Exploring University Students' Competence on Learning to Live Together Sustainably: An International Survey Research

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This study presents an international survey that studied university students' competence on learning to live together sustainably as a constituent of an ESD competence framework aimed to guide the Reorientation of University Curricula to Address Sustainability (RUCAS) - an EU Tempus-funded project. The sample was 3,757 students from 11 universities, 6 were from EU and 5 from Egypt, Lebanon and Jordan. The respondents represented six disciplinary strands: educational sciences, social sciences, applied sciences, technical sciences, business/economics sciences and health sciences. A Cronbach reliability test for the research instrument indicated a measure of 0.87 which implies that the constructed instrument was highly reliable. The analysis of the learning to live together sustainably competence shows that the mean score on a 6-point Likert scale ranged from 3.5 to 4.4. Compared to the other ESD-related competences (learning to know, learning to be, learning to do and learning to transform oneself and society), there were some differences (mean scores from 3.6 to 4.30). The results of this study are discussed in terms of their implications in revising curricula and instructional methods to be aligned with the concept of learning to live together sustainably.

Local/Global Challenges

We are increasingly confronted with complex, interconnected social, economic and environmental problems locally and globally. Humanity is living a crisis of sustainability that includes not only environmental issues such as climate change, ozone depletion, biodiversity loss, but also economic and social issues, such as poverty, social inequalities, violation of human rights, gender inequalities, loss of indigenous knowledge, etc. As depicted in Figure 1, that sums up at a glance these sustainability challenges, countries to the left of the vertical line are marking a score of 0.8 on the Human Development Index, which implies that people are not sufficiently meeting their basic needs. In countries above the horizontal dotted line and to the right of the vertical line, people are meeting their needs, but in ways that destroy ecosystems.
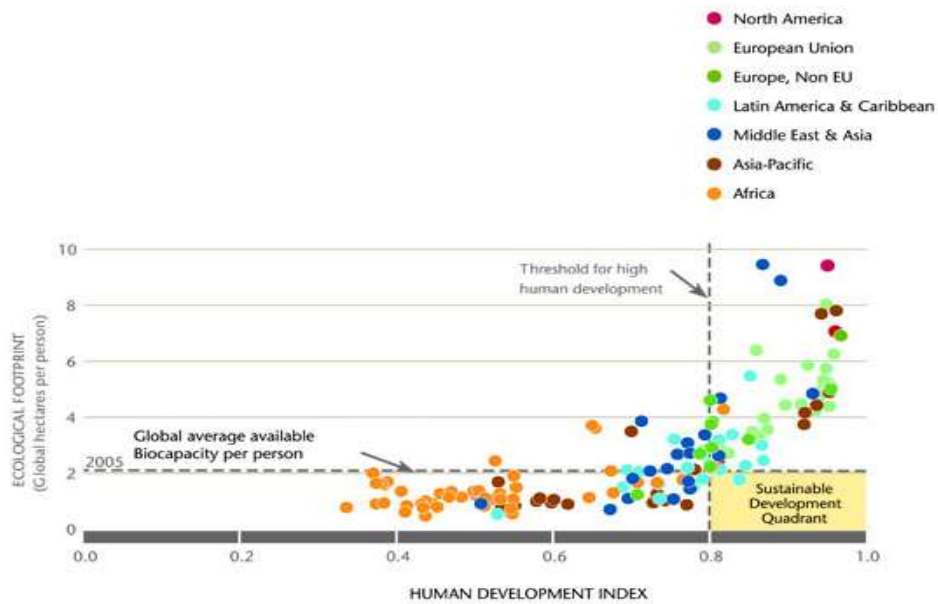
Figure 1: Human development index and ecological footprint worldwide

Source: Alliance for Global Sustainability and the Global Footprint Network. Cited in http://www.europeanbusinessreview.com/?p=1302

A large portion of these local/global problems arise from the disparity in wealth and the seemingly oppressive nature of neo-liberal economic systems. As revealed by the UN's Human Development Index, economic development has been highly uneven and unjust across the planet. In general, in the globalisation era an enormous economic wealth has been accumulated almost exclusively in the developed world, while the world's poorest nations have grown even poorer (UNDP, 2000). The increasing gap between rich and poor, between the affluent and non-affluent countries, between the current and futures generations, is widening. It seems that the whole concept of sustainability "may not be compatible with capitalist social relations" (Huckle, 1993, p. 59). The neo-liberal economic hegemony, despite its late interest in "green economics", it still prioritizes capital accumulation, at the expense of the ecological recovery, social equity and people's well-being. Despite claims of compatibility between economic globalization and sustainable development (Byrne & Glover, 2002; Panayotou, 2000), economic globalisation driven by hegemonic forces oriented to profit maximization are threatening environmental values and ecological health (Sachs, 2000; Sachs et al. 1998; Castells, 1998; 1996). Summing up, this crisis is largely based on the:

1. Unsustainable modes of production and consumption
2. Increased proliferation of military expenses and unsustainable use of technology
3. Generation of growing gaps of social, economic and political inequality
4. Globalization of the market economy driven by greediness of capital accumulation.

The Role of Higher Education

Education systems, at all levels, and especially Higher Education bear their own responsibility for this crisis, as through the education system all sorts of professionals and leaders who take decisions at all levels in public and private sectors, are products of the education system. Corcoran and Wals (2004) observe that "[t]he scope and range of the negative impacts of university educated people on the natural systems that sustain Earth are unprecedented" (p. 3). It is also notable that while most people have positive environmental attitudes and are concerned about environmental issues, a much smaller proportion of people actually translate their knowledge and concern into action (Fujii, 2006; Sattmann-Frese, 2005; Finger, 1994). Simply educating citizens to higher levels does not necessarily lead to higher levels of sustainable ways of thinking and living. Thinking of the role of education, to what extent university teachers and curricula encourage their students to self-reflect on the following questions?

- What is my vision of what I would like our world to be?
- Are my actions consistent with the way I would like the world to be?
- What does the way I lead my life mean for the lives of others?
- How can I contribute in creating a more just, peaceful, and ecologically sound world?
- What can we do together as a local community, as a country and as a global community to promote learning to live together sustainably?

University curricula, taking into consideration, their own responsibility to the current state of humanity's crisis, do not seriously deal with such questions. There is need to review and critically question as to how much our universities are responsible and committed to an education that acts as a force for personal and social change towards sustainability. There is need for a shift of consciousness that alters: our way of being in the world (learning to be), our way for discovering others by discovering ourselves (learning to live together), our way of learning how to learn as well as appreciating all sorts of knowing (learning to know) and our way of putting knowledge into action (learning to do). It is above all learning to "transform problematic frames of references – sets of fixed assumptions and expectations – to make them more inclusive, open reflective and emotionally able to change" (Mezirow, 2003: 57-58). Reorienting existing education at all levels to address sustainable development is very urgent and necessary, so that all can gain knowledge, skills, perspectives and values conducive to creating a sustainable future and lifestyle. Education for sustainable development (ESD) or education for sustainability (EfS), used interchangeably here, was defined by 37 panellists "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, 2011, p.411). Education for sustainability is described as "overtly transformative" (Huckle & Sterling, 1999) whereby student learning moves from a focus on "doing things better [to] doing better things [to] seeing things differently" (Sterling, 2004, p.56). ESD, as a cross-curricula theme, is often marginalised in curricula, which in turn reproduces and perpetuates academic divisions of knowledge that separate the natural and social sciences and the humanities, and fails to acknowledge lay and tacit knowledge (Huckle, 2008).

Without major transformative changes in what we learn, the understanding of the interests of knowledge behind learning and the methods applied to learning, education will play an instrumental role in the hands of those who want to manipulate and perpetuate an unsustainable society.

A Response to the Local/Global Challenges through RUCAS

The great challenge of the 21st century for institutions of higher education is to educate students and professional on learning to live sustainably. These challenges call that university curricula and teaching methods should be revised and improved upon in order to infuse ESD and translate knowledge and critical consciousness into action towards sustainable development. 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.

To this end the UNESCO Chair ICT in ESD along with the RCE Crete through its leading HEI, the University of Crete, has taken the initiative to establish a consortium of 12 universities and three NGOs, with the overarching goal to help partner HEIs to reorient their university curricula to address sustainability through capacity building of university staff, for curriculum revision and implementation. The RUCAS project was funded by the European Commission Tempus Programme for a three-year period (2010-13). 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.
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.

The RUCAS approach

The RUCAS project adopts a multi/inter-disciplinary and systemic approach contextualized in the partner countries and regions. The approach entails the following key processes:

- 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 competencies 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.

The focus of this paper is one of the specific aims that was, to develop a framework of ESD competences for university students contextualized to the European Union and Arab region to be used to assess students' competences in the participating Higher Education Institutions (HEIs). The results of the ESD student competence framework are used for guiding the process of curriculum revision and implementation to embed sustainability.

Developing the competence framework

Competences, in general, are defined as a combination of knowledge, skills and attitudes appropriate to the context (Seitz and Schreiber, 2005; De Haan, 2006) which refer to the behavior adopted in competent performance (Seitz and Schreiber, 2005; De Haan, 2006; Rychen & Salganik, 2003; Garvin, 2000). In general, competences overlap and thus cannot be viewed independently of context, values, ideological assumptions and domains. In that sense, they are social constructs that contain certain ethical and political assumptions. The label of "general or generic competence" is used along with 'disciplinary' or 'specific' competences. The first may be described as interdisciplinary and cross-disciplinary in that they can be applied in a range of contexts and domain. Specific competencies refer more to certain disciplinary cognitive prerequisites that an individual requires to have in a certain academic and professional domain.

The process of developing the ESD student competence framework started with an expert panel review, with the participation of 37 experts from various disciplines and vocations, to develop the first corpus of generic ESD competences. The first run was followed-up by a second review process through which panellists attempted to reach a consensus-based corpus of generic and disciplinary ESD competences. The third and last review process attempted the final refinement of competences before validation through piloting it in one of the partners' institutions (Makrakis et al., 2012. Through this process, the clusters adopted for the generic competences were based on the 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 live together and 4) learning to be. We also added the

fifth cluster of 'learning to transform oneself and society' that has been later introduced by UNESCO as the 5th pillar (Figure 2).

Figure 2: The five ESD competences clusters.

For the piloting of the generic and disciplinary competences, we have chosen one partner Institution, the Notre Dame University in Lebanon. The descriptors of each ESD competence cluster were measured through a six-type Likert scale. *Cronbach a* reliability analysis was performed to assess internal reliability for all the five ESD competence clusters. In each, the *Cronbach's alpha* score for the five clusters of ESD competences ranged from 0.80 to 0.95, while the *Cronbach's alpha* score for the attitudinal scale of learning to live together sustainably was 0.66.

Hypotheses, Subjects, Data Collection and Analysis

Although this study is an explorative one, a number of hypotheses were formulated supported by previous studies to be explored through a survey that is targeted to final year students in six academic disciplines, namely: educational sciences, social sciences, applied sciences, business/economics sciences, technical sciences and health sciences. One of the hypotheses relevant to the present paper is that "Learning to live together sustainably is expected to be affected by learning to be, learning to do and learning to transform oneself and society.

A structured questionnaire based on the ESD student competence framework was developed, that besides the five clusters of ESD competences, a number of other variables, treated either as independent and/or dependent, were designed to explore students' generic and disciplinary ESD competences. The survey instrument, which was piloted before, was administered in the 11 out of the 12 Universities of the RUCAS consortium. The only University excluded was the Heliopolis University for Sustainable Development due to the fact that during the administration of the survey, there were not students admitted yet in its academic programmes. The study population was all final year students in the courses of the six disciplines that were taught by the university staff involved in the RUCAS project. In total, 3757 replies were collected among the 11 university partners (Table 1).

Table 1: Frequency of students' responses by participating university

RUCAS Partners	Frequency	Valid %
University of Crete	189	5,0
University of Athens	204	5,4
University of Padova	467	12,4
Dublin City University	47	1,3
University of Bordeaux3	401	10,7
University of Stockholm	127	3,4
Suez Canal University	305	8,1
Hashemite University	754	20,1
University of Jordan	696	18,5
Norte Dame University	339	9,0
University La Sagesse	228	6,1
Total	**3757**	100,0

RESULTS

Background statistical results

As Table 2 shows, the most active in embedding sustainable development in their curricula are the disciplines of Business/economics (46% of students have taken courses dealing with sustainable development; 66% have taken courses relevant to sustainable development and 35% have done assignment with sustainable development issues); and Educational Sciences (35% of students have taken courses dealing with sustainable development; 62% have taken courses relevant to sustainable development and 24% have done assignment with sustainable development issues). In general, half of the students surveyed across all the six disciplines have taken courses, which seems to integrate some aspects of sustainable development.

Table 2: 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%	**35%**	38%	**62%**	76%	**24%**	800
Sciences	70	30	48	52	84	16	915
Engineering	83	17	70	30	86	14	423
Health Sci.	86	14	62	38	94	6	325
Soc. Sciences	70	30	55	45	73	27	763

Business/Ec.	54	**46**	34	**66**	65	**35**	414
Total	70%	**30%**	50%	**50%**	79%	**21%**	3640

Table 3 shows that the Internet (53%) has been by far ranked as the first information source in themes related to sustainable development, followed up by radio (23%), while university courses are ranked as third choice (25%). It would be expected that TV would be ranked higher than Radio, something which needs to be further explored. It should be, however, pointed out that the university does not play any significant role in this process, as it is ranked thirdly as a source of knowledge on issues related to sustainability.

Table 3. Sources of information about sustainable development according to the three first ranks

Sources of information	Rank 1		Rank 2		Rank 3	
	N	%	N	%	n	%
Internet	1975	**53**	626	17	416	11
University courses	672	18	544	15	955	**25**
TV	653	17	745	20	837	22
Newspapers	731	20	829	**22**	809	22
Publications/brochures, etc.	444	12	490	13	794	21
Events (conferences, etc.)	780	21	716	19	780	21
Peers, friends, family, etc.	645	17	723	19	699	19
Special interest groups, etc.	704	19	516	14	589	16
Radio	851	**23**	609	16	542	14

Students were asked to indicate a number of key actions they have done during the past month related mostly to environmental sustainability (Table 4). Of the nine actions they were asked about, only two sustainable actions surpassed the others, namely, switched off unnecessary lights (89%) and using energy saving light bulbs (75%), followed by recycling can, glass or paper (51%). The least actions done are those of refusing to take plastic bags from the supermarket, voluntarism and donations to charities. It thus seems that students' actions are directed more to those environmental sustainability actions that also contribute to saving money, while other sustainability actions such as the purchase of eco-labelled and fair-trade products as well as refusing to take plastic bags when offered in supermarkets are less evidenced. It is these actions that show a higher cognitive and affective attitude and bahavior towards sustainability action.

Table 4. Actions done during the past month for sustainable development reasons

Have you done any of the following actions during the past month for SD reasons?	Yes (%)	No (%)
Switched off unnecessary lights	**89**	11
Purchased eco-labelled and fair-trade products	35	65

Recycled cans, glass or paper	51	49
Used carpooling	37	73
Purchased environmentally friendly products	40	60
Did any form of voluntary work in your community	31	69
Donated money to charities	32	68
Refused to take a plastic bag from the supermarket	27	63
Used energy saving light bulbs	**75**	25

The above results reflect Table 5, which indicates the teaching and learning methods applied in the participants HEIs. The questionnaire included a list of ten teaching and learning methods and students were asked to rank them according to their frequency of use at the university. From their responses summarized in Table 5, lecturing came in the first rank at 62%, tech-supported instruction came in second at 22%, followed up by case-based instruction and interdisciplinary teaching in the third place at 20%. The least one was placed-based learning (15%) which is the most relevant with education for sustainable development pedagogy along with inquiry-based learning and problem/project-based learning.

Table 5. Teaching and learning methods- arranged according to the first three ranked

Teaching and learning methods	Rank 1		Rank 2		Rank 3	
	N	%	n	%	N	%
Lecturing	2328	**62**	453	12	535	14
Project-based learning	646	17	1150	**31**	940	25
Interactive engagement	719	19	1059	28	854	23
Case-based instruction	749	20	875	23	909	24
Inquire-based learning	623	16	929	25	817	22
Inter-disciplinary teaching	739	20	886	24	726	19
Problem-based learning	634	17	816	22	838	22
Tech-supported instruction	816	**22**	849	22	689	18
Placed-based learning	756	**15**	603	16	988	**26**
Discovery-learning	598	16	734	20	915	24

Attitudes and Competences Associated with Learning to Live Together Sustainably

Students' attitudes addressing learning to live together sustainably, was assessed through a series of 10 items in the survey (Table 6). The majority of the respondents (55% of which 29% strongly and 26% moderately) agree that "people should be prepared to make sacrifices to improve the quality of life for others". Also, half of the students (51%) agree that "the governments' priority should be to improve the quality of life for people in this country rather than other countries, which in fact contradicts with the results of the previous statement. However, the majority of students disagreed (74%) with the statement that "what other countries do to improve or destroy the environment is none of our business". Despite the recent global financial and economic crisis and the high level of unemployment, that is heated all

participating in this survey countries, 48% disagreed with the statement 'economic growth and increased employment are more important than protecting the environment'. 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, as it has been also pointed earlier.

Table 6. Students' attitudes towards learning to live together sustainably

Attitudinal Statements	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
	(valid %)					
(Mean=3.5; St. deviation=0.80; alpha= 0.66)						
People should be prepared to make sacrifices to improve the quality of life for others	10	7	9	19	**26**	**29**
Everyone should look after themselves rather than rely on the government for help	9	12	16	17	20	25
There is little connection between the protection of the environment and people's quality of life	36	16	9	12	11	16
Economic growth and increased employment are more important than protecting the environment	**27**	**21**	20	13	9	10
There is very little someone like me can do to protect the local environment	34	21	15	12	9	9
What I do in this country has little effect on the quality of life for people in other countries	22	18	17	17	13	13
What other countries do to improve or destroy the environment is none of our business	**58**	**16**	7	6	5	8
The third world or less developed countries should deal with their own problems and not look to the world for help	30	15	11	10	11	23
There is very little someone like me can do to protect the global environment	29	18	17	14	10	12
The governments' priority should be to improve the quality of life for people in this country rather than other countries	10	9	15	15	**16**	**35**

With respect to the cluster of competence to learning to live together sustainably, Table 7 indicates that the majority of the respondents (58% of which 30% strongly and 28% moderately) think that their study programme help them to develop empathy by putting themselves in others' position. Also, close to this result, 56% declared that they learned well to work cooperatively with other people, followed by 52% who indicated that they have been equipped well to learn to balance between personal and collective needs. In total, the great majority of students' responses fall within the second rank that is between 2 to 3.9, with an average mean 3.9, of the six-point assessment scale. This is translated to a moderate competence for learning to live together sustainably. Again, 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, learning to reflect, learning to think systemically.

Table 7. General competences to learning to live together sustainably

Learning to Live Together Sustainably Competences	Not at all	Poor	Fair	Good	Very Good	Excellent
	Valid (%)					
Learning to Live Together Sustainably (Rate the extend to which you are able to:) (Mean=3.9; St. deviation= 0.88; alpha=0.87)						
become advocates for a sustainable future for all	6	10	23	29	19	13
acknowledge multiple perspectives	3	6	17	28	27	19
develop empathy by putting myself in others' position	2	4	13	23	**28**	**30**
facilitate networking in order to find the relevant knowledge for ESD and to establish partnerships	5	11	23	28	20	13
co-operate and participate in collective decision-making processes	3	8	18	28	26	17
delegate and involve others in meaningful ways, form partnerships and nurture communities of practice	4	10	21	27	23	15
probe into the realities of the worlds in which people live	4	7	18	28	25	18
work cooperatively with other people	2	4	12	25	**30**	**26**
learn to balance between personal and collective needs	3	4	15	26	**33**	**19**
take responsibility for personal and community well-being	5	7	19	26	26	17

Comparing Means among the five Clusters of Competence Scales

Statistical analysis performed through paired samples t-test reveal that there is not any statistical difference between the ESD competence clusters of learning to live together sustainably (Mean rate 3.9, st. dev. 0.88) and learning to know (Mean rate 3.9). On the contrary, statistical significant differences were detected between learning to live sustainably and all other ESD competence clusters. More specifically, in terms with learning to be (Mean= 4.4, St. dev. 0.80), the mean difference with learning to live sustainably is -0.50, with $t(3417) = -34.3$, at $p< 0.0001$. With respect to learning to do (Mean= 4.1, St. dev. 0.85), the mean difference with learning to live sustainably is -0.20, $t(3361) = -15.3$, $p< 0.0001$, while for learning to transform oneself and society (Mean= 4.2, St. dev. 0.85), the mean difference with learning to live sustainably is -0.30, $t(3313)= -19.9$, $p< 0.0001$. It seems that the hypothesis learning to live together sustainably differs statistically with the other ESD competence clusters, except that of knowledge. However, these differences are located within the medium range of sustainability competence scale, thus, except from statistical points, there is not any practical implication.

Concluding Remarks

This study presents an international survey that examined university students' competence on learning to live together sustainably as a constituent of an ESD competence framework aimed to guide the Reorientation of University Curricula to Address Sustainability (RUCAS) - an EU Tempus-funded project. The respondents represented six disciplinary strands: educational sciences, social sciences, applied sciences, technical sciences, business/economics sciences and health sciences. In general, half of the students surveyed across all the six disciplines have taken courses which, seems to integrate some aspects of sustainable development. However, university courses as a source of information and knowledge on sustainable development issues was selected by students in the third rank. Both, attitudes and competences towards learning to live together sustainably are moderate and students actions towards sustainability seems to be driven more from utilitarian and instrumental reasons rather than inherent sustainability values and critical consciousness. This is also reflected in the teaching methods dominated in the participating university institutions, where lecturing overpasses ESD-related teaching and learning methods, such as place-based learning and problem-based learning. These findings suggest there is need for curriculum revision across the six academic disciplines included in this study by applying transformative learning perspectives. It seems that university curricula are decontextualised and ESD is not prioritised. Higher education is generally organized into highly specialized areas of knowledge and traditional disciplines without giving due emphasis to interdisciplinarity. This problem is tackled by the RUCAS project which has initiated curriculum revision across all the participating institutions.

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