

Usage of the Goals for Sustainable Development in Formation of Learning Outcomes in Higher Education

Baiba Briede Dr. paed.

Latvia University of Agriculture, Latvia

baiba.briede@llu.lv

Abstract: Learning outcomes (knowledge, skills and competence) as one of the vital concepts of the 21st century Europe is being developed in the field of education and it is explained in the European Qualification Framework's (EQF) levels and national frameworks. It means constant revision of them on all levels of education. The aim of the study is to analyse the goals for sustainable development of society and education and substantiate the principles for implementation of the goals' ideas in learning outcomes, and analyse students' and educators' attitude towards the learning outcomes. The study was carried out analysing scientific cognitions and documents as well as questioning students of the learning outcomes. The process of formulation them is quite complicated because it is necessary also to decide on the crucial ideas of 21st century considering pillars of education, development of knowledge society and United Nations Organization aims for sustainable development. They should serve as a base for revising the formulations of learning outcomes in favour of the goals of sustainable development and determining of principles how to reach them. Theoretical investigations of sustainable development goals and prospects of reaching them are summarized in the following principles of university studies which foster understanding, analysis, assessment and implementation of actions holistically in favour of sustainability: integration of the themes and problems of sustainable development in study programmes; transdisciplinarity; transformative learning including both orientation towards process and outcomes; usage of information and communication technology (ICT). The results on students attitude towards learning outcomes by means of the method of questionnaire were obtained from 761 students and 20 educators of Latvia University of Agriculture (LLU) from 2015 till 2017. There were compared the data and their distribution got from the first and third year students using p value ($p \leq \alpha = 0,05$) as a criterion. The goals for sustainable development by means of the principles should be included in each study programme and they could have an impact on students' values and conscience in a way that they become true agents of sustainable development, and the principles could serve as a base for revising the content of study courses and learning outcomes.

Keywords: higher education, goals for sustainable development, learning outcomes, principles.

Introduction

The concept of sustainable development manifests that "Humanity has the ability to make development sustainable to ensure that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission..., 1987, 11).

According to UNECE Strategy for Education for Sustainable Development (ESD) (Learning from..., 2009, 149-150). "Sustainable development is a complex issue, encompassing economic, environmental and social dimensions. In other words, development is essential to satisfy human needs and improve the quality of human life. At the same time, development must be based on the efficient and responsible use of all of society's scarce resources – natural, human and economic".

In order to keep and develop the concept of sustainable development in higher education the study directions/programmes and courses should include the ideas of the goals of UNECE Strategy for ESD (Learning for..., 2009), Sustainable Development Goals (2015) by UN and The Four Pillars of Learning (2016) by UNESCO.

Learning outcomes are understood to be statements that describe mainly three major domains: knowledge (learning to know), skills (learning to do) and competences (learning to be). The three domains are in themselves contested concepts, and interpretations vary across contexts (Keavy, Chakroun, 2015, 32).

Learning outcomes are explained as an entity of knowledge, skills and competence at the end of the study programme, module or course in the Law of Higher Schools of Latvia (Augstskolu likums, 2011).

Understanding and solving of the 21st century challenges in the context of sustainability should be a vital part of learning outcomes in higher education and therefore importance, steps, difficulties and communication with students in the process of formulation of the learning outcomes had been discussed in the focus groups of educators of LLU in 2015.

The first and third year students' purposefulness to reach learning outcomes and self-assessment of them had been studied in 2015, 2016 and 2017.

The aim of the study is to analyse the goals for sustainable development of society and education and substantiate the principles for implementation of the goals' ideas in learning outcomes, and analyse students' and educators' attitude towards the learning outcomes.

Methodology

The ideological basis for revising learning outcomes is crucial goals of the sustainable development of education and society stated by the United Nations (UN) and United Nations Educational, Scientific and Cultural Organization (UNESCO).

On September 25th 2015, countries adopted a set of 17 goals to end poverty, protect the planet, and ensure prosperity for all as part of each goal has specific targets to be achieved over the next 15 years. Targeted learning outcomes considering 17 goals in learning outcomes could be sustainability oriented contribution during the process of studies. The goals are the following (Sustainable Development ..., 2015):

- end poverty in all its forms everywhere;
- end hunger, achieve food security and improved nutrition and promote sustainable agriculture;
- ensure healthy lives and promote well-being for all at all ages;
- ensure inclusive and quality education for all and promote lifelong learning;
- achieve gender equality and empower all women and girls;
- ensure access to water and sanitation for all;
- ensure access to affordable, reliable, sustainable and modern energy for all;
- promote inclusive and sustainable economic growth, employment and decent work for all;
- build resilient infrastructure, promote sustainable industrialization and foster innovation;
- reduce inequality within and among countries;
- make cities inclusive, safe, resilient and sustainable;
- ensure sustainable consumption and production patterns;
- take urgent action to combat climate change and its impacts;
- conserve and sustainably use the oceans, seas and marine resources;
- sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss;
- promote just, peaceful and inclusive societies;
- revitalize the global partnership for sustainable development.

Appropriate understanding, analysis and assessment of 17 goals could be included in learning outcomes on all levels of various study courses of education directions/programmes, for example: understand, analyse and assess: how to "adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility"; "...the share of renewable energy in the global energy mix"; "promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities" (Sustainable Development ..., 2015).

The Four Pillars of Learning (2016) are fundamental principles for reshaping education and their content reflects the way how a person could get knowledge of himself/herself and how to act with the purpose to keep humanistic way of living in the society. It is important that people with higher education understand and implement the content of four pillars in their professional and everyday life because they usually are the leading persons and have an important impact on public events and its development.

Like UN 17 goals for sustainable development the four pillars of education for sustainable development content could be integrated in the courses of higher education programmes and outlined in learning outcomes.

Actually understanding and implementation of the pillars start already on the lower levels of education, i.e. in general or vocational education but higher education gives a deeper, more versatile and generalized sense of them. The Four Pillars of Learning (2016) content in higher education could be the following:

- learning to know: to provide the cognitive tools required to better comprehend the world and its complexities, and to provide an appropriate and adequate foundation for future learning.
- learning to do: to provide the skills that would enable individuals to effectively participate in the global economy and society.
- learning to be: to provide self analytical and social skills to enable individuals to develop to their fullest potential psycho-socially, affectively as well as physically, for a all-round 'complete person.
- learning to live together: to expose individuals to the values implicit within human rights, democratic principles, intercultural understanding and respect and peace at all levels of society and human relationships to enable individuals and societies to live in peace and harmony.

United Nations Economic Commission for Europe (UNECE) put forward expected outcomes (Learning from..., 2009, 65) which could be reached including the four pillars of learning into study courses enhancing learners' capacity for:

- learning to learn (to know): posing analytical questions/critical thinking; understanding complexity/systemic thinking; overcoming obstacles/problem-solving; managing change/problem-setting; creative thinking/future-oriented thinking; understanding interrelationships across disciplines/holistic approach;
- learning to do: applying learning in a variety of life-wide contexts; decision-making, including in situations of uncertainty; dealing with crises and risks; acting responsibly; acting with self-respect; acting with determination;
- learning to be: self-confidence; self-expression and communication; coping under stress; ability to identify and clarify values;
- learning to live and work together: acting with responsibility (locally and globally); acting with respect for others; identifying stakeholders and their interests; collaboration/team working; participation in democratic decision-making; negotiation and consensus-building; distributing responsibilities (subsidiarity).

Diverse challenges outlined in goals determine also the key themes of sustainable development which should be investigated during studies, for example, "...poverty alleviation, citizenship, peace, ethics, responsibility in local and global contexts, democracy and governance, justice, security, human rights, health, gender equity, cultural diversity, rural and urban development, economy, production and consumption patterns, corporate responsibility, environmental protection, natural resource management and biological and landscape diversity. Addressing such diverse themes in ESD requires a holistic approach" (Learning from..., 2009, 147).

It means that holism ties together content and methodical parts of studies promoting systemic reaching of learning outcomes. Holistic approach also fosters the development of coherent view of overcoming or solving of problems of challenges and one's needs, attitudes and values, as well as make studies more professional, emotional, social, valuable and transdisciplinary for every student and educator.

Holism and transdisciplinarity is oriented towards both on process and outcomes and it means diverse scope of teaching/learning, evaluation methods and personal lifestyle fostering the development of competence.

Reaching of UN 17 goals of sustainable development and four pillars of education for sustainable development (ESD) is a serious challenge and therefore a teaching/learning process in that direction is of high importance. UNECE (Learning from..., 2009, 66) proposed the following teaching/learning methods for usage in ESD: discussions; conceptual and perceptual mapping; philosophical inquiry; value clarification; simulations; role playing; games; scenarios; modelling; information and communication technology (ICT); surveys; case studies; excursions and outdoor learning; learner-driven projects; good practice analyses; workplace experience and problem-solving.

ESD methods should not be usual group works but it could be more effectively to implement the transformative learning as experimental learning by means of critical reflection through rational discourse by J. Mezirow (1991, 2000).

Transformative learning theory developed by J. Mezirow (1991, 2000) describes diversely how learners use their experience constructing, discussing and assessing meaning. Critical reflection of the experience is a crucial component of transformative learning. It empowers changes of understanding of the self, beliefs, attitude and emotions. Rational discourse is a means which should be used in the process of transformative learning. Therefore, the meaning schemes are transformed and the learners develop their thinking skills integrating new cognitions in their experience (Briede, 2016, 60).

It is worth mentioning that the usage of ICT is a crucial for contemporary professionals because it is information and innovations era and societies' development largely depends on an access and usage of global information. To keep progress, it is necessary to receive appropriate information at the right time, and it is important both in science and practice. ICT cannot be separated from daily needs as well.

The theoretical construct of the empirical study instrument were M. T. Siniscalco and N. Auriat (2005) and L. Cohen, L. Manion and K. Morrison (2011) conceptions for writing questions. They stress keeping of the vocabulary simple and the questions short, avoiding of: double-barrelled, hypothetical questions and double negatives, overtaxing of the respondent's memory and overlapping response categories. The questionnaires should encourage respondents to co-operate and raise their interest on problems. It means that the questions have to be easy understandable and attractive. The purpose of the questionnaire is both to collect data and promote students' deeper reflection on: assessment of their learning outcomes; ability to use knowledge, skills and competence in new situations; studies with the purpose to reach as much as possible better learning outcomes and interest to reach planned learning outcomes of every study course.

There were compared the data and their distribution got from the first and third year students using p value ($p \leq \alpha = 0,05$) as a criterion. Calculations were done by interactive calculation tool (Preacher, 2001).

Empirical study had been carried out in May and December 2015 and in September 2016 and 2017. The method of questionnaire to investigate the first and third year students' self-assessment on the learning outcomes had been carried out. There were included ranged answers in the questionnaire (Kristapsone, 2014). Students marked high (h), medium (m) and low (l) level of purposefulness of reaching better outcomes of learning and their ability to use the learning outcomes in further studies. The obtained results could be used in the revision of planned results of study courses and implementation of methods and content promoting better reaching of the learning outcomes.

Respondents: 294 first and 218 third year students in 2015/2016 study year and 249 first year students in 2016/2017 study year from the Faculty of Engineering, Faculty of Environment and Civil Engineering, Faculty of Food Technology, Faculty of Economics and Social Development, Faculty of Information Technologies, Faculty of Agriculture, Forest Faculty and Faculty of Veterinary Medicine. Totally eight faculties and 761 students.

The focus group method was used in the group of 20 LLU educators in October 2015. The were discussed and summed up views about the meaning of formulation of learning outcomes.

Results and discussion

Theoretical investigations of sustainable development goals and prospects of reaching them are summarized in the following principles of university studies which foster understanding, analysis, assessment and implementation of actions holistically in favour of sustainability:

- integration of the themes and problems of sustainable development in study programmes;
- transdisciplinarity;
- transformative learning including both orientation towards process and outcomes;
- the usage of ICT.

The first and third year students' self-assessment of learning outcomes in 2015/2016 study year is displayed in details in Table 1.

Table 1

Students' self-assessment of learning outcomes

Indicator		Respondents		Self-assessment			P value
		Year	Totally	h	m	l	
Students assess their learning outcomes	n	1	294	166	121	7	0.02
		3	218	111	91	16	
	%	1	100	57	41	2	
		3	100	51	42	7	
Usage of knowledge, skills and competence in new situations	n	1	294	121	163	10	0.09
		3	218	78	124	16	
	%	1	100	41	56	3	
		3	100	36	57	7	
Studies with the purpose to reach as much as possible better learning outcomes	n	1	294	182	112	0	0.000
		3	218	102	102	14	
	%	1	100	62	38	0	
		3	100	47	47	6	
Totally	n	1	882	469	396	17	0.000
		3	654	291	317	46	
	%	1	100	53	45	2	
		3	100	48	45	7	

The indicator's *studies with the purpose to reach as much as possible better learning outcomes* differences are very significant between the first and third year students' self-assessment ($p < 0.000$). It is higher for the first year students - 62 % of students gave the highest self-assessment.

The indicator on students assessment of their learning outcomes also shows statistically significant ($p = 0.02$) differences between the first and third year students' self-assessment – 57 % of the first year students gave the highest self-assessment.

There are also self-assessment differences between the first and third year students in the indicator *usage of knowledge, skills and competence in new situations* but they are not statistically significant ($p = 0.09 < p = 0.05$).

The differences between the first and third year students' self-assessment sums are significant ($p < 0.000$) – they are higher (%) for the first year students.

The first year students' self-assessment of their interest about planned learning outcomes in 2016/2017 study year is displayed in details in Table 2.

Table 2

First year students interest about reaching planned learning outcomes of the study course

Indicators	Level of interest			
	h	m	l	Totally
In all study programmes				
%	60	36	4	100
n	148	91	10	249
	148	101		249

The study had been carried out in September 2016./2017 study year. High level of interest is for 60 % of respondents. Their number (148) differs statistically significantly ($p < 0.00$) from the number of respondents with middle and low level of interest (101). P value is determined by online programme (Preacher, 2001). A group of 20 LLU educators discussed on the importance of writing of learning outcomes. They recognised that the process of writing helps them to develop and revise a course's content and concretise their intention. The learning outcomes are very helpful for students because they reflect the essence of the course and students can comprehend the entity of the course easily. The educators stressed that the learning outcomes help them to focus more clearly what they really want that the students reach as well as common outcomes language promotes discussions with colleagues.

Topicality of learning outcomes in coherence with sustainability is analysed by M. Svanstrom, F.J. Lozano-Garcia, D. Rowe (2008). It is emphasized that “addressing sustainability will imply that HEIs (higher educational institutions – the author’s note) to provide the proper foundation to consider the concept within their multiple interconnected dimensions. Of course, the professionals should be knowledgeable and skilful in their disciplines, but also they should resonate with the systemic and complex frame of reference of sustainability” (Svanstrom, Lozano-Garcia, 2008, 350). The authors recognise that “Skills that are often mentioned are problem-solving, critical thinking, creative thinking, self-learning and skills related to communication, teamwork and becoming an effective change agent to shift policies, practices and societal norms. But LOs (learning outcomes – the author’s note) do not refer only to knowledge and skills but also to awareness, attitudes and values” (Svanstrom, Lozano-Garcia, 2008, 342).

Guidance for United Kingdom (UK) higher education providers defines education for sustainable development as „...the process of equipping students with the knowledge and understanding, skills and attributes needed to work and live in a way that safeguards environmental, social and economic wellbeing, both in the present and for future generations” (Education for..., 2014, 5).

“Education for sustainable development means working with students to encourage them to:

- consider what the concept of global citizenship means in the context of their own discipline and in their future professional and personal lives;
- consider what the concept of environmental stewardship means in the context of their own discipline and in their future professional and personal lives;
- think about issues of social justice, ethics and wellbeing, and how these relate to ecological and economic factors;
- develop a future - facing outlook; learning to think about the consequences of actions, and how systems and societies can be adapted to ensure sustainable futures” (Education for..., 2014, 5).

The core themes for sustainable development in higher education in UK are global citizenship, environmental stewardship, social justice, ethics and wellbeing, and developing of future. The themes are cross-referred in learning outcomes: knowledge and understanding, skills, and attributes in UK higher education (Education for..., 2014).

W. Louw (2013) suggests that in the cases when the studies are focussed on human settlements qualifications three aspects should be included in the curriculum: knowledge (basic knowledge about many disciplines); conflict management and negotiation (working with contractors, labourers, municipalities, and lawyers) and project scope (project plan and time frames, vision, and impact).

W. Louw (2013) has outlined a practical case where sustainability goal ideas could be implemented in real life. Curriculum suggestions by W. Louw (2013) could be useful for other curriculums in which sustainability goals are worked in because reaching of them sometimes could not convenient for industries as nature protection and local society’s interests. Therefore higher education through curriculums has to show ways for becoming specialists how to be effective in implementing sustainability ideas.

Conclusions

- University graduates will be influential problem-solvers and decisions-makers and they will educate society and professionals. They are becoming change initiators to create, introduce and implement progressive ideas. Therefore, they need deep comprehension of the goals for sustainable development and means of reaching them balancing between economic and political pressures. The goals for sustainable development should be included in each study course content and implementing of transformative learning paradigm could have an impact on students’ values and conscience in a way that they become true agents of sustainable development.
- The principles of university studies which foster understanding, analysis, assessment and implementation of actions holistically in favour of sustainability could serve as a base for revising the content of study courses and learning outcomes.
- Students’ self-assessment of their learning outcomes should be promoted regularly to maintain their ability to form a critical opinion of their successes in studies. The easiest way to do it is by questionnaires, and it is possible to get an appropriate number of responses in a short period of time. Therefore the questionnaire results reflect the students’ and educators’ understanding of the quality

of studies. The obtained results serve as an indicator which shows further activities to improve the study process.

Bibliography

1. *Augstskolu likums (Law of Institutions of Higher Education)*. (2011). Rīga: LR Saeima. [online] [03.11.2016]. Available at <http://likumi.lv/doc.php?id=37967> (in Latvian)
2. Briede B. (2016). Purposefulness and Time Management Components of Self-directed Studies at Latvia University of Agriculture. *Proceedings No 9 of the 9th international scientific conference Rural Environment. Education. Personality*. Latvia University of Agriculture, pp. 57 – 63.
3. Cohen L., Manion L., Morrison K. (2011). *Research methods in Education*. (7th ed.). Oxon, NY: Routledge, p. 758. [online] [03.11.2016]. Available at <https://www.amazon.com/Research-Methods-Education-Louis-Cohen/dp/0415583365>
4. Education for Sustainable Development. (2014). *Guidance for UK higher education providers*. [online] [03.11.2016]. Available at <http://www.qaa.ac.uk/en/Publications/Documents/Education-sustainable-development-Guidance-June-14.pdf>
5. Keevy J., Chakroun B. (2015). *Level-setting and recognition of learning outcomes*. Paris: UNESCO, p. 203. [online] [03.11.2016]. Available at <http://unesdoc.unesco.org/images/0024/002428/242887e.pdf>
6. Kristapsone S. (2014). *Zinātniskā pētniecība studiju procesā (Scientific Research in Study Process)*. Rīga: SIA Biznesa augstskola Turība. [online] [03.11.2016]. Available at <http://www.turiba.lv/f/Izdevnieciba/ZPSP-saturs-ievads-internetam.pdf> (in Latvian)
7. *Learning from Each Other. The UNECE Strategy for Education for Sustainable Development*. (2009). New York, Geneva: United Nations. [online] [02.11.2016]. Available at <https://sustainabledevelopment.un.org/content/documents/798ece5.pdf>
8. Louw W. (2013). Green Curriculum: Sustainable Learning at a Higher Education Institution. *The International Review of Research in Open and Distributed Learning*, Vol. 14(1). [online] [02.11.2016]. Available at: <http://www.irrodl.org/index.php/irrodl/article/view/1310/2418>
9. Mezirow J. (1991). *Transformative Dimensions of Adult Learning*. San Francisco: Jossey Bass.
10. Mezirow J. (2000). *learning as transformation: Critical Perspectives on a Theory in Progress*. (1st ed.). San Francisco: Jossey Bass. [online] [02.11.2016]. Available at <https://www.amazon.com/Learning-Transformation-Critical-Perspectives-Progress/dp/0787948454>
11. Preacher K. J. (2001). *Calculation for the Chi-square Test: An Interactive Calculation Tool for Chi-Square Tests of Goodness of Fit and Independence* [Computer software], [online] [06.11.2015]. Available at <http://quantpsy.org> and <http://www.quantpsy.org/chisq/chisq.htm>
12. Siniscalco, M. T., Auriat, N. (2005). *Questionnaire Design. Quantitative Research Methods in Educational Planning*. Module 8, K.N. Ross (Ed). Paris: UNESCO International Institute for Educational Planning, p. 92. [online] [12.11.2016.] Available at http://www.unesco.org/iiep/PDF/TR_Mods/Qu_Mod8.pdf
13. *Sustainable development goals*. (2015). [online] [14.11.2016.] Available at: <http://www.un.org/sustainabledevelopment/sustainable-%20development-goals/>;
<http://www.un.org/sustainabledevelopment/hunger/>;
<http://www.un.org/sustainabledevelopment/energy/>;
<http://www.un.org/sustainabledevelopment/climate-change-2/>
14. Svanstrom M., Lozano-Garcia F.J., Rowe D. (2008). Learning Outcomes for Sustainable Development in Higher Education. *International Journal of Sustainability in Higher Education* (IJSHE), Vol. 9(3). [online] [07.11.2016.] Available at http://hub-media.aashe.org/uploads/SvanstromLearning_OutcomesSust_Dev.pdf
15. *The Four Pillars of Learning*. (2016). UNESCO. [online] [04.11.2016.] Available at <http://www.unesco.org/new/en/education/networks/global-networks/aspnet/about-us/strategy/the-four-pillars-of-learning/>
16. *World Commission on Environment and Development Report*. (1987). UN General Assembly. [online] [04.11.2016.] Available at http://www.channelingreality.com/Documents/Brundtland_Searchable.pdf