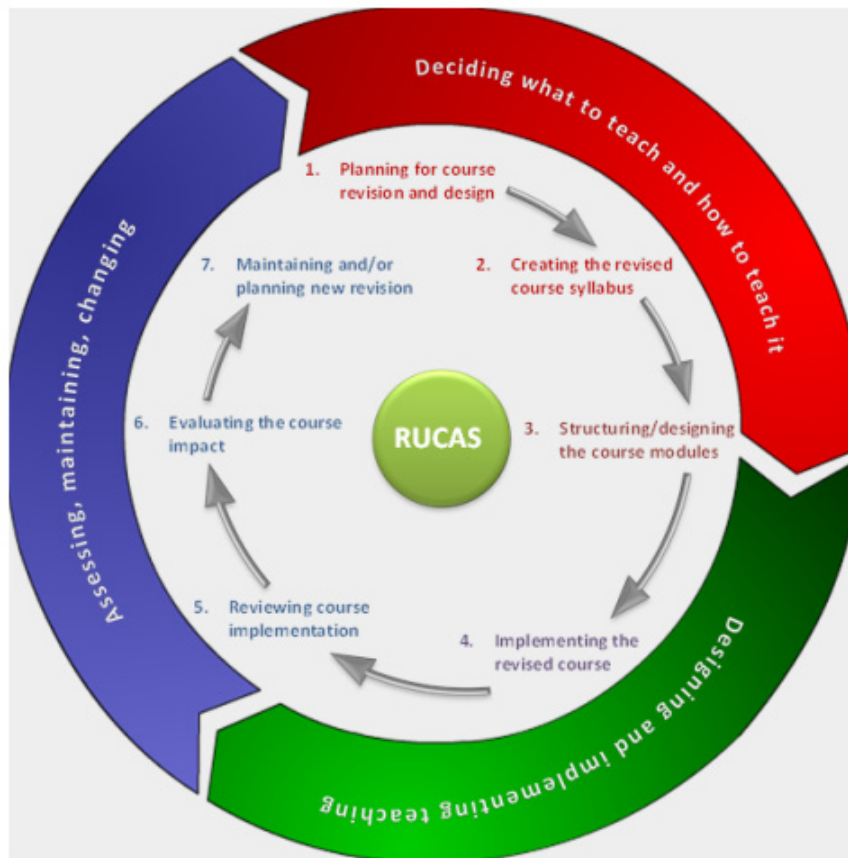
\*\*p< 0.01(2-tailed)

Arab students). Surprisingly, Radio scored much higher (33%) than university courses (16%) and TV (16%) among Middle Eastern students. The average means of the generic ESD competences as depicted in Table 3 show a range from 3.9 to 4.2 on the six-point scale. Similarly, average means of the discipline-specific competences show a range from 3.6 to 4.0. The fact that some courses related to sustainability have been introduced cannot be seen as an adequate response to the current sustainability crisis. Things cannot be changed by just adding and/or embedding sustainability in one or two courses being taught with conventional pedagogical methods. It has been revealed that most of the students (62%) rated lecturing as the most dominant teaching method, while other teaching and learning methods such as place-based learning (15%), inquiry-based learning (16%), problem-based learning (17%), discovery learning (16%), inter-disciplinary teaching (20%), which are suitable with learning to live together sustainably, are much less evidenced in higher education pedagogies (Makrakis, 2012). These findings suggest there is need for a revised curriculum, not only in terms of content, but also in terms of teaching and learning methodology, including learning processes such as values clarification and critical reflection.

Accordingly, we have made two key decisions: first, to develop a strategy for reorienting university curricula to address sustainability that ended up to the RUCAS Model consisted of seven interactive and cyclical processes to respond to three critical questions: 1) what to teach and how to teach it; 2) how to design and implement a course and 3) how to ensure that students are learning what is being expected (Figure 1). The RUCAS model provided the guiding instrument in the course revision, implementation and evaluation process to address sustainability.

Second, we have adopted Makrakis and Kostoulas-Makrakis (2012a) ExConTra learning model depicted in Figure 2. This model is underpinned by experiential (Kolb & Kolb, 2005), constructivist (Jonassen, 1999) and transformative (Mezirow, 2000; Marsick & Mezirow, 2002) theories of learning and is associated with educational approaches such as inquiry and discovery-based learning (Hai-Jew, 2008; Balim, 2009; Alfieri et al. 2011), case-based learning (Carroll & Borge, 2007; Lee et al., 2009), service learning (Shumer & Duckenfield, 2004; Simons & Cleary, 2005), place-based learning (Ault 2008; Grue-newald & Smith, 2008; Smith & Sobel, 2010) and reflective/reflexive learning (Kostoulas-Makrakis, 2010; Tilbury, 2011). All of these methods are based on the principle that students experience,

Figure 1. The RUCAS Seven Step Model



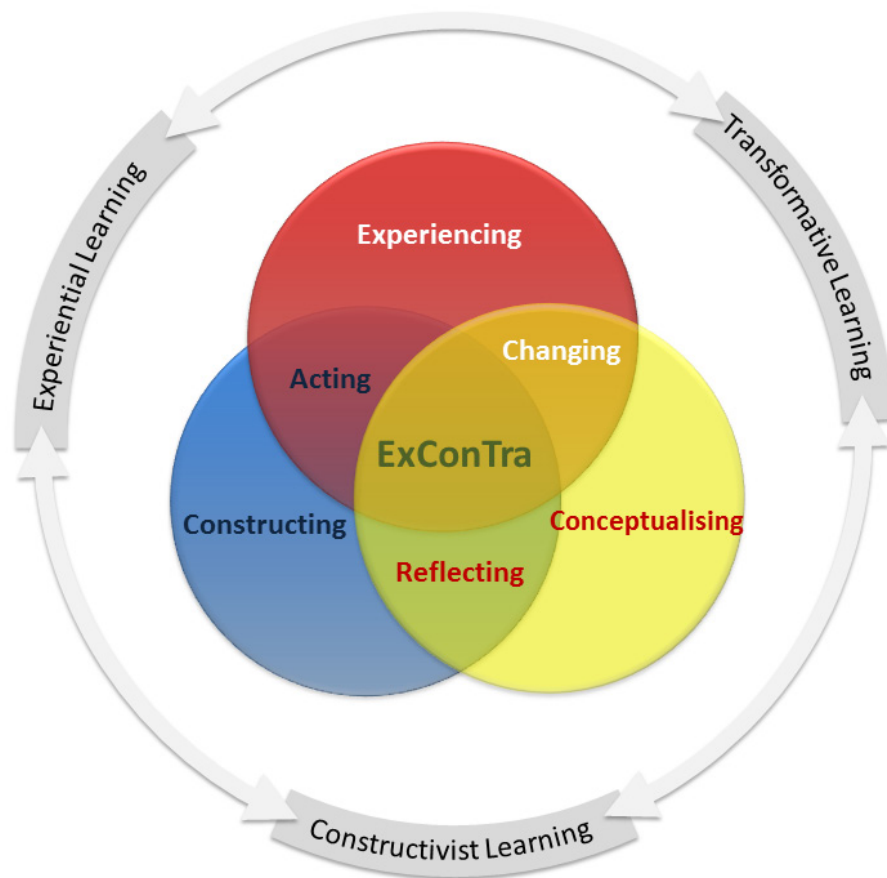
construct and transform their own versions of reality rather than, simply absorbing versions presented by others. From a sustainability perspective, these methods help to transform unsustainable actions and reconnect people to the natural and cultural world of which they are an organic part.

In the following, three examples will be presented, one from Heliopolis University in Egypt, the other from the University of Jordan and the last from Notre Dame University in Lebanon focusing on an assessment of the extent to which the five pillars of sustainability competences were integrated into the revised course curricula to address sustainability. The assessment was based on peer-review carried out by a team of experts from three EU partner universities. More specifically, Dublin City University expert team was

assigned to review courses revised in the Egyptian partners, an expert from Heliopolis University was assigned to review the Lebanese partners and another one from University of Padova was assigned to review the Jordanian partner universities. The methodology for peer-reviewing used an open-ended instrument that covered various dimensions of course curriculum revision for sustainable education substantiated by class observation and focus interviewing.

In the case of Heliopolis University, 34 courses within the disciplines of Business, Engineering and Pharmacognosy were reviewed by the DCU team in April 2013. In general, all revised courses have infused sustainability, some to a greater extent, such as: Living Economics; Money & Accounting; Sustainable Development; and Pharmacognosy

*Figure 2. The ExConTra Learning Paradigm*

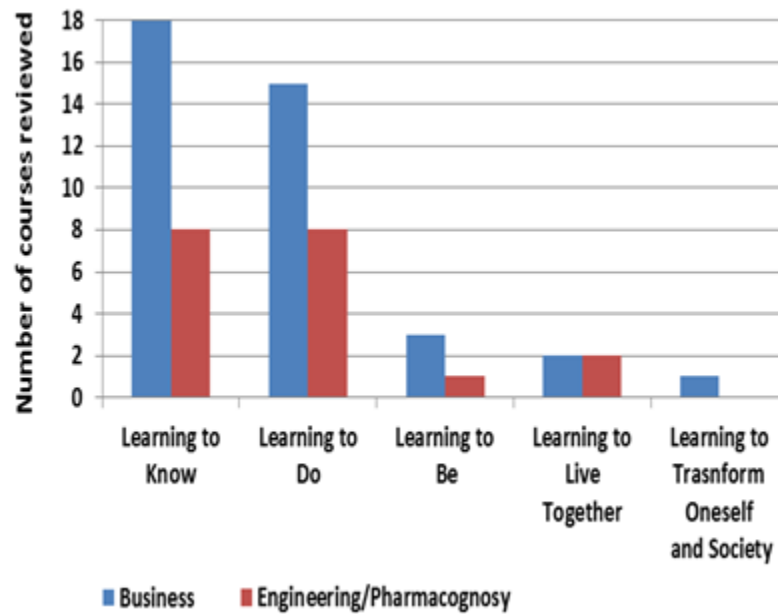


I, II. A number of innovative projects have been noticed, such as the ‘Water is Life project’ that straddles several different disciplines. Results summarised in Figure 3 show that there is an emphasis on sustainability aspects related to preparing learners to know and do, while there is less emphasis on sustainability aspects related to preparing learners to reflect on own values base (Learning to Be), or on how learners can contribute to peaceably “Live Together,” or on how learners can act as Agents of Change (Learning to Transform Oneself and Society). It has been also observed that there is creative engagement between lecturers & students, especially through the student engagement in real-world project based learning. Examples of real-world projects are the

ones on an Engineering project on hybrid cars and “IT and Sustainable Development”. In discussions with management, it was also evident that there is a high degree of commitment to the infusion of sustainability in all aspects of University life. A Summer Internship programme was seen as an excellent initiative, providing practical experience in partner companies within SEKEM, as well as other institutions, factories, farms etc.

In the case of the University of Jordan, 11 courses within the disciplines of Math teaching, International Finance, Finance Analysis and Multimedia Programming, were reviewed by the University of Padova reviewer in June 2013. As Figure 4 shows, there is an emphasis on sustainability competence aspects for preparing learners

Figure 3. Integration of the five pillars of sustainability competences in Heliopolis University

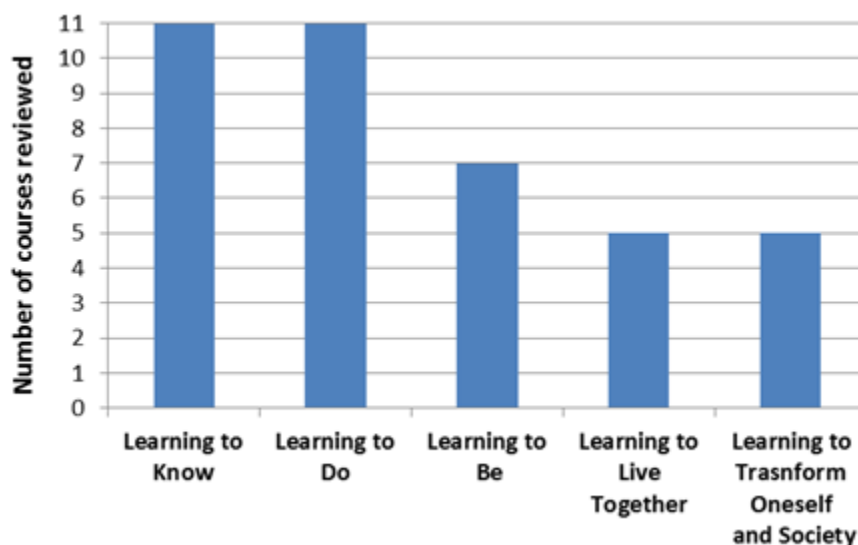


to know and do, but less emphasis on preparing learners to reflect on own values base (Learning to Be), or on how learners can contribute to “Learning to Live Together,” or on how learners can act as “Agents of Change” (Learning to Transform). Various practicum assignments were developed placing students in relevant community sites. For example, a student practicum concerned ‘Environmental education for the young child’ that aimed to improve the physical environments at the College of Education in the University of Jordan. Another practicum focused on working with community institutions, such as orphanage and home for the elderly. Another practicum involved students in working with children and teachers from public and private schools to improve their understanding of their environment, and the importance of sustainable development. Working as volunteers to help poor children by picking olive trees from a farm and taking 1/3 of the crops for poor children was another innovative practicum developed by students at the University of Jordan. Designing a Learning Center at the University of

Jordan Kindergarten can be also counted as an innovative practicum assignment. The Learning Center includes: hand made puzzles to improve thinking skills; stories; thinking games and learning materials from recycled items. ‘Designing a digital story’ and ‘Solve problems regarding international finance crisis’ are other practicum assignments developed by students participating in the revised courses.

In the case of Notre Dame University-Louaize in Lebanon, a total of 14 revised courses within the Faculties of “Business Administration and Economics,” “Engineering” “Nursing and Health Sciences,” “Natural and Applied Sciences,” “Engineering,” and “Political Science, Public Administration and Diplomacy” were reviewed by the Heliopolis University team in May 2013. All of the courses reviewed had sustainability infused in them albeit to greater and lesser degrees. It was found that the courses that were most interesting were, “Economics of developing countries” and “Air Pollution Engineering”. Practicum student assignment developed within the first course are

*Figure 4. Integration of the five pillars of sustainability competences in University of Jordan*



‘Groundwater pollution and its impacts on development in Lebanon’, involving stakeholders such as the Federal Institute for Geosciences and Natural Resources-Lebanon. Another practicum assignment focused on ‘Child labor’, involving among others the Ministry of Social Affairs-Lebanon. Other practicum assignments focused on reducing youth unemployment, involving various schools such as Jesus and Mary, Saint Joseph and Champville as well as the Lebanese American University; ‘Agricultural development’, involving the Ministry of Agriculture-Lebanon and Cenacle Libanais pour la protection de l’environnement; ‘The effect of oil extraction on economic development in Lebanon’, involving the Ministry of energy and water resources and the Ministry of economy; and ‘Sports in Lebanon: A potential tool for development and peace’, involving the Ministry of youth and sports and the Federation Libanaise du Basketball (FLB). In the context of the “Air Pollution” course, practicum assignment developed are ‘Assessing Particulate Matter Pollution at a Construction Site in Keserwan’ and the ‘Air Pollution Impact of Private Generators in Sahel Alma and Haret Sakhr, involv-

ing the municipalities of Haret Sakhr & Sahel Alma; ‘Noise Pollution of a Building Under Construction in Metn on the Surrounding Environment’ and the ‘Emission of Pollutants from cars at NDU-Louaize’ and ‘Measuring Indoor Air Pollution at Different Locations in NDU-Louaize. As Figure 5 shows, with the exception of the pillar “Learning to live together,” that seemed to be neglected by most of the courses, all others are sufficiently represented in the courses reviewed. In particular, there is an emphasis on preparing learners to know and do, and a bit lower but equal emphasis on preparing learners to reflect on own values base (Learning to be) and on how learners can act as “Agents of Change” (Learning to Transform).

### **The RUCAS Curriculum Perspective: The “Where” Question**

Considering curriculum perspectives, it is of particular importance to examine current curricula to identify where they are focused and to where should be directed in light of current trends and sustainability crises. In terms of academic disciplines,

Figure 5. Integration of the five pillars of sustainability competences in Notre Dame University

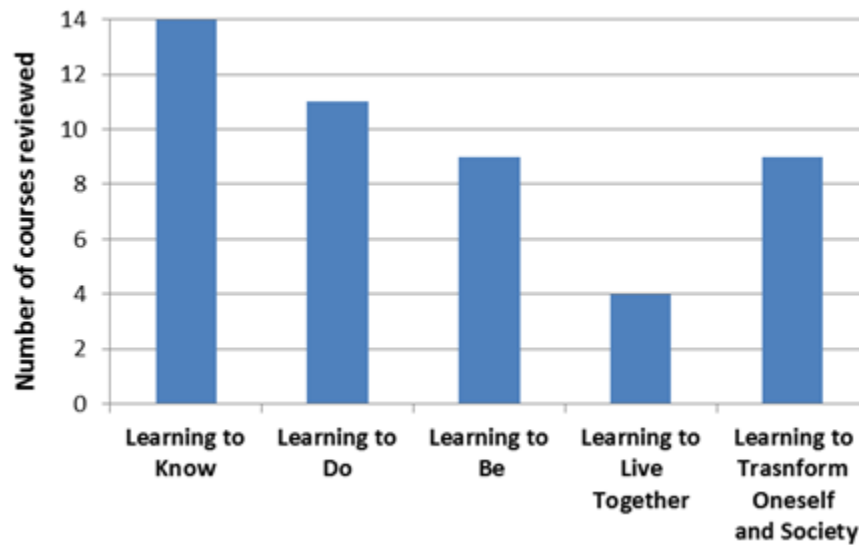


Table 4 shows that the most active in embedding sustainable development in their curricula are the disciplines of Business/economics followed up by Educational Sciences. The least active ones are those of Health Sciences and Technical Sciences. Interpreting the average means of the discipline-specific competences related to sustainability, ranging from 3.6 to 4.0 of the six-point scale together with the overwhelming dominance of lecture-based approaches to teaching, university curricula in the RUCAS participating higher education institutions needed a re-examination of their orientation.

It is often said that education plays a dual role. On the one hand, it reproduces certain aspects of current society and, on the other hand, it prepares students to transform oneself and society. Although, these roles are not necessarily mutually exclusive, curricula tended in the past to reproduce an unsustainable culture rather than empowering citizens to think and work towards a sustainable future (Makrakis & Kostoulas-Makrakis, 2012b). Sterling (2001) sets out what the role of education could/should be:

- To replicate society, culture and citizenship: A socialisation function.
- To train for employment: A vocational function.
- To develop the individual: A liberal humanist function.
- To encourage a fairer society and a better world: A transformative function.

The last role is seen by Sterling as central to achieve a more sustainable educational system. The first two roles mirror ideologies adherent to curriculum as product, the third, curriculum as process and the fourth curriculum as praxis. Curriculum as product is principally based upon an objectivist approach – seeing knowledge as something stable that should be replicated in learners' minds, decontextualized from social reality and perceived as existing independently from learners' experiences. A division of knowledge into fields of specialization continues to characterize modern educational systems, including in the RUCAS participating institutions with some variation. Such a curriculum orientation functions as a bottleneck to turning these institutions into



*Table 4. Sustainable development curriculum experiences by academic disciplines*

Disciplines	SD courses taken		Relevant to SD		SD assignments		No
	No	Yes	No	Yes	No	Yes	
Education	65%	<b>35%</b>	38%	<b>62%</b>	76%	<b>24%</b>	800
Sciences	70	30	48	52	84	16	915
Technical Sciences	83	17	70	30	86	14	423
Health Sciences	86	14	62	38	94	6	325
Soc. Sciences	70	30	55	45	73	27	763
Business/Ec.	54	<b>46</b>	34	<b>66</b>	65	<b>35</b>	414
Total	70%	<b>30%</b>	50%	<b>50%</b>	79%	<b>21%</b>	3640

sustainable universities. This forces university teaching staff to view knowledge from a compartmentalised perspective that leads to serving and maintaining a culture of unsustainable production and consumption. In decontextualized learning, curricula and teaching methodology are mainly used in the context of instrumental rationality and technical interest in knowledge, which does little to develop human self-realization and critical discourse (Makrakis & Kostoulas-Makrakis, 2005; 2012). A curriculum as process is not a prescribed body of knowledge to be transferred, but rather an active process that links with the practical form of reasoning (Grundy, 1987). In this sense, the curriculum is being considered more open-ended than a prescribed body of knowledge, setting an emphasis on interpretation, judgment and meaning making. Curriculum as praxis moves beyond process, as it integrates in its conception an emancipatory knowledge interest, not just a practical one.

Assessing the students' preferences towards the roles universities can play and the curriculum that these roles support shows what values are dominant and what directions are needed to be taken as well as how to better understand the extent to which sustainability principles drive curriculum development. Taking into consideration the whole sample of the RUCAS survey, it is evidenced a clear trend towards the transformative function, that sees a university as an agent

of change towards a fairer society and a better world. More specifically, 42% of students indicated that function compared to 6% that perceived the university's role to replicate society and culture and promote citizenship. When taking into consideration the country of students, perceptions are spread between the liberal and the transformative role. Italian and Irish students indicated a clear preference to the liberal role, in contrast to the Greek (56%) and Jordanian (46%) students who were oriented towards the transformative role. It is interesting to note, that the Egyptian students' preferences are situated between the socialisation (28%) and the transformative (37%) role. A more balanced preference between the liberal and transformative role was revealed among the French, Swedish and Lebanese students. Similarly, a more balanced preference is revealed between the vocational, liberal and transformative role among Lebanese students.

Although, the students' perspectives with respect to the role and function of higher education is directed towards the transformative function, the peer-review on the revised courses shows that the corresponding pillar or cluster of "Learning to transform oneself and society" competence was integrated in less than half of the courses peer-reviewed, with the exception of the Notre Dame University-Louaize. Students must not only acquire new skills and information through transmissive and constructivist approaches, but



Figure 6. The RUCAS OCoP



also critically reflect and radically transform their own perspectives, knowledge and approaches to thinking and learning.

### Preparing Academic Staff for Transforming Curricula: The “Whom” question

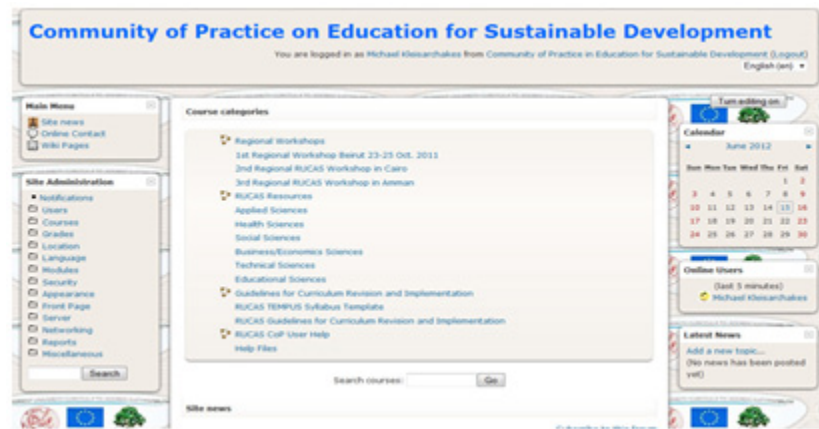
The great challenge of the 21st century for institutions of higher learning is to train professionals who are critical of, and capable of acting in transforming their frames of reference to achieve sustainable development goals and objectives. To facilitate and strengthen the transformation of university curricula towards sustainability in the partners’ universities, an online community of practice (OCoP) has been developed that gives access to all academic staff in the partner institutions (<http://community.cc.uoc.gr>). The RUCAS OCoP (Figure 6) considers university instructors as part of a “critical community” of practitioners committed not only to improve the quality of teaching and learning in their institutions, but also to transform those structures, practices and behaviours that provide constraints to turning their universities into sustainable ones. It provides a virtual space in which university staff and other practitioners across its consortium members can come together, share stories and experiences, and

solve problems pertaining to the RUCAS tasks and activities. Although, the OCoP is restricted to the academic staff involved in the RUCAS project, it is planned to be open to every interested university that wants to be associated with the RUCAS Sustainable Universities Network.

Two types of participation among members of the OCoP have been identified: 1) active participation and 2) peripheral participation. As depicted in Figure 7, university staff participating in the RUCAS project used the OCoP tool to formulate discussion groups/forums, upload revised course syllabi, use the space provided as a repository for teaching materials, guidelines, publications and so forth. About one third of the more than 100 members of the RUCAS OCoP can be considered as active participants. The rest can be considered as peripheral participators, who read and benefit from its tools and resources without contributing themselves.

The RUCAS OCoP played a critical role in the three regional workshops aimed to get the academic staff ready to transform their courses and pedagogies. The first regional workshop was held at the Notre Dame University-Louaize in Lebanon (October 2011) with the aim to introduce academic staff to the teaching methods, concepts, principles, processes and practices in ESD curriculum design and revision for Higher Education.

*Figure 7. The RUCAS repository*



The specific objectives were to: 1) build capacity amongst university staff in the partner universities of Egypt, Jordan and Lebanon to embed ESD in curricula and pedagogy and 2) review and revise undergraduate curricula to address ESD in line with Bologna and Lisbon processes. Through this workshop, 52 participants discussed why there was a need to re-orient university curricula to address sustainability and identified ESD themes, teaching methods, goals and competencies to be addressed within their curriculum design and practice. A particular model for ESD curriculum re-orientation was also presented and discussed. The first regional workshop paved the way to the second that was held in Cairo January, 2012. In the second regional workshop 35 academic instructors were to review the produced revised course syllabi and present experiences from their practices. In particular, the emphasis was placed on reviewing existing courses and teaching methods to address issues that are pertinent to education for sustainability through the infusion approach.

All members of the group participated in a rich discussion and provided feedback and suggestions of how to infuse ESD and obstacles that partner universities might face. The keyword that members identified as the means to infusion was ‘contextual-

izing’ examples within ESD without undermining the main concepts of the original course. Results of this discussion were evident in the session that followed. In the 3<sup>rd</sup> Regional Workshop held in Amman April, 2012, 40 participants:

- Examined the implementation process of the revised courses during the spring semester.
- Discussed the process and outcomes of disseminating the ESD-student competence survey results through publications in international journals and conferences as well as the general dissemination activities for the project.
- Prepared suggestions and a catalogue for course revisions and new courses in the disciplines of educational sciences, technical sciences, health sciences, applied sciences, business/economic sciences and social sciences for the next academic year.
- Discussed the strategies for the institutionalisation of ESD in the partner institutions.

A particular emphasis was also placed on the student practicum placements in the community. In this context, community engagement work was perceived as an important dimension of ESD

since engagement with communities helps to bridge the gap between theory and practice and between universities and the broader community. The opportunities for students to engage in service learning programmes which provide them with 'real-life' experience were emphasised. It was widely shared among the participants that engaging students in situations identical with those they are expected to find after graduating and to equip them with the necessary hands-on experience to confront the real-life issues, is of paramount importance in curriculum transformation. Such activities help students to reflect upon their experiences in the real world and to gain a deeper understanding of their role as active local/global citizens and professionals in their respective academic areas and to develop practical skills to apply in real-life situations. To this end, emphasis was placed upon reflective and reflexive practice through the use of particularly developed self and peer-reviewing instruments that ensure quality and facilitate the monitoring and evaluation process of the RUCAS initiative.

## **CHALLENGES PAST AND PRESENT FACING THE ORGANIZATION**

The great challenge of the 21st century for institutions of higher education in general and the RUCAS partner institutions, in particular is to educate students on learning to live together sustainably. This challenge implies that university curricula and teaching methods should be revised and improved upon in order to infuse sustainable development and translate knowledge and critical consciousness into action. Higher education institutions bear a profound, moral responsibility to increase the awareness, knowledge, skills and values needed to create a just and sustainable future. Indeed, higher education plays a critical but often overlooked role in making this vision a reality. Other challenges faced before the start of the RUCAS project were: 1) lack of staff

readiness to address sustainability issues from a transformative perspective; 2) lack of understanding about why an interdisciplinary education for sustainability program is needed and 3) existing administrative and other infrastructures were not ready to respond to and support the transformation of university curricula to address sustainability. To this end, reorienting university curricula to address sustainability (RUCAS) was seen as a very urgent and necessary initiative to equip graduates with knowledge, skills, perspectives and values of sustainability so as to assume responsibility for creating a sustainable future and lifestyle. From experiences of RUCAS interventions in different contexts and situations, there are some specific challenges, which have come across.

**Challenge 1:** Creating a mechanism by which different stakeholders can work together is complex due to different perceptions, interests, experiences and understandings of what is needed and how issues and problems can be handled.

**Challenge 2:** Training university staff for course revision, especially from different educational and socio-cultural backgrounds is a real challenge. Some may think that they know best and not give due importance to the opinions or perspectives of the others. Some could also raise conflicting ideas and they may be intimidated by others due to different interests, perceptions, culture, and academic background.

**Challenge 3:** Develop local ownership and self-reliance. From a managerial perspective, issues identified were related to developing local and regional leadership that could sustain efforts to make major transformations at various domains and levels. Also, appropriate coordination among all the Consortium members and working teams for connected related activities was a critical issue.

**Challenge 4:** From an organisational perspective, there was an issue of communication, taking

into consideration different perceptions of leadership, time, culture, political problems arising in the region, etc.

**Challenge 5:** From a technological point, one major challenge concerned the supporting infrastructure in terms of coordination and professional development that would foster the attempted transformative actions to change course content and instructional methodologies.

**Challenge 6:** Students must recognize the limitations of their current knowledge and perspectives. This means that university teaching staff cannot simply transmit knowledge on students. What is required is a true transformation of students' existing knowledge, especially through learning to clarify own values and critical reflection.

**Challenge 7:** Identifying important learning goals/objectives and outcomes aligned with appropriate feedback and assessment procedure is of critical importance in this process. Ensuring the alignment of learning outcomes, teaching methods and learning activities and assessment tasks is decisive to the course revision process.

**Challenge 8:** Embedding sustainability in the university curricula is emerging as a process and praxis in transforming faculty perspectives and increasing their active global competence and sustainable citizenship.

**Challenge 9:** Building of quality assurance systems supported by new information technologies is seen as a key development process.

**Challenge 10:** Keeping up to date academic staff with disciplinary and interdisciplinary knowledge and skills, especially through professional development and academic rewards is critical to any transformative change planned.

## **SOLUTIONS AND RECOMMENDATIONS**

Referring to the above cited challenges, our experiences show that establishing a 'platform' where you can have an open and continuous discussion or dialogue with different stakeholders is of paramount importance. A face-to-face communication among participants has been proved difficult and costly. Thus, the use of online and offline discussions with key stakeholders and ensure that they are informed regularly and thoroughly is a decisive strategy to the success of any program. Developing local ownership and self-reliance is a managerial perspective that can generate changes and sustain efforts to make major transformations at various domains and levels. Another issue was the level of willingness to get involved in highly demanding tasks. This was tackled through incentives and rewards such as joint publications, certification and so forth. Development of a shared understanding and acceptance of managerial principles among all participants proved to be a critical driver to achieve expected outcomes. Setting-up an internal and external monitoring and quality assurance system is seen very critical. Indeed, distributed leadership is of critical importance together with encouragement for co-production of and sharing knowledge. The building of a supportive infrastructure in terms of coordination and professional development can foster the attempted transformative actions to change course content and instructional methodologies. The establishment of a Virtual Training Center in each partner university is expected to support the process of reorienting university curricula to address sustainability. Similarly, the online community of practice (OCOP) and the development of an ICT-based training Toolkit on ESD curriculum reform and innovation in Higher Education can be considered among the key drivers for transformative change. Development of guidelines for strengthening stakeholders' inputs in the curriculum development and implementa-

tion has been considered as a critical solution to the demands for capacity-building.

Indeed, one critical move to support academic staff has been the development of a monitoring and evaluation framework to provide guidance about the core teaching and learning approaches used in transforming their courses and pedagogies towards sustainability. This covers basic pedagogic methods, approaches to curriculum design and various quality assurance instruments used across all stages from developing competences to integrating competences in the course revision process as well as self assessment and peer-reviewing. Through critical reflection of biases and assumptions, academic staff involved in the RUCAS project had the opportunity to critically reflect on their understandings, points of view and habits of mind, worldviews, and create transformative learning experiences to alter their frames of reference, teaching practices and course content. Summing-up, other solutions attempted are: obtaining constructive feedback and strengthening the inputs of the key stakeholders; monitoring visits by internal and external evaluators to verify adoption of quality assurance standards; contextualise sustainability taking into consideration local problems and issues; organize symbolic rewards to the most committed ones (e.g. certification, champion awards); identify the barriers and drivers related to their potential contribution; encourage and support strong distributed leadership and support for the change agenda; provide needed materials and resources in a timely manner and appropriate coordination among all working groups.

Our reflections on the processes and practices during these three years revealed a number of key strategic points that should be taken into consideration when implementing such fundamental change in higher education curricula and pedagogy. These include: a commitment for personal and institutional change; designated leadership at institutional and consortium level; a multi-stakeholder perspective; a risk analysis and

a plan for change; development and dissemination of appropriate resources; and engagement in capacity-building. Replication and up-scaling are fundamental objectives of the RUCAS project as it provides the opportunity to build on best practices and lessons learned and expand the reach and impact not only within partner institutions, but within partner countries. The issue of up-scaling is inherent in the project itself as the RUCAS project provides a viable avenue for “whole institution” curriculum reform, research and teaching across all Higher Education Institutions in the Arab region.

## **FUTURE DIRECTIONS INCLUDING RESEARCH**

Our experiences and studies with the participation of more than 3000 undergraduate students in European and Middle Eastern Universities indicate that it is very important to develop undergraduate students’ sustainability competences and sustainable development issues than developing specialised post-graduate courses. Such an approach will have a greater impact on society, environment and economy besides the increased employability of graduates and the modernisation of universities. Also, the isolation in the partner countries’ higher education institutions from the labour market and stakeholder guidance in course design and content has placed sustainable development courses in a marginal position. A multi-stakeholder-driven model for modernising higher education curricula is needed, taking into consideration the evidence that current efforts to curricula take place within a framework of limited or not any stakeholder consultation. There is a critical need for Middle East universities in light of the climate change challenges their region is facing to cultivate interdisciplinary expertise among their future leaders across many of the societal sectors. Further research is needed to identify and analyse the barriers and drivers of stakeholders’ inputs to interdisciplinary curriculum development.



Research questions to be considered include the following: What and how much knowledge about sustainability is required in the course? Does the course already include the examination of and the development of perspectives and values that lead to the transition towards a healthy, just, equitable, secure and environmentally sustainable society? To what extent are students encouraged in this course to be aware of the connections between the environmental, social, cultural, political and economic aspects of sustainability? Are the teaching methods used consistent with the values, ethics and principles of education for sustainability? As most failed attempts to embed sustainability cite a lack of leadership, incentives, knowledge, and/or resources when trying to implement new programs or add them to existing curricula, further research is needed to explore barriers and drivers to embedding sustainability in higher education institutions.

## **CONCLUSION**

The RUCAS Euro-Mediterranean initiative through the development of sustainability competences and capacity-building programs to train university teaching staff for embedding sustainability in their academic disciplines is considered a good example for reorienting university curricula to address sustainability. It provides the opportunity to build on best practices and lessons learned and expand the reach and impact not only within partner institutions, but beyond that. Within the three years of the RUCAS initiative, we have transferred expertise from European universities through the organization of three regional workshops in Beirut, Cairo and Amman, where university staff coming from six disciplines have been trained on revising course curricula to embed sustainability. An Online Community of Practice (OCoP) developed is being used as a resource, repository and forum (<http://community.cc.uoc.gr/>). Almost 250 university courses have been revised to address sustainability across the six

prioritised academic disciplines (educational sciences, social sciences, applied sciences, technical sciences, business/economics sciences and health sciences). A pilot initiative for student placement and practicum has been carried out, through which more than 3000 students have been involved in producing collaborative projects dealing with local sustainability issues. The opportunities for students to engage in service learning programmes provided them with 'real-life' experiences. It was also widely shared among the participants that engaging students in situations identical with those they are expected to find after graduating become more equipped to confront with real-life issues.

The interventions carried out by the RUCAS project have contributed significantly in producing a corpus of university teaching staff in each partner university who in turn initiated course curriculum revisions to address sustainability. It has also resulted in shifting traditional approaches to teaching and learning towards alternative teaching and learning methods such as place-based learning, inquiry-based learning, problem-based learning, discovery learning, inter-disciplinary teaching, which are suitable to education for sustainability. It is of particular importance to note that students participated in a survey for mapping their competences related to education for sustainability. They were also actively involved, especially through practicum assignments during the implementation of the revised courses. Teaching staff was also involved in developing the ESD-student competence framework that was applied. They also took part in professional development or capacity building workshops to get the needed readiness and involved in the curriculum revision process, the implementation and the assessment of the revised courses. Administrative staff has also taken part in facilitating the process and the local National Tempus Offices organised external monitoring field visits. The revised student courses and the institutional ESD framework policies and practices that are being developed are also expected to be the drivers of change within and among institutions in the partner countries and region.

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