Abstract
Recently, teacher training courses have attracted the researchers’ special attention, while teacher education programs have not received as much attention. The present study investigated the attitudes key stakeholders in a teacher education program (i.e., student teachers, in-service teachers, and teacher educators) hold toward the appropriateness of TEFL teacher education programs at an Iranian teacher education university and their relevance to and sustainable impact in the real teaching context. To this end, 62 pre-service teachers, 48 in-service teachers, and 28 teacher educators filled out the Foreign Language Teacher Education Program Evaluation questionnaire adapted from Peacock (2009). The results of ANOVA tests indicated that the pre-service teachers and teacher educators found courses with literary strands less relevant to English language teaching and believed that those courses should be modified or replaced by teaching more knowledge-building or knowledge-applying subjects. In addition, the in-service teachers harboured a negative perspective towards the courses which were not practical in the real classroom setting and considered them less empowering. All three groups found teaching-related courses, such as teaching methodology, of more sustainable nature and useful in the real teaching context. Besides, the participants believed that it is essential for the universities to incorporate several practical courses including practicum and classroom observations within the curriculum. This study suggests that accommodating key stakeholders’ preferences in a teacher education programs could lead to crafting more accountable and empowering teacher education programs.

Keywords: In-service teachers, Pre-service teachers, Teacher education, Teacher educators, Teacher education program evaluation

Introduction
Nowadays, English has become the international language throughout world and is widely used in daily communication and business. This has made the need for exploring the field of English language instruction and learning even more crucial within the general educational system whereby teachers are being educated and trained. Since teachers have the most highlighted contribution in students’ learning as well as the
effectiveness of the educational systems, most studies in English Language Teaching (ELT) have centered on teachers’ professional development and education both of which play important roles in teachers’ effective performance and in learners’ success in the classroom. As Seyoum (2016) states, continuing professional development is directly related to high quality teaching and learning. Although professional development programs are an effective way to enhance teachers’ performance in the classroom and improve their practice through an ongoing process, the role of teacher education programs should not be overlooked. In fact, those programs act as the building blocks of teachers’ knowledge in respect to their understanding of teaching and learning theories. As a result, the need is felt to develop an appropriate and structured evaluative system within pre-service teacher education programs which may lead to a more improved and effective educational program.

Peacock (2009) argues that teacher-training programs must involve internal evaluation systems within their programs. The main reason for employing those internal evaluation systems is to increase the accountability of the program to the stakeholders (White, 1998; Lynch, 2003). As Peacock (2009) states, the evaluation of pre-service teacher education programs would result in the professionalization of the ELT field and make a useful contribution to the robustness of the theoretical backgrounds. Rea-Dickins and Germaine (1998) contended that systematic evaluation should be placed at the very heart of a program. In addition, Al Barwani, Al-Mekhlafi, and Nagaratnam (2013) argue that the validity of the curricula, policies, methods, and even principles in Middle Eastern countries are being questioned, and, hence, they have turned to educational reform and school improvement as the most practical choice. It goes without saying that more judicious reforms can be enacted through evaluation of the programs.

Evaluation of teacher education programs can also lead to more sustainable practices and outcomes in these programs. As Gholami, Sarkhosh, and Abdi (2016) put, sustainable behavior of teachers in the classroom is considered as one of the characteristics of efficient teachers. According to Besong and Holland (2015), sustainability is something that goes on continuously and for a long period of time. Redman (2013) points out that sustainability in education leads to change in behavior. However, how to develop a sustainable educational system is of utmost importance. The main objective of this study was to investigate the three key stakeholders’ (i.e. pre-service teachers, in-service teachers, and teacher educators) opinions about the courses presented at Farhangian University, a leading teacher education university in Iran. Definitely, the opinions of these three stakeholders could be of instrumental value in promoting sustainable teacher education in the short run and student education in the long run.

According to Day (1991), the concept of Foreign Language Teacher Education and its developments have been under-researched areas in the recent years. Likewise, Weir and Roberts (1994) confirmed that the studies conducted on the evaluation of teacher education programs have been limited in number indeed.

As Widdowson (1990) states, novice teachers need to be confident when faced with difficult, new, and, even sometimes, threatening situations in class. To have this confidence, he states that they need to rely on a series of established and reliable techniques, which assist them in dealing with such adversity. It is quite clear that teachers get familiar with such techniques in their pre-service training programs. Teacher training programs may fail to develop such confidence in teachers. Therefore, evaluation of these programs is beneficial and necessary in order to prepare more confident and efficient
teachers. Indeed, the importance of teacher education program evaluation has been noted by some experts in the field such as Bretta and Davies (1985), Yang (2009), and Sullivan (2006) as there have been some complaints from graduates, school authorities, and policy makers on the appropriateness of these programs (Barone, Berliner, Blanchard, Casanova, & McGowan, 1996; Sandlin, Young, & Karge, 1992).

Pre-service teacher education program is defined as a course which prepares the teachers prior to the real teaching experience (Richards & Schmidt, 1985). These courses aim at preparing the student teachers for the real practice of teaching by making them familiar with the teaching methodology, techniques, as well as practices. Pre-service teacher training courses should encompass broad general themes related to language learning and teaching and different kinds of activities to make the student teachers more knowledgeable on those grounds. As Lucas, Villegas, and Freedson-Gonzalez (2008) state, “pre-service teacher education programs can engage prospective teachers in various types of activities that will prepare them to learn about ELLs in their future classes” (p. 367).

Some studies have been carried out on evaluation of teacher preparation courses. A study by Al-Gaeed (1983) in Saudi Arabia aimed at pinpointing the weak and strong points of an English teacher education program by asking the student teachers and the graduates’ opinions about the course. The results revealed that both groups hold positive attitudes towards the linguistics, methodology, and teaching practice courses as well as the knowledge and quality of the professors. However, they argued that the program should include some courses to improve their oral abilities and provide them with more communicative opportunities. They also found the literature-related courses irrelevant to their preparation.

In another study, Cosgun-Ogeyik (2009) evaluated the courses presented in the curriculum of an English teacher education program in Turkish universities. The results indicated a general positive evaluation of the course by the trainees courses provided in the program are consistent with their needs and expectations regarding outlining the goals of teaching profession, social objectives, and benefits obtained from the program. On the other hand, they suggested that the program needed to include some courses that were more culture specific.

In an evaluation study, Erozan (2005) evaluated the language improvement courses in the undergraduate curriculum of the Department of ELT at Eastern Mediterranean University. The findings indicated that both instructors and students were satisfied with the courses in general; however, they recommended that some changes be made in the courses in order to make them more effective and in line with the pre-service teachers’ needs and expectations and the course should contain more practice and production, the use of more authentic materials from diverse sources, and the continuity and coherence between the courses be strengthened.

Seferoglu (2006) explored the attitudes of pre-service teachers towards practice and methodology components of pre-service English teacher training program in Turkey through a qualitative study. The results indicated that the senior student-teachers believed that the courses presented during the program were not really useful in practice in real classrooms. They also stated that the micro-teaching and practice teaching opportunities during the course were not sufficient.

This brief sketch of the literature demonstrates that although professional development courses have been the focus of most of the previous studies, the evaluation of pre-
service education programs has not been researched much so far. Moreover, no attempts have been made to evaluate the pre-service teacher training courses in terms of the perspectives of these three key stakeholders, namely teacher trainers, pre-service teachers, and in-service teachers at the same time and in on context. Hence, the present study aims to explore how these stakeholders evaluate a pre-service teacher education course as well as to examine their attitudes toward the relevance of the courses presented in the program to their future application in the real teaching contexts. We believe that more accountable results could be gained if we investigate the opinions of other key stakeholders. In addition, to our best knowledge, such studies are generally missing in the Iranian context.

The Methodology of the Research

Participants

Three groups of participants took part in the present study. The first group consisted of 62 pre-service teachers who were senior BA students in TEFL at three Farhangian Universities (FUs) and familiar enough with all of the courses provided by FU. The pre-service group included 35 female and 27 male students with a mean age of twenty-four. The second group constituted 48 in-service EFL teachers who were TEFL graduates (Mean age 29) and had at least four years of teaching experience in public schools. Finally, the third group comprised 28 teacher educators (18 male, 10 female, mean age: 56) who were teaching courses related to TEFL at four Iranian state universities or teacher education universities which offered BA programs in TEFL.

Procedure

In order to explore the attitudes of the participants towards the relevance of the BA courses to their use in the real teaching context, an adapted version of Peacock’s (2009) Foreign Language Teacher Education Program Evaluation questionnaire was used. This questionnaire was adapted in order to comply with the courses presented at FUs in Iran.

The questionnaire consisted of two parts. In the first part, the participants were required to evaluate the courses presented in each semester based on Fridman Rank Order Scale ranging from 1 to 10 for the responses. The score of 1 indicated the least amount of relevance, and the score of 10 indicated the highest amount of relevance of the courses to their use in the teaching context. In the second section, the participants provided their comments with regards to the maintenance and omission of the courses within the program.

In case the participants rated for the necessity of the courses, they were free to write their suggestions for further improvements in the parts allotted for this purpose at the end of the questionnaire. On the other hand, if the participants believed that the course should be excluded from the program, they were given the chance to specify a tentative replacement for that course. They could write the name of the course in a section in front of the course they thought as irrelevant as well as in a separate section at the end of the questionnaire (see Appendix for more details on the questionnaire).
Copies of the questionnaire were administered among the participants in order to discern their attitudes toward the relevance of the BA in TEFL to their sustainable use in the real teaching practice. The questionnaires were distributed during the 2015-2016 academic year. The reliability of the questionnaire was checked for the three groups. The Cronbach alpha coefficients of the questionnaire for teacher educators, pre-service teachers, and in-service teachers were found to be 0.91, 0.87, and 0.88, respectively. The validity of the questionnaire was also confirmed by two ELT experts, each holding a PhD in TEFL. The questionnaires were personally administered to the participants by the second researcher, and the study details were explained to them. Instructions on how to fill the questionnaire were also provided to the participants. The questionnaires were delivered to the student teachers at the end of the fall semester in 2015 so that they could express their opinions about the courses with more insightful views on the courses.

To analyse the data, a series of One-way between groups ANOVAs were run in order to see if a significant difference existed among the groups with regard to their attitudes toward the courses presented in the BA program in TEFL at FU. The ANOVAs were run for each lesson in separation. The alpha level in all the analyses was set at $p < .05$. All the statistical analyses were carried out using Statistical Package for the Social Sciences (SPSS), version 18.

Results

The present study attempted to examine the perspectives of three groups of key stakeholders (i.e. pre-service teachers, in-service teachers, and teacher educators) with regard to the appropriateness of the BA courses they were attending. According to the results, the majority of the participants hold similar attitudes toward the courses. However, there were significant differences among these groups with regard to a few courses. The results concerning these courses are depicted in detail in Tables 1, 2.

Table 1
ANOVA results regarding each course in teacher education program in TEFL

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Result</th>
<th>Group Mean / SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PT* Mean / SD</td>
</tr>
<tr>
<td>Language Study Skills</td>
<td>$F(2, 137)=6.7$ $p = .02$</td>
<td>4.3 .21 3.50 .57 7.23 .66</td>
</tr>
<tr>
<td>Phonetics &amp; Phonology</td>
<td>$F(2,137)=5.04$ $p = .02$</td>
<td>8.3 .53 5.50 .63 8.91 .92</td>
</tr>
<tr>
<td>Media English</td>
<td>$F(2,137)=5.68$ $p =.02$</td>
<td>8.2 .58 5.10 .83 8.53 .72</td>
</tr>
<tr>
<td>Principles of High School Lesson Planning (Held in Persian)</td>
<td>$F(2,137)=5.62$ $p = .02$</td>
<td>10. 0 6.03 .33 10.00 0</td>
</tr>
<tr>
<td>Materials Development (Held in Persian)</td>
<td>$F(2,137)=5.43$ $p = .04$</td>
<td>9.3 .79 6.37 .97 10.00 0</td>
</tr>
<tr>
<td>Research Methodology</td>
<td>$F(2,137)=6.3$ $p = .03$</td>
<td>8.4 .91 4.61 1.06 9.31 1.02</td>
</tr>
<tr>
<td>Materials Evaluation</td>
<td>$F(2,137)=6.21$ $p = .03$</td>
<td>8.9 .48 5.34 .23 9.56 .58</td>
</tr>
</tbody>
</table>

Note: PT: Pre-service Teachers; IT: In-service Teachers; TE: Teacher Educators
Table 2
Post-hoc comparisons among three groups of stakeholders

<table>
<thead>
<tr>
<th>Name of the course</th>
<th>Post-hoc results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language Study Skills</td>
<td>The mean score for PT* group was significantly different from the TE* group; the mean score for IT* group was significantly different from TE group. There is no statistically significant difference between PT and IT groups.</td>
</tr>
<tr>
<td>Phonetics and Phonology</td>
<td>The mean score for PT group was significantly different from the TE group; the mean score for IT group was significantly different from TE group. There was no statistically significant difference between PT and IT groups.</td>
</tr>
<tr>
<td>Media English</td>
<td>The mean score for IT group was significantly different from both TE and PT group. There was no statistically significant difference between PT and TE groups.</td>
</tr>
<tr>
<td>Principles of High School Lesson Planning (Held in Persian)</td>
<td>The mean score for IT group was significantly different from both TE and PT group. There was no statistically significant difference between PT and TE groups.</td>
</tr>
<tr>
<td>Oral Reproduction of Short Stories</td>
<td>The mean score for PT group was significantly different from the TE group; the mean score for IT group was significantly different from TE group. There was no statistically significant difference between PT and IT groups.</td>
</tr>
<tr>
<td>Materials Development (Held in Persian)</td>
<td>The mean score for IT group was significantly different from both TE and PT groups. There was no statistically significant difference between PT and TE groups.</td>
</tr>
<tr>
<td>Research Methodology</td>
<td>The mean score for PT group was significantly different from the TE group; the mean score for IT group was significantly different from TE group. There was no statistically significant difference between PT and IT groups.</td>
</tr>
<tr>
<td>Materials Evaluation</td>
<td>The mean score for IT group was significantly different from both TE and PT groups. There was no statistically significant difference between PT and TE groups.</td>
</tr>
</tbody>
</table>

Note: PT: Pre-service Teachers; TE: Teacher Educators; IT: In-service Teachers

As Tables 1 and 2 indicate, there were significant differences among the three groups of participants with regard to Language Study Skills, Phonetics and Phonology, Media English, Principles of High School Lesson Planning, Oral Reproduction of Short Stories, Material Development, Research Methodology, and Material Evaluation courses in this teacher education program. In the rest of the courses, no significant difference was found among the participants.

The results can be also approached from another perspective, namely, the participants’ opinions with regard to maintaining the courses in or excluding them from the program. In this respect, the mean scores for each course were divided into three categories (1-4, 4.1-7, and 7.1-10). The first category (1-4) indicated the participants’ agreement on excluding the courses. The second category (4.1-7) indicated the participants’ uncertainty about maintaining or excluding the courses, and the last category (7.1-10) indicated the participants’ agreement on maintaining the courses. Table 3 provides the findings on this aspect of this study.
Table 3
Stakeholders’ attitudes on maintaining or excluding courses in teacher education program in TEFL

<table>
<thead>
<tr>
<th>Pre-service teachers</th>
<th>In-service teachers</th>
<th>Teacher educators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 – 4.0 Item</td>
<td>Items</td>
<td>Items</td>
</tr>
<tr>
<td>23, 15, 18, 43, 45, 47</td>
<td>3, 23, 43, 47, 15, 18, 45</td>
<td>23, 15, 18, 45, 47</td>
</tr>
<tr>
<td>4.1 – 7.0 Items</td>
<td>Items</td>
<td>Items</td>
</tr>
<tr>
<td>3, 22, 29, 31, 38</td>
<td>14, 22, 24, 28, 29, 31, 35, 36, 38, 40</td>
<td>22, 31, 38, 43</td>
</tr>
<tr>
<td>7.1 – 10.0 Items</td>
<td>Items</td>
<td>Items</td>
</tr>
<tr>
<td>1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 19, 20, 21, 24, 25, 26, 27, 28, 30, 32, 33, 34, 35, 36, 37, 39, 40, 41, 42, 44, 46</td>
<td>1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 19, 20, 21, 24, 25, 26, 27, 30, 32, 33, 34, 37, 39, 41, 42, 44, 46</td>
<td>33, 34, 35, 36, 37, 39, 40, 41, 42, 44, 46</td>
</tr>
</tbody>
</table>

The results suggested that the participants did not have significantly different attitudes towards the relevance of the majority (83%) of the courses presented in the BA program in TEFL at FUs to their use in the teaching context. In other words, the participants had significantly different attitudes towards only 17% of the courses. The insignificant results among the participants in 83% of the courses imply a consensus among them with regard to these courses. The consensus includes both negative and positive attitudes among the participants, which will be discussed later. The significant results, however, is much more worthy of noting and, hence, require an in-depth discussion.

Discussion

The first significant result was related to the course entitled “Study skills” (item 3). This course instructed the students on the basic skills in order to have an efficient study. For instance, it provided the learners with lessons focusing on how to use the dictionary, what the appropriate study place is, or how to take notes while studying. Both pre-service and in-service teachers ranked this course as redundant, while the teacher educators held more favourable ideas on its inclusion in the program. This may be due to the possibility that the student teachers felt competent enough in those skills and therefore found it useless. The in-service teachers’ low ranks in this regard could be attributable to the course’s irrelevancy to their authentic teaching practices. The teacher educators, however, might have given a higher score in comparison to the other groups since, as stated in a number of comments, they felt the necessity for the BA students to be familiarized well enough with the fundamental study skills.

The second significant result was found in “Phonology” course (item 14). In this course, the learners were provided with rudimentary information about the phonology and phonetics of the language. The significant result was due to the difference between the in-service teachers and the other two groups. That is, the pre-service and teacher educators both gave a lower rate to this course in comparison to the in-service teachers. The reason the trainers were more in favour of this course may be that the teacher educators see the teachers’ pronunciation and accent as models for students whom they teach. This is, indeed, what a number of teacher educators stated in their comments. A
few of the teacher educators also found this course beneficial to student teachers in their future teaching recruitment in private language schools. In Iran, as well as in many other countries, a native-like pronunciation is considered a plus if not a must for teachers. As Medgyes (2001) states, native or native-like teachers benefit from more job opportunities compared with the ones whose pronunciation and accent is not native-like. Therefore, as pronunciation is an inseparable and prominent component of a native-like proficiency, the teacher educators might have rated this course as highly significant. The pre-service teachers stated their willingness to work in the private sector after graduation along their teaching in public schools. The comments by the student teachers were similar in content to those provided by teacher educators, that is, there is a relationship between native-like pronunciation and job opportunities in private language schools. In addition, a good number of pre-service teachers found native-like pronunciation as a prestige-enhancing aspect. The reason for in-service teachers’ negative attitudes toward this course can be attributed to their recruitments in public schools. In these schools, teachers are not evaluated based on their pronunciation. In fact, the student teachers at FUs are guaranteed a teaching job at public schools regardless of their pronunciation. This is reflected in the comments the in-service teachers have provided for this course.

The third significant result was observed in the “Media English” course (item 24). In this course, the students are provided with authentic news pieces in both written and oral modes and they are expected to comprehend the discourse of the news. The pre-service teachers and teacher educators gave significantly higher scores as compared with the in-service teachers for the aforementioned course. As declared by in-service teachers and teacher educators, Media English course has a great contribution in improving the proficiency of the teachers. Moreover, a number of pre-service teachers commented that understanding media English makes them stand out among the majority of English teachers in Iran. The main reason may be the fact that a majority of Iranian teachers are not proficient enough in media English comprehension. In contrast, the in-service teachers found this course ineffective in the teaching context. In their idea, the course has the least relevance to their real professions in schools. Instead, they suggested that Media English could be replaced by courses such as classroom management, teaching language components, and real class observation and report, particularly, in public schools. For this purpose, it was suggested that it may be more helpful to incorporate some language teaching courses in pre-service programs. They also proposed that more courses related to micro-teaching be included in the program so that the pre-service teachers would be readier for the real teaching practice in the classroom. What is implicit in those comments is that this course is not aligned with the realities of the teaching context. This finding is in line with Seferoglu’s (2006) and Adamson’s (2012) claim that the pre-service teacher education programs, in some cases, do not simulate the teaching setting. And if this occurs, teachers will not be sufficiently prepared for the real teaching practice (Seferoglu, 2006). Similarly, Freeman and Johnson (1998) stressed the importance of making teachers familiar with the realities of the social context of learning, in this case public school classes, since it is an essential feature of learning and teaching process.

Another significant result was observed in “Principles of High School Lesson Plans” course (item 28). In this course, students get familiar with the most essential principles in lesson planning for high school. The pre-service and teacher educators both rated this course as the most relevant course, while the in-service teachers considered the course as the least appropriate one. In-service teachers’ attitudes toward this course is
not surprising since, in most cases, Iranian teachers are provided with a pre-packaged lesson plan suggested by The Ministry of Education at the beginning of the school year and are required to follow it step by step without making any changes in it. The interesting point in this respect was the comments provided by some in-service teachers. These teachers mostly stated that including this course in the BA program was very useful for teachers. However, the educational system in Iran, in a way, prevents the teachers from developing their own lesson plans. These teachers also stated that, in most cases, they were not in favour of the lesson plans provided by The Ministry of Education as they found many defects in these lesson plans which resulted in a poor quality of teaching. Based on these reasons, the in-service teachers might have given a low score to this course. Among the teachers, some argued that they would have given a high score to this course if they could indeed make use of it in their teaching context (i.e., high schools).

The pre-service teachers, however, did not seem to have a true perception of the realities of the teaching context (i.e., high school), in Iran. This was observed in the comments provided by a few of the participants in this group. There were some pre-service teachers whose comments opposed the ones provided by the in-service teachers. For instance, one of the participants wrote “I’m happy that I’ve studied this course. I think I can develop great lesson plans for my classes in school”. There was another participant who held a similar attitude “This course was one of the best courses we passed in BA. Being familiar with the principles of lesson planning, I can be different from the teachers in school, of course in a good way. Great classes need great lesson plans. I can give this course even a rating above the maximum”. Based on such comments, it seems that these pre-service teachers are not adequately aware that they will have few opportunities to develop their own lesson plans or even revise the one provided by The Ministry of Education. Having found this course very useful, which is in line with the opinions of in-service teachers, and is accompanied with an unawareness of the realities of the teaching context (excluding the in-service teachers), the pre-service teachers might have given a high score to this course.

The very high score given by teacher educators to this course indicates that they believed in the usefulness and necessity of this course to teachers. It goes without saying that the very basic requirement of running any class is a well-structured lesson plan which is developed based on the needs and characteristics of that class. As a result, the teacher educators felt the need to pay extra attention to the aforementioned course and not overlook its requirements. As teacher educators, it would be ignorant of them to neglect this fact and undervalue the importance of this course. The comments provided by two teacher educators in this regard are worthy of noting. The two teacher educators stated that it is a pity that teachers in schools are not allowed to develop their own lesson plans. These comments support the ideas of in-service teachers in that this course has little to do in the real context, although it is of high importance in any classroom context.

The same findings and discussion also hold true for “Material Development” course (item 35). Similar comments were also found for this course indicating that in-service teachers have true understanding of the realities of the teaching context, while their counterparts (pre-service teachers) do not always have these true perceptions. This could be due to their lack of involvement in the real teaching practice in the target teaching context.
The next significant result was found in the course entitled “Oral Reproduction of Short Stories” (item 29). In this course, the students are required to retell stories orally in class. The pre- and in-service teachers both gave a significantly lower priority to this course as compared to the teacher educators. It is possible that in-service teachers had not found this course useful in their teaching context, since it did not add anything to their teaching strengths. The pre-service teachers might have had the same opinion, since they have experienced seven years of studying English at school and have not observed their teachers telling stories in the class. In a comment, one of the pre-service teachers argued that “I have never seen any of my English teachers tell stories to us in any classes. And I don’t think I would ever need to tell any English stories in my classes. I don’t understand why we need to pass this course at university.” The teacher educators, on the other hand, believed that this course could contribute to students’ improvements in general English proficiency and fluency.

The next significant result was related to the “Research Methodology” course. The in-service teachers gave a significantly lower score to this course in comparison to pre-service teachers and teacher educators. The reason may be ascribable to the fact that research has no place in public schools in Iran. As in-service teachers put it, conducting research could be constructive within the class as it could alleviate some of the common problems in the teaching context. However, as the teachers found the research results inapplicable in the classroom setting, they mostly lacked the necessary motivation to carry out research. A few of the in-service teachers also stated that they wished there had been a committee in The Ministry of Education to which they could report the research findings so that the Ministry would possibly consider those results in their policies. As it was discussed earlier, pre-service teachers sometimes may harbour false perceptions of the teaching context. Teacher educators, on the other hand, viewed research, particularly the action research, as an indispensable characteristic of an efficient teacher.

“Material Evaluation” course can also be discussed from the same perspective. Such findings, in general, indicated that in-service teachers’ opinions should be taken into account when designing and preparing courses for pre-service teachers at FUs. The main reason for this may be the fact that in-service teachers are directly involved in the teaching practice in the target context and, therefore, have true perceptions of the realities of these contexts.

Moreover, the data can be approached from a different perspective. The comments of the participants can be employed as a help in the maintenance or omission of the program. This fact underscores the importance of the insignificant findings. Accordingly, the courses can be categorized into three major groups (group 1: 1-4, group 2: 4.1-7, group 3: 7.1-10, see Table 3).

The findings indicated that all the courses related to English literature lay in the first group. This means that the participants have opted for the omission of these courses from the program. This might be caused by the fact that literary courses have no use in the teaching practice of the teachers in the real context. This finding is in line with Al-Gaeed (1983) who reported that the pre-service and in-service teachers considered the literary courses as irrelevant to their preparation.

The other course for which similar results were obtained was the “Typing” course. This finding is not surprising as typing has little place in teaching language in Iranian schools. The comments provided by some participants give support to this interpretation. The participants’ opinions about the omission of typing and literary courses indicate
that these courses do not foster sustainable ability as far the job at hand is concerned. This implies that presenting these courses for pre-service teachers is of no use for them in their future career as a teacher. It would be a better idea to replace these courses by ones that are more related to teaching, which are apparently more sustainable.

The findings related to the translation courses indicated that these courses fell within the second group in the above-mentioned categorization. The translation courses might not have immediate use in the teaching context. However, this course may be useful in translating texts from Persian to English or vice versa. Indeed, a number of participants expressed that this course helped them in their translation jobs.

All the other courses fell under the third category, which means that the participants were satisfied with their existence in BA program in TEFL. These courses were either related to teaching, such as Teaching Methodology course, general English courses, such as Reading and Grammar, or Linguistics courses. This finding was indeed anticipated as it is generally believed these are the fundamental courses for a teacher preparation program.

Taking the ideas of in-service teachers into account can result in a more sustainable teacher education program since they are already in the job and well familiar with the realities and challenges of the classroom and educational issues. Besides, gathering the data from the other two key stakeholders provides us with a more robust account of the educational system and its demands and, thus, leads to a more sustainable reform in the educational system.

**Implications, Conclusions and Debate of Future Research**

In this study, we aimed at exploring the Iranian pre-service and in-service teachers’ as well as teacher educators’ attitudes towards the teacher preparation programs at the BA level in TEFL at FUs. In addition, this research examined, from the participants’ perspective, whether the courses should be maintained, modified, or replaced by other courses.

In conclusion, this study found that the three groups of participants were unanimous in their evaluations of the majority of the courses, while their evaluative perceptions significantly varied for a small fraction of the courses in the program. The findings also revealed that the three groups harboured strikingly identical conceptions in maintaining and excluding some courses. The participants had a positive attitude towards the maintenance of most of the courses addressing teaching methodology and practice. Moreover, they were unanimous in omitting and replacing the courses related to translation and English literature. They also believed that there is a need for inclusion of practical courses like practice- and micro-teachings as well as real classroom observations. The in-service teachers had a negative attitude toward the courses that did not have practical nature in their classrooms, even the ones that are related to teaching practice, methodology, and planning but are of no immediate use in the classroom. The pre-service teachers and teacher educators found only the courses that are not related to teaching, that is, literary courses and typing, as irrelevant and suggested that these courses be amended or even be replaced by some other courses.

The results of the study provide some pedagogical implications that can be of help for EFL teacher educators, syllabus designer, and policy makers at universities. The findings of this study can contribute to re-evaluation of the courses presented in English
Language Teacher Education Programs so that the courses that are not related to the teaching, like courses related to literature and translation, would be excluded and amended. Furthermore, based on the findings, it is suggested that the courses which are related to teaching but not aligned with the realities of the teaching context can be improved in a way that they match the goals of the program and the teaching context in real classrooms. The in-service teachers’ opinions, as the ones who are in direct contact with the classroom context and are well familiar with the realities and challenges of EFL classes at schools as well as the educational issues, should also be considered in setting educational policies and selecting the courses to be taught at universities. Through catering to the program evaluations of these key stakeholders, one could craft a more tailored teacher education program in similar contexts. Besides, exploring the program evaluation views of the other two key stakeholders provides us with a more robust mosaic picture of how this program is viewed in Iran.

References


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Appendix

Teacher Education Program Evaluation Questionnaire (Adapted from Peacock, 2009)

Thank you very much for taking part in this survey. Your participation is voluntary, and confidential treatment of your information is guaranteed by the researchers. The results will be discussed and published in whole, and if presented individually, it would be done so without revealing any personal details. Participation in this study causes no harm or danger. The results are going to be published and, thus, used by those who are interested.

This questionnaire is designed to evaluate the courses given to the university students at Farhangian teacher education programs in Iran. The purpose is to see if these courses should be maintained, improved or excluded or need replacements. In the first column, you evaluate the course by Fridman Rank Order scale, giving 1-10 relevance scale, that is, if you think the most relevance of the given course, give 10 and the least one receives 1, followed by four other columns. In the second column, you can agree on maintaining the course if you think that the individual course meets the student teachers’ needs while the third column focuses on the improvement. It happens when the participants believe that the course is necessary for student teachers to cover but either in content or the way of performing or even the authenticity of the course needs some changes and also the part needs special changes, in other words, what aspects regarding that course require improvement. The same judgement occurs on the forth column, that is to say, the participants decide on the exclusion of the course and finally tentative replacement which seem optional.

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Credit Num.</th>
<th>Scale of Relevance 1-10</th>
<th>Maintain (specify it)</th>
<th>Improve</th>
<th>Exclude</th>
<th>Tentative Replacement</th>
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<tbody>
<tr>
<td><strong>Semester one</strong></td>
<td></td>
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<tr>
<td>1. Reading Comprehension (1)*</td>
<td>4</td>
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<tr>
<td>2. Grammar (1)**</td>
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<tr>
<td>3. Language Study Skill**</td>
<td>2</td>
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<td><strong>Semester two</strong></td>
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<tr>
<td>4. Reading Comprehension (2)**</td>
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<tr>
<td>5. Grammar (2)**</td>
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<tr>
<td>6. Psychology (held in Persian)**</td>
<td>2</td>
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<td><strong>Semester three</strong></td>
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<tr>
<td>7. Conversation (1)**</td>
<td>4</td>
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<tr>
<td>8. Language Grammar (3)**</td>
<td>2</td>
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<tr>
<td>9. Writing (1) (Basic Writing)**</td>
<td>2</td>
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<td>10. Reading Comprehension (3)**</td>
<td>4</td>
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<tr>
<td>11. Language Teaching Method-ology (held in Persian)**</td>
<td>4</td>
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<tr>
<td>12. Childhood and Young Adult Psychology***</td>
<td>2</td>
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<td><strong>Semester four</strong></td>
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<tr>
<td>13. Conversation (2)**</td>
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<thead>
<tr>
<th>Course Title</th>
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<tbody>
<tr>
<td><strong>Key Stakeholders’ Attitudes towards Teacher Education Programs in TEFL</strong></td>
<td></td>
</tr>
<tr>
<td>14. Phonetics &amp; phonology**</td>
<td>2</td>
</tr>
<tr>
<td>15. Simple Prose**</td>
<td>2</td>
</tr>
<tr>
<td>16. Linguistics (1)**</td>
<td>2</td>
</tr>
<tr>
<td>17. Writing (1)**</td>
<td>2</td>
</tr>
<tr>
<td>18. Simple Poetry**</td>
<td>2</td>
</tr>
<tr>
<td>19. Advanced Reading Comprehension (4)**</td>
<td>2</td>
</tr>
<tr>
<td>20. Mentoring &amp; Counselling (held in Persian)**</td>
<td>2</td>
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<td><strong>Semester Five</strong></td>
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<td>21. Linguistics (2)**</td>
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<tr>
<td>22. Translation Principles**</td>
<td>2</td>
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<tr>
<td>23. Typing**</td>
<td>2</td>
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<tr>
<td>24. Media English**</td>
<td>2</td>
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<tr>
<td>25. Topic Based Conversation**</td>
<td>2</td>
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<tr>
<td>26. Conversation (3)**</td>
<td>2</td>
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<tr>
<td>27. Writing (2)**</td>
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<td>28. Principles of High School Lesson Planning (held in Persian)**</td>
<td>2</td>
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<tr>
<td><strong>Semester Six</strong></td>
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<tr>
<td>29. Oral Reproduction of Short Stories**</td>
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<tr>
<td>30. Conversation (4)**</td>
<td>2</td>
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<tr>
<td>31. Translation (1)**</td>
<td>2</td>
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<tr>
<td>32. Language Idioms and Expressions**</td>
<td>2</td>
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<tr>
<td>33. Teaching Methodology (theories)*</td>
<td>4</td>
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<tr>
<td>34. Contrastive Analysis**</td>
<td>2</td>
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<td>35. Material Development (held in Persian)**</td>
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<tr>
<td>36. Research Methodology**</td>
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<td>37. Educational Management (held in Persian)**</td>
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<td>38. Translation (2)**</td>
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<td>39. Teaching Language Skills**</td>
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<tr>
<td>40. Materials Evaluation**</td>
<td>2</td>
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<td>41. Practical Teaching (1)**</td>
<td>2</td>
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<tr>
<td>42. Error Analysis**</td>
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<td>43. English Literature (1)**</td>
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<tr>
<td><strong>Semester Eight</strong></td>
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<td>44. Practical Teaching (2)**</td>
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<tr>
<td>45. English Language Literature (2)**</td>
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<table>
<thead>
<tr>
<th>Course Number</th>
<th>Aspect(s) to modify</th>
<th>Notes: * = Specific Course, ** = Main Course, *** = Educational Psychology Courses (taken by all fields at Farhangian teacher education universities in Iran)</th>
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<tbody>
<tr>
<td>46. Testing*</td>
<td>2</td>
<td></td>
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<tr>
<td>47. English Literature (2)**</td>
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</table>

Courses Needing Improvement

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Aspect(s) to modify</th>
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Suggested Additional ideas for Inclusion

1. ..............................................................................................................................................................
2. ..............................................................................................................................................................

Thanks for Your Participation
Assessing the Infusion of Sustainability Principles into University Curricula

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University of Padova, Italy

Theodora De Baz
Hashemite University, Jordan

Hala Alshawa
Amman University of Jordan, Jordan

Abstract

The current paper presents the assessment of the infusion of sustainability principles into university curricula at two Jordanian universities. The peer review process of revising the curricula infusing sustainability principles is also discussed. The research methodology involved quantitative methods to assess the revised courses. The results revealed the following: the most relevant ESD themes in the revised curricula were “human connections to the physical and natural world”, and “ethics/values”. The most relevant ESD topics were: “sustainable production/consumption” and “health promotion”. The most infused ESD pillars (competencies) were: “learning to know” and “learning to do”. The most relevant ESD principles were: “practiced locally” and “responds through applied learning”. The findings offered a rich scenario of the strategies applied by the university professors in revising the curricula, providing evidence of a mental attitude to adopt ESD strategies, as well as a goal-oriented approach in curriculum planning. The paper also discusses the implications of the study results for syllabus revision and development, as well as the refinement of the teaching methods that focus on infusing sustainability into university curricula.

Keywords: education for sustainable development, higher education, professional development, curricula revision, Reorient University Curricula to Address Sustainability (RUCAS)

Introduction

A key outcome of the United Nations World Summit on Sustainable Development was the establishment of a special United Nations Decade of Education for Sustainable Development (UNDESD) from 2005 to 2014. The central concern of the UNDESD was to integrate principles, values, and practices of sustainable development into all aspects of teaching and learning (Biasutti & Surian, 2012; Pipere, Veisson, & Salite, 2015).
Higher education institutions in the Arab region faced challenges related to the slow progress of the implementation of the UNDESD. This was due to a number of barriers such as limited staff awareness and expertise, lack of appropriate curricula, traditional teaching methods and materials to address Education for Sustainable Development (ESD). In response to these needs and priorities, the three-year Tempus project coordinated by Prof. Makrakis of Crete University, entitled Reorient University Curricula to Address Sustainability (RUCAS), was launched on October 2010. The RUCAS project was funded by the European Commission and aimed to support the development of ESD in six higher education institutions from the Arab region (Egypt, Jordan, and Lebanon), with the assistance of five EU higher education institutions from France, Greece, Ireland, Italy, and Sweden. The main goals of the project were: to build capacity among university teaching staff to embed ESD in curricula and pedagogy, to review and revise undergraduate curricula to address ESD in line with Bologna and Lisbon processes, and to assist the coordination and dissemination of ESD policy, research, curriculum reform, and practice relating to ESD in the partner institutions (RUCAS, 2011). In addition, it was expected that the higher education institutions from the Arab region participating in the project would function as role models in the region.

The current study focuses on the assessment of the infusion of sustainability into the curricula at two Jordanian universities (which will be referred to as University 1 and University 2) in agreement with the UNDESD. The background of the revision process and course implementation is initially presented. The experimental part focuses on the assessment of the revised courses.

Background of the Revision Process and Course Implementation at University 1

Introducing ESD into University 1 curricula involved reviewing existing courses and teaching methods to address issues that were pertinent to education for sustainability. For this purpose, the infusion process was adopted, which implied re-orienting the existing courses and approaches to teaching and learning, so that concepts, contexts, principles, practices, and values of ESD were addressed (Kostoulas-Makrakis, 2010). The process entailed the integration of sustainability content, skills, methods and competencies into the existing course, not by adding another course, or jeopardising its integrity, where each discipline could be infused by sustainability principles, concepts and methods.

The infusion process was accomplished by faculty teaching staff who worked independently and in teams during the following three workshops: the first regional workshop was held in Beirut, Lebanon on 23–25 October 2011; the second regional workshop was held in Cairo, Egypt on 7–9 January 2012; and the third regional workshop was held in Amman, Jordan on 17–19 April 2012. The focus of the first workshop held in Beirut was on training the participants on innovative teaching and learning methods and the processes for revising university curricula to address sustainability. The second workshop held in Cairo focused on discussing and reflecting on the revised syllabi developed by each educator to infuse sustainability in the institution’s curricula. The emphasis of the third workshop that took place in Amman was placed on examining the implementation process of the revised courses.

At University 1, the areas of curriculum revision included: educational sciences, social sciences, engineering, information technology, and applied sciences. The process
began with revising the learning goals and objectives addressed in the templates of course syllabi to find out whether they were clearly stated in the different subject areas. The next step was going over the course learning outcomes and checking whether the sustainability competencies were addressed and aligned with the five pillars of sustainability competencies: learning to know, learning to do, learning to be, learning to live together, and learning to transform oneself and society (Delors, 1996). The third step was to determine the extent to which the course outcomes focused on the following critical sustainability themes: scale-time, human connections to the physical and natural world, ethics and values, functioning of natural systems, technological and economic relationships to sustainability, and motivating environmentally sustainable behaviour. Through the revision process, emphasis was placed to ensure that the themes included within the courses fit the environmental, social, and economical aspects of sustainability contextualised in the local and regional conditions. To effectively implement the courses, the following ESD principles or criteria were considered:

- Interdisciplinary, cross-disciplinary, and holistic approaches;
- Approaches based on authentic learning;
- Value-driven and ethics based principles;
- Approaches focused on experiential, constructivist, and transformative learning;
- Multi-methodological principles;
- Participatory decision-making approaches;
- Locally relevant and culturally appropriate criteria;
- Approaches interconnecting local content with global and vice versa.

The revision process involved the determination of the most appropriate teaching and learning activities for each class session to facilitate the student learning. For example, the activities could be lectures, small group discussions, independent work, simulations, debates, case studies, role playing, demonstrations, experiential learning activities, instructional technologies, or collaborative learning work.

### Background of the Revision Process and Context of the Peer Review at University 2

The participants from University 2 revised their courses according to the syllabus template that was available from the RUCAS Community of Practice (2013) website. This template consisted of information about:

1. Instructor, such as: instructor’s name and title, office location, telephone, office hours, e-mail, and website;
2. Course identifications, such as: course number, course title, course location, class times, prerequisites, and faculty web page;
3. Course description;
4. Course learning objectives;
5. Course content leaning outcomes;
6. Course resources;
7. Assignments and grading scheme;
8. Grading policy;
9. Course schedule.

The members of the team conducted several face-to-face meetings to discuss in depth the process of developing their own syllabi. During those meetings, they shared their
ideas and provided rich suggestions on how to integrate sustainability content, skills, and competences into the existing courses to address sustainability areas. After preparing the first draft of the syllabi, the members shared the syllabi with each other and got feedback.

The next step in the peer review was during the 2nd RUCAS regional workshop that was held in Cairo. The main aim of it was to finalise the revised course syllabi. University 2 participated with eleven syllabi from various disciplines of educational sciences, pharmacy, engineering, and business/economic sciences. During the workshop events, teaching staff from Egypt, Jordan, and Lebanon discussed and reflected on the revised syllabi that each member of the RUCAS Community of Practice had developed to infuse sustainability concepts in his/her institutional undergraduate curricula. Furthermore, experts from European Union universities, the National Tempus Office in Egypt, the UNESCO Regional Office in Beirut and the UNESCO Office in Cairo contributed to the peer review of the syllabi.

At University 2, the implementation of the revised syllabi started during the spring semester of the academic year 2011–2012. Many constraints were faced by the teaching staff, such as working with a large number of students, which was one of the main obstacles. The professors were able to overcome the obstacles with patience, hope, and strong will. In the beginning, it was hard due to several duties, but later on things went smoothly and every student knew what s/he was supposed to do and how to work. Another constraint was communicating with the local community foundations and institutions. Some administrations were not cooperative with the students and were not willing to let them in at all. Therefore, the university staff tried to speak to the administrations and explain the assignment. Sometimes the university had to write an official letter to the local community foundations and institutions for developing the collaboration. Some students had full schedules so that they were not able to finish all the assignments, which required field visits. The solution to this problem was giving the students many assignments and letting them decide what to choose based on their convenience. Classroom physical setting was also a problem especially for conducting group discussion, because the seats were stable but sometimes we announced to the students that we had to move to another classroom where we could remove and change the setting. Furthermore, some students were not used to this type of learning but later on they enjoyed it.

One of the methods used for improving the skills of the teaching staff during the RUCAS project was peer review of teaching. Peer review of teaching is an established technique for improving teaching and promoting professional development of professors.

**Peer Review of Teaching**

In recent years, teaching at the university has become more and more complex and required several skills, which include not only the knowledge of the discipline, but also mastering teaching techniques and methods. This situation determines the basic needs for the teachers to have support and a professional comparison in order to obtain a suitable level of their teaching skills. This is a crucial issue, which is related to the discussion of the more appropriate models to enrich the teaching quality standards. Recently, several approaches have been developed to promote the professional development of faculty staff based on peer review of teaching, which involves comparison and interaction with colleagues.
With regard to peer review definitions, there are different approaches and techniques (Buchanan & Stern, 2012), and for this reason it is difficult to give a precise definition. Several terms with a similar meaning are often used, such as peer evaluation, peer assessment, peer review, peer observation, and it is difficult to determine the precise differences among them. Lomas and Nicholls (2005) defined peer review of teaching as an intentional process with the aim to provide feedback as a “critical friend”. Peer review of teaching includes techniques based on peer collaboration and mutual respect rather than establishing dynamics of domination and superiority. During peer review, teaching styles and teaching plans are considered with constructive purposes, aiming to improve the quality of teaching. Feedback is based on a positive attitude analysing how to improve teaching strategies with the assumption to offer precious information for further didactic development. Such kind of positive feedback is usually considered valuable and inspiring.

With regard to the university context, there are several ways for developing peer review of teaching, which includes observations and discussions. However, only a few approaches have been assessed in order to determine the strengths and weaknesses of peer review of teaching. Tighe and Bradshaw (2013) reported three main models of peer review: an evaluation model, a developmental model and a collaborative model. The evaluation model is based on the assessment and “include appraisal to confirm probation, to identify under performance, for promotion purposes and as a quality assurance tool”. It is performed by an expert, who could be a faculty senior member and observe the colleague during teaching. With regard to the developmental model, it aims to improve teaching skills rather than only assess them, and it is based on professional development. The performer of the developmental model may be a teaching administrative official or an external expert. With regard to the collaborative model, “the observation is usually a mutual and reciprocal process, whereby both parties observe each other’s teaching and provide feedback which prompts dialogue and reflection. Aims of this model include to promote dialogue and discourse about teaching between peers, to stimulate innovation and to offer an opportunity for reflection.” (Tighe and Bradshaw, 2013, p. 1348). The collaborative model of peer review comprises the following three main phases:

“The pre-observation meeting, the observation of teaching and the post-observation meeting. The pre-observation meeting provides both participants with an opportunity to establish trust and clarify the purpose of the observation, deal with any anxieties, discuss involvement of students and agree timing of feedback. This meeting provides both individuals with time to prepare for the process through dialogue about expectations. The role of observer also carries responsibilities in relation to providing confidential early feedback in a manner that is supportive, valuable and identifies areas for improvement. Equality, mutuality and reflection are at the heart of a collaborative model of peer supported review of teaching. The observation of teaching is just one stage in the process; however it often gets the most recognition. Finally, the post-observation meeting is central to the model whereby both observed and observer discuss, analyse and reflect on the process and identify strengths and areas for improvement. A crucial part of the process is the discussion and feedback afterwards.” (Tighe and Bradshaw, 2013, p. 1348).
With regard to the strengths of peer review, Lomas and Nicholls (2005) in a case study found that university staff considered praiseworthy the collaborative peer review process for the possibility it offered them to think over their didactic activities. Peer review is connected with the reflective teacher paradigm proposed by Schön (1983), which is based on the teacher ability to reflect on their informal dimensions and their intuitive knowing. Peer observation develops the practice of reflection, enhancing metacognitive strategies and determining an individual growth and professional development as a teacher. Self-reflection practices promote a constructive learning environment based on support and collaboration through dialogue. Peer collaboration is an important aspect of the teacher profile and may offer support to beginner teachers, for developing their teaching strategies and their confidence in teaching.

The Current Research

Aims and Research Questions

Based on the background of the revision process and course implementation at two Jordanian universities the current study presents the assessment of the revised curricula verifying how the ESD principles were infused. The evaluation processes employed quantitative and qualitative data collection techniques. However, for the purposes of this study only the quantitative data are presented. With regard to the revised courses, the following research questions were considered:

- What were the most relevant ESD themes?
- What were the most relevant ESD topics?
- What were the most relevant ESD pillars (competencies)?
- What were the most relevant ESD principles?

A specific questionnaire was built to analyse the revised courses.

Method

To assess the progress in reorienting university curricula to address sustainability, a quantitative study design was used in the framework of the peer review models described above. Data were collected with a tool to perform a quantitative evaluation of specific aspects of the revised syllabi.

Procedure and Participants

The revised syllabi were sent via email to the evaluator enabling him to acquire a high level of familiarity with the topics and to develop the first draft of the assessment. The following seven syllabi were sent by University 1: applied developmental biology, concepts and methods of teaching biology, elementary science methods, multimedia programming, teaching science, the environment and community, and tissue culture.

The following 11 syllabi were sent by University 2: applied chromatography, designing and producing instructional materials, financial analysis, instrumental analysis, instructional materials for children, international finance, math concepts for generalist-2, medicinal chemistry-3 A, medicinal chemistry-3 B, metallurgical processes, properties of engineering lab.
After about one month of sending the syllabi, there were meetings held with four professors from University 1 and four professors from University 2. The four professors from University 1 were two males and two females and were teaching the following topics: biology, science teaching, and multimedia programming. The four professors from University 2 were one male and three females and were teaching the following topics: math teaching, international finance, finance analysis and multimedia programming. During the meetings, the revised syllabi were discussed with the aim to verify how the ESD principles were infused. In addition, meetings were an occasion for discussing teaching methods, principles, didactic processes and practices in ESD curriculum design in higher education.

The Assessment Tool

The Assessment Template (AT) was used as an assessment tool in the current research (see Appendix 1). The AT was developed by the research team directed by Prof. Makrakis within the framework of the RUCAS project. The AT was developed to assess the revised courses as a tool for self-peer-external assessment. The theoretical background of the AT is based on the reflective teacher paradigm by Schön (1983), in which the professors have to reflect on the processes involved in teaching/learning and not to consider teaching merely as a product. In this framework, teaching could be constantly further revised and improved, and critical reflection became the main instrument to ameliorate the quality of teaching. Critical reflection is a crucial activity, in which the instructor thinks upon his experiences, defining the strengths and the weaknesses of his actions. It is also a tool for developing metacognitive strategies and the control over the teaching actions (Biasutti, 2012, 2013, 2015; Biasutti & Frate, in press). The application of the reflective practice in ESD could be a method for implementing a dynamic transformation, in which the ESD principles are used as a driving force for curriculum planning.

The AT is composed of several parts, including quantitative and qualitative questions. The first part is composed of general questions such as a name of course instructor, course title, institution, country, name of the evaluator, and institution. The main quantitative part of the questionnaire is composed of the following five sections:

1. ESD themes;
2. ESD competencies;
3. Teaching strategies;
4. Assessment alignment;
5. ESD critical principles.

Section 1 is composed of two parts. The first part included the following themes: scale, human connections to the physical and natural world, ethics and values, functioning of natural systems, technological and economic relationships to development, motivating sustainable behaviour and pedagogical strategies for integrating sustainability. The second part is composed of the following topics: natural resource management (water, forest, agriculture, biodiversity), climate change, disaster prevention and mitigation, energy management, citizen participation and good governance, wellbeing and poverty reduction, indigenous knowledge and ethnic groups, sustainable urbanisation, sustainable production/consumption, cultural diversity, gender equality, peace and human security, health promotion, human rights, sustainable agriculture, corporate responsibility and other theme (please specify). It was asked to tick the box if the ESD theme was integrated.
in the revised course and to indicate the percentage of the revised course that addressed each theme (0–100%).

In Section 2, it was asked to insert the course learning outcomes from the revised course and to tick if the five ESD competencies (1. Learning to Know; 2. Learning to Do; 3. Learning to Be; 4. Learning to Live Together; 5. Learning to Transform Oneself and Society) were explicitly or implicitly addressed by the learning outcomes within the revised course. In addition, the degree of the expected overall mastery of each competency should be evaluated according to a three-level scale (low level, medium level or high level of integration).

In Section 3, it was asked to evaluate the teaching and learning strategies used within the revised course, and their frequency of use based on a 5-point Likert scale (not used at all, rarely used, used sometimes, used quite often, used very often). The task was closed since a list with the following teaching strategies was presented: lecturing, project-based learning, interactive engagement, case-based instruction, inquiry-based learning, interdisciplinary teaching, problem-based learning, tech-supported instruction, placed-based learning, discovery learning, role plays & simulations, group discussion, stimulus activities, debates, critical incidents, case studies, reflective/reflexive accounts, fieldwork & outdoor learning, modelling good practice. In addition, the following open question was presented: “Other: please detail any other teaching and learning strategy that has not been listed above here.”

In Section 4, it was asked to indicate the different modes of assessment that had been used in the course, for example, examination, essay, project, portfolio, oral presentation, group presentation, etc. In addition, participants were asked to list the learning outcome/s that each mode of assessment was related to.

Section 5 included the following 11 ESD principles: 1: Emphasises system thinking; 2: Practised locally; 3: Extended globally; 4: Focuses on community; 5: Highlights connections; 6: Nurtures personal and social responsibility; 7: Fosters transformation; 8: Clarifies one’s own values; 9: Envisions more positive and sustainable future; 10: Responds through applied learning; 11: Explores the dialectic between tradition and innovation. Two tasks were asked: to tick the box below if each critical principle was explicitly or implicitly integrated in the revised course and to explain how the ESD principle was addressed or was not addressed in the revised course.

The last part of the questionnaire was qualitative and comprised the following three sections:

6. Dimensions of Sustainable Development (Please explain how the four dimensions of Sustainability – Social, Environmental, Economic or Cultural – explicitly or implicitly were addressed within this revised course).

7. Critical reflection (Please summarise the recorded incidents applied for the formative assessment of the revised course during its implementation and the changes that occurred).

8. Overall suggestions (Please summarise the general proposed suggestions for the further improvement of the course revised).

These questions induced a range of qualitative comments by participants and offered a variety of insights into the strengths and weaknesses the ESD infusion process.
Results

In this section, the data of the AT are presented addressing the four research questions described above. The quantitative data were analysed using descriptive statistics. For the purposes of this study, only the quantitative data are presented for sections 1) ESD themes and topics; 2) ESD competencies; and 5) ESD principles.

With regard to University 1, seven revised syllabi within the disciplines of biology, science teaching, and multimedia programming were reviewed for the purpose of this interim evaluation. With regard to University 2, eleven revised syllabi within the disciplines of math teaching, international finance, finance analysis and multimedia programming were reviewed for the purpose of this interim evaluation. All courses have infused sustainability, some to a great extent. In the following sections, the details of this progress are reported.

**ESD Theme Coverage.** With regard to Section 1 (ESD themes), part one of the AT, the results are reported in Table 1. As you can see in Table 1, for University 1 all the seven ESD themes are very well covered – only the themes “Functioning of natural systems” and “Technological and economic relationships to development” appear a bit less addressed.

For University 2, the ESD themes infused in the revised course covered a wide range of ESD themes across all the disciplines. The themes “Human connections to physical and natural world”, “Ethics and values” and “Technological and economic relationship to development” are well addressed, while the theme “Functioning of natural systems” is less well addressed.

### Table 1
**ESD Themes Infused in the Revised Courses at the Two Universities**

<table>
<thead>
<tr>
<th>ESD themes in the revised course</th>
<th>University 1</th>
<th>University 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Scale</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>2. Human connections to the physical and natural world</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>3. Ethics and values</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>4. Functioning of natural systems</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>5. Technological and economic relationships to development</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6. Motivating sustainable behaviour</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>7. Pedagogical strategies for integrating sustainability</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>

**ESD Topic Coverage.** With regard to Section 1 (ESD topics), part two of the AT, the results are reported in Table 2. As you can see in Table 2, for University 1 a wide range of ESD topics across all the disciplines were covered. Only the topic “Indigenous knowledge and ethnic groups” was not addressed at all by any course. Also for University 2 there is a wide range across the disciplines of ESD topics infused in the revised course and “Health promotion” and “Sustainable production/consumption” are the most well addressed. Only one of the ESD topics “Natural resource management (water, forest, agriculture, biodiversity)” was not considered by any of the revised courses at University 2.
Table 2
ESD Topics Infused in the Revised Courses at the Two Universities

<table>
<thead>
<tr>
<th>ESD topics</th>
<th>University 1</th>
<th>University 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Natural resource management (water, forest, agriculture, biodiversity)</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>2. Climate change, disaster prevention and mitigation</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>3. Energy management</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>4. Citizen participation and good governance</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>5. Wellbeing and poverty reduction</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6. Indigenous knowledge and ethnic groups</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>7. Sustainable urbanization</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>8. Sustainable production/consumption</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. Cultural diversity</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>10. Gender equality</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>11. Peace and human security</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>12. Health promotion</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>13. Human rights</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>14. Sustainable agriculture</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>15. Corporate responsibility</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>16. Other themes</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

ESD Pillars of Learning. With regard to Section 2 (ESD competencies) of the AT, the results are reported in Table 3. As you can see in Table 3, for University 1 all the seven ESD pillars are very well covered with an emphasis on the first two pillars (learning to know and learning to do), which are the basic ones. At University 2, there is an emphasis on preparing learners to know and to do. There is less emphasis on preparing learning to reflect on its own value basis (learning to be), or on how learners can contribute to peacefully “live together”, or on how learners can act as agents of change. It would be interesting to reflect upon the right strategies for developing such kind of processes within the specific topic. Defining the appropriate didactic methods is an important step for implementing these skills during the course.

Table 3
ESD Pillars Infused in the Revised Courses at the Two Universities

<table>
<thead>
<tr>
<th>ESD pillars infused in the revised course</th>
<th>University 1</th>
<th>University 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Learning to know</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>2. Learning to do</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>3. Learning to be</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>4. Learning to live together</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>5. Learning to transform oneself and society</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

ESD Principles. With regard to Section 5 (ESD critical principles) of the AT, the results are reported in Table 4. As you can see in Table 4, there is a wide range of ESD principles that are covered across all the disciplines. For University 1 only the principle “highlights connections” is less addressed. The principles “focuses on community”, “nurture personal and social responsibility”, “clarifies one’s own values” and “envisions more positive and sustainable future” were addressed by all the courses. As far as Univer-
Assessing the Infusion of Sustainability Principles into University Curricula

Table 4

<table>
<thead>
<tr>
<th>ESD principles infused in the revised course</th>
<th>University 1</th>
<th>University 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Emphasises system thinking</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>2. Practiced locally</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>3. Extended globally</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4. Focuses on community</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>5. Highlights connections</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>6. Nurtures personal and social responsibility</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>7. Fosters transformation</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>8. Clarifies one’s own values</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>9. Envisions more positive and sustainable future</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>10. Responds through applied learning</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>11. Explores the dialectic between tradition and innovation</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Meetings with the professors at the two universities provided evidence of the great work done for infusing sustainability in their university curricula. There was evidence of the professors’ awareness of their professional development as an effect in participating in the RUCAS project. The teaching staff members participating in the project were very well informed on relevance of sustainability within their respective disciplines. Many courses infused ethics and motivated sustainable behaviour. In discussions with management, there was a high degree of interest to the infusion of sustainability in all aspects of university life.

The overall conclusion is that the teaching staff demonstrated high awareness and skills necessary for infusing sustainability in their syllabi. This was not only from a theoretical perspective but also from an applied point of view, since many courses infused ethics and motivated sustainable behaviour. A general recommendation is to continue working in this direction and involve more colleagues in the process of curricula revision.

With regard to the general areas for improvement, there were the following other issues:

- There were differences in the syllabi concerning the number of course learning objectives: probably too many in some cases. Course learning objectives were linked to assessment; measurable, evaluable, clear and specific objectives helped define the assessment phase;
- Assignment brief had to be more detailed in the syllabi;
- In a few cases, the course overview informed that sustainability was infused, but not listed within the learning outcomes or detailed in the course schedule. This was made clearer in discussions with the teaching staff;
- The scheduled course needed to be more detailed (topics);
- Four syllabi had the “course description/overview” section in the Arab language and could not be understood;
• The way of involving students in reflection on the importance of ESD principles and the process of their application in the future profession;
• Supporting students to develop the metacognitive skills for becoming conscious transformation agents of self and society.

Discussion

Several aspects emerged from the assessment using the AT questionnaire. With respect to Section 1, part one (ESD themes) of the AT, the results showed that the themes of “Human connection to physical and natural world”, “Ethics and values”, “Pedagogical strategies for integrating sustainability” and “Technological and economic relationship to development” were well addressed by all the revised courses, whereas the theme of “Functioning of natural systems” was less addressed. This finding can be explained by the fact that the type of the revised courses is not directly related to the functions of the natural systems. As mentioned earlier, the revised courses were offered by the Faculty of Educational Sciences and the Faculty of Business and Administration. Furthermore, this result can be explained by the fact that ethics and values are very important in our lives (Frenz, 2012), especially as the vast amount of information and knowledge has become easily accessible through technological tools and resources. In addition, this result agrees with the findings of Moore’s (2011) study dealing with ethics in education. Nowadays no one owns the knowledge. It is crucial to emphasise on ethics and values in the revised syllabi. The theme “Pedagogical strategies for integrating sustainability” was also highly considered probably because it was one of the relevant issues in this revision process. Technology has become essential in our daily life, starting from early age we notice that children are attached to technology. Many studies showed that using technology in teaching affected students’ learning abilities and improved their motivation towards learning as well as helped students develop high level of thinking skills (Kapenieks, & Salite, 2012; Makrakis, Gkotzos, & Larios, 2012; Makrakis, & Kostoulas-Makrakis, 2012).

With respect to Section 1, part two (ESD topics) of the AT, the results indicated that “Health promotion” and “Sustainable production/consumption” were well addressed by all the syllabi. The reason could be because the revised courses were connected to human beings and their everyday lives, while the topic “Natural resource management” was not addressed. This could be explained by the fact that the nature of the course content where the topic “Natural resource management” was not addressed.

With respect to Section 2 (ESD competencies) of the AT, the most infused ESD pillars were “learning to know” and “learning to do”. For Section 5 (ESD critical principles) of the AT, the results showed an emphasis on “practices locally”, and “responds through Applied Learning” in all the syllabi. This could be explained by the fact that mastering skills (how to do) was very important for students seeking jobs after graduation. We can see that job market now focuses more on skills and competencies rather than on knowledge. Sisley (2010) stated that market needs changed dramatically due many reasons and education was one of those reasons. However, Franklin (2010) pointed out that skills were important to ease gaining a job. According to Madson (2013), we as instructors cannot demonstrate skills without introducing the basic knowledge about these skills. Moreover, students need to know the skills before learning how to practice them (Dembo, 2000).
In this study, the AT was applied as an assessment tool for the revised syllabi. The results may vary or change when applying different instruments, such as interviewing selective students enrolled in the revised courses and asking them what they think of sustainability and what are the competencies that they have acquired from studying the revised courses. Another suggestion is using surveys such as the Attitudes toward Sustainable Development scale (Biasutti and Frate, in press) to collect data from the students enrolled in the revised courses for triangulating the results. We can also analyze students’ assignments, projects, and/or portfolios to examine how they reflect on the ESD principles. Furthermore, we can conduct several visits to the local community foundations and collect information regarding infusing sustainability into the curriculum.

Instruction should be constantly revised and improved based on critical reflective practices. The AT questionnaire appeared to be a viable instrument that could be used for self-peer-external assessment where the instructors could be able to reflect on their teaching/learning processes. The AT measures the extent to which the following variables have been considered during the course instruction, namely: ESD themes and topics, ESD competencies, learning strategies, assessment alignment, ESD critical principles, in addition to three open questions.

The instrument proved to be a convenient indicator for measuring strengths and weaknesses of the instructors’ teaching/learning practices. From this perspective, incorporating ESD concepts and principles into the curriculum should be a major concern for today’s higher education institutions. Through adopting the framework of the RUCAS project, the infusion of the principles of sustainable development could be improved and expanded. Thus, the practices and policies of several courses offered at both universities, as related to sustainability, could be modified and amended.

Conclusion

The current study presents the peer assessment process of the revised syllabi for infusing ESD principles by professors at two Jordanian universities. The AT was used as the main tool for conducting the assessment. During the meetings teaching methods, principles, didactic processes, and practices in ESD curriculum design and revision for higher education were discussed. The peer review was an opportunity to reflect and discuss syllabi development, as well as refine teaching methods for university lessons. The meetings with the professors provided evidence of all the great work accomplished for infusing sustainability in the revised courses at the two Jordanian universities. Findings offered a rich scenario of the strategies engaged by professors in revising the curricula, providing evidence of a mental attitude in adopting metacognitive strategies as well as a goal-oriented approach in curriculum planning.

With regard to the further development of the research, it is interesting to apply a pre-post research design, in which the AT and other surveys are administered before and after the syllabus revision. This procedure allows the researchers to compare the results in the two conditions and to verify with statistical analysis the progress in revising the syllabi. In conclusion, the experience of both universities participating in the RUCAS project can lead the way in developing the strategies and tools for infusing sustainability concepts and principles into the curricula, and provide a benchmark for other universities in Jordan.
Acknowledgment

The present research has been conducted within the framework of the RUCAS (Reorient University Curricula to Address Sustainability) project that has been funded with support from the European Commission (European Commission, TEMPUS – No 511118-2010-GR-JPCR). The content of the paper reflects the views of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Authors’ contribution: MB was the originator of the idea of the paper, who made the literature review, data analysis, result interpretation and wrote the paper; TDB undertook the literature review, RUCAS actions and described the revision process; HA undertook the literature review, RUCAS actions and described the revision process.

References


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Appendix 1. The Assessment Template

**Assessment Template**

**INSTRUCTIONS:** This template should be used for each revised course as a tool for self-peer-external assessment. Viewing curriculum as a process and praxis and not merely as a product implies among other things that what we are being teaching can be further revised and improved. In this context, critical reflection is an important human activity in which people recapture their experience, think about it, mull it over and evaluate it. It is working with experience that is important in learning. In education for sustainability,
seeing it from a transformative perspective, reflective practice is applied widely, referring to the process of the educator studying his or her own teaching methods and content and determining what works best for the students. Often there is a requirement to reflect on practice, which can be traced back to the work of John Dewey (felt need) and Donald Schön (reflective practice), both of whom put forward the notion that reflection is a critical underpinning of growth and learning. Donald Schön’s 1983 book introduces concepts such as “reflection on action” and “reflection in-action”, read about it. Interactive introspection (reflexive practice) is an effective tool used to improve our courses while being tried out. As discussed in the Cairo workshop, keeping a journal; seeking feedback; viewing experiences objectively; and taking time to reflect-on-actions should be applied. Thus, in the self-assessment template summarise in the space provided at the end all those thoughts, processes and actions taken to improve your course during its implementation.

Good Luck
Vassilios Makrakis: Project Coordinator

<table>
<thead>
<tr>
<th>Name of course instructor:</th>
<th>Course Title:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institution:</td>
<td>Country:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of the evaluator:</th>
<th>Institution:</th>
</tr>
</thead>
</table>

1. ESD Themes (Please tick the ESD themes that are explicitly or implicitly addressed within your revised course)

<table>
<thead>
<tr>
<th>ESD Theme</th>
<th>Please tick the box below if this theme is integrated in the revised course</th>
<th>Please indicate the percentage of the revised course that addresses each theme (0–100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human connections to the physical and natural world</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Ethics and values</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Functioning of natural systems</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Technological and economic relationships to development</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Motivating sustainable behaviour</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Pedagogical strategies for integrating sustainability</td>
<td>■</td>
<td>■</td>
</tr>
</tbody>
</table>

1 For a quick further reading on critical reflection look at http://en.wikipedia.org/wiki/Reflective_practice and the cited references. Further literature on critical reflection and reflexive practice will be uploaded in the CoP.

2 ‘Scale’ refers to consideration within the course of Local/Global impacts, and or intergenerational impacts, of human action.
### ESD Themes Infused in the Revised Course

<table>
<thead>
<tr>
<th>ESD Theme</th>
<th>Please tick the box below if this theme is integrated in the revised course</th>
<th>Please indicate the percentage of the revised course that addresses each theme (0–100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural resource management (water, forest, agriculture, biodiversity)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climate change, disaster prevention and mitigation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citizen participation and good governance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wellbeing and poverty reduction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indigenous knowledge and ethnic groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable urbanisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable production/consumption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural diversity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender equality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peace and human security</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health promotion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human rights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable agriculture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corporate responsibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other theme, please specify</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 ‘Human Connections to Physical and Natural World’ refers to consideration within the course of humans as part of nature & the effects of human activity on population, health, biosphere and our ability to sustain.

4 ‘Ethics and Values’ refers to consideration within the course of how we can sustain equity, justice and societal well-being; an examination of our ethical-values base, our identity and how this impacts on others and bio-sphere.

5 ‘Functioning of Natural Systems’ refers to consideration within the course of the natural laws that dictate how our earth’s biosphere functions. It focuses on the holistic and interdependent nature of the ecosystem.

6 ‘Technological and economic relationships to development’ refers to consideration within the course of technical, scientific and economic strategies that will foster sustainable development.

7 ‘Motivating Sustainable Behaviour’ refers to consideration within the course of how sustainable behaviour patterns can be motivated, activated and sustained.

8 ‘Pedagogical Strategies for Integrating Sustainability’ refers to consideration within the course of the different approaches and strategies to teaching, learning and assessment that help integrate and promote sustainability.
2. ESD Competencies (Please tick the ESD competencies explicitly or implicitly addressed by the learning outcomes within this revised course, and the degree of expected overall mastery of each competency: low level, medium level or high level of integration)

<table>
<thead>
<tr>
<th>Course Learning Outcomes (alignment with ESD competencies)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning outcome (LO)</td>
</tr>
<tr>
<td>LO1</td>
</tr>
<tr>
<td>LO2</td>
</tr>
<tr>
<td>LO3</td>
</tr>
<tr>
<td>LO4</td>
</tr>
<tr>
<td>LO5</td>
</tr>
<tr>
<td>LO6</td>
</tr>
<tr>
<td>LO7</td>
</tr>
<tr>
<td>LO8</td>
</tr>
</tbody>
</table>

3. Teaching Strategies (Please indicate the main teaching and learning strategies used within this revised course, and their frequency of use)

<table>
<thead>
<tr>
<th>Teaching and Learning Strategies</th>
<th>Please tick the frequency of use of each teaching and learning strategy in the revised course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecturing (the instructor transmits knowledge and dispenses wisdom in the classroom and the students listen and take notes)</td>
<td>Not used at all</td>
</tr>
<tr>
<td>Project-based learning (the instructor engages students in activities designed to answer a question or solve a problem in the everyday world outside the classroom)</td>
<td>1</td>
</tr>
<tr>
<td>Interactive engagement (the instructor involves students in activities that yield immediate feedback through group discussion with peers and/or instructor)</td>
<td></td>
</tr>
</tbody>
</table>

Sequel to Table see on the next page.

9 Please rate the degree of Mastery of this competency within the revised course: Low Level (L) of mastery, Medium level (M) of mastery, High Level (H) of mastery.
**Sequel to Table.**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

**Case-based instruction** (the instructor provides students with real-life situations to explore and apply a range of theories, behaviours and information)

**Inquiry-based learning** (the instructor poses questions allowing students to search for information and learn on their own with guidance)

**Interdisciplinary teaching** (the instructor involves in teaching the integration or synthesis of information and knowledge from more than one subject)

**Problem-based learning** (the instructor presents students with a problem to solve it collaboratively and reflect on their experiences)

**Tech-supported instruction** (the instructor uses tools such as concept mapping, mind-tools, modelling, simulations, the Internet and other Web-based tools)

**Placed-based learning** (students are placed for voluntary community/social service to merge theory with practice)

**Discovery learning** (the instructor allows students to explore and manipulate objects, wrestling with questions and controversies or performing experiments)

**Role plays & simulations**

- Group discussion
- Stimulus activities
- Debates
- Critical incidents
- Case studies
- Reflective/ reflexive accounts
- Fieldwork & outdoor learning
- Modelling good practice
- Other: Please detail any other teaching and learning strategy that it is not listed above here:

4. **Assessment Alignment** (Please indicate which course learning outcomes your assessment addresses)

<table>
<thead>
<tr>
<th>Modes of Assessment</th>
<th>List the learning outcome/s that each mode of assessment examines</th>
</tr>
</thead>
</table>

- Write down different modes of assessment that have been used. (For example, Examination/ Essay/Project/Portfolio/Oral presentation/ Group presentation, etc.)
5. ESD Critical Principles (Please tick the ESD Critical Principles explicitly or implicitly addressed within this revised course)

<table>
<thead>
<tr>
<th>ESD Critical Principles</th>
<th>Please tick the box below if this critical principle is integrated in the revised course</th>
<th>Please explain how you have addressed this ESD principle, or why you have not addressed this ESD critical principle in the revised course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principle 1: Emphasises system thinking</td>
<td>[ ]</td>
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<td>Principle 2: Practiced Locally</td>
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<td>Principle 3: Extended Globally</td>
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<td>Principle 4: Focuses on Community</td>
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<td>Principle 5: Highlights Connections</td>
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<td>Principle 6: Nurtures personal and social responsibility</td>
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<td>Principle 7: Fosters Transformation</td>
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<tr>
<td>Principle 8: Clarifies one’s own values</td>
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<tr>
<td>Principle 9: Envisions more positive and sustainable future</td>
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<td>Principle 10: Responds through applied learning</td>
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<tr>
<td>Principle 11: Explores the dialectic between tradition and innovation</td>
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</tbody>
</table>

6. Dimensions of Sustainable Development (Please explain how the four dimensions of Sustainability – Social, Environmental, Economic or Cultural – explicitly or implicitly are addressed within this revised course)

<table>
<thead>
<tr>
<th>Dimensions of Sustainable Development Infused in the Revised Course</th>
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</thead>
</table>

7. Critical Reflection (Please summarise the recorded incidents applied for the formative assessment of the revised course during its implementation and the changes that occurred)

<table>
<thead>
<tr>
<th>Changes Implemented during the Course Implementation</th>
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</table>

8. Overall Suggestions (Please summarise the general proposed suggestions for the further improvement of the course revised)

<table>
<thead>
<tr>
<th>Overall Suggestions for the Revised and Implemented Course</th>
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</table>
Modelling a Learning Journey towards Teacher Ecological Self

Rea Raus
University of Tampere, Finland
Statera Research and Practice Center for Sustainability, Estonia

Abstract
The article discusses the notion of the ecological self as a key concept for teacher identity construction during teacher education in the context of sustainable development (SD). Substantial amount of literature supports the understanding that the solution to the global sustainability crisis lies in the field of education where teacher identity, teacher self, plays a significant role. The paper gives the argumentation for the concept of ecological self and focuses on the question how to support the development of the ecological self during teacher education (TE). Esbjörn-Hargens & Zimmerman’s model of eco-selves and Saks’ model of intention are presented that could be used for that purpose. Some methods for supporting the development of an ecological self of a future teacher are also shared, for investigation and practical implementation in TE. The limitations of the present approach are obvious first and foremost due to the understanding that we are currently facing transformation in governing paradigms, change in dominating worldviews that penetrate any quest for ‘truth’, also in the field of science.

Keywords: teacher education, sustainable development, ecological self, deep ecology

Sustainability Crisis: A Crisis in the Self

The key field to address the global sustainability crisis is the field of education. This issue, especially in the context of values and worldviews, has been widely discussed by a myriad of authors in natural and social sciences (e.g., Meadows et al., 1972; Brown & Garver, 2009; Capra, 1983; Orr, 1992; Orr, 1994; Ehrenfeld, 2005; Macy et al., 1998/2013; Macy, 2007; Drengson & Inoue, 1995; Bartels & Parker, 2012; Jones et al., 2010; Weinsten & Turner, 2012; Hopkins, 2011; Tudge, 2007; Bowers, 1995; Kasemir et al., 2003; DuNann Winter, 2003; Harding, 2013). Sustainability or sustainable development, as used interchangeably in the present article, is literally the way for and of the future (Bartles and Parker, 2011, p.1), being a great challenge because it involves a shift as radical as the Copernican revolution (Capra & Luisi, 2014, ix) in governing paradigms, our individual and collective identities or selves, as the terms are used in the present article. Davis Orr (1992, p. 4) adds that we are facing the crisis of
spirit and spiritual resources besides our environmentally destructive way of life. The alarming fact is that the public has been flooded with ecological information as well as warning about modern sustainability crisis and yet has not dramatically altered behaviour responsible for serious eco-psycho-social problems. Additional information in and of itself is clearly not enough, we cannot continue to believe that education about the natural environment will change people’s behaviour. As Ehrenfeld (2005, p. 24) warns, unsustainability is a systemic failure and should be attacked on a very fundamental level, on the level of ontology. Integral awareness of developmental dynamics and the capacity to take multiple worldviews are crucial elements in achieving behavioural changes and altering our current treatment of the biosphere (Esbjörn-Hargens & Zimmerman, 2009, p. 215). If we attempt to address the root causes of sustainability crisis in TE, we should also be aware of the challenges such an attempt brings along. Wals and Blewitt state that the more fundamental challenge was attempted to re-orient teaching, learning and research that would lead to new mental models and competencies, the more problematic such an attempt would be. Firmly established empirical and analytical frameworks are invariably reductionist and mechanistic and have come to characterise higher education (Wals & Blewitt, 2010). Hence, the conflict of worldviews and values on many levels may be foreseen in this quest. The problem with the contemporary educational establishment is not that values have been ignored. Education today is surely teaching values both explicitly and implicitly. The problem is that it is teaching of the worldviews and values of the scientific/technological society (Ireland, 2007, p. 18) and as such the re-enforcing mechanistic view of the world. Therefore, the notion of being a reflective and critical theorist and practitioner also applies to higher education settings, especially in the light of ‘the Great Challenge of TE for SD’. It is equally important to reflect on the role of higher education and especially on teacher education as well as consider the whole system re-design to challenge existing unsustainable concepts and approaches in the field of education (Unesco, 2005).

Sustainability has also been described as a bridging concept between the existing western approach towards environment and development and a new emerging ecological paradigm. Stephen Sterling (2001) sees these tensions as a conflict between mechanistic and ecological views of the world, including approaches to education and teacher self, which sets a challenge for teacher education to question first the educational philosophy and its underpinnings, an ontology that penetrates our current way of thinking and viewing the world. Such a prominent layer in the foundation of the “house of teacher education” defines the whole construction of ontological, epistemological and methodological body of teacher education as such.

**Ecological Ontology for TE**

Underpinning ecological philosophy, ecosophy (Naess, 1973, 1987/1995) is an ontology of metaphysical holism (Nelson, 2008), which sees human and non-human world as connected and interdependent. In that context, it is worthwhile broadening the understanding of the term “ecology”, which is defined by Jakob Saks (2005) in his work about integral ecology. He expands the term with three additional meanings that are important in present paper:

- the global problem of human activities endangering the Earth (planetary protection);
a science of the dynamic balance of the co-existence of Man and Earth, (sustainable joint evolution);

- the problems of the cosmic unity of mankind and Earth (cosmic responsibility).

Therefore, the content of ecology can also be interpreted as an integral philosophy of how to preserve and protect our home, be part of the Earth and its inhabitants as a living, unified system (Saks, 2005, p. 2). The concept of integral ecology also supports the meta-paradigm of Gaia, Earth as a living organism. The theory well known as Gaia Theory developed by James Lovelock (1979) sets the locus of discussions about the transformation of our world, our societies into an inner world of a human being, a teacher in this case. As such integral philosophy directs us to ecophilosophy, ecosophy discussed by deep ecologists, e.g., Arne Naess, who see the intrinsic value of nature independently of human needs or wants.

The concept of deep ecology was formulated by Norwegian philosopher Arne Naess in the early 1970s as a response to the limits of shallow ecology. Naess (1973) rejected anthropocentrism, instrumentalist approach towards the world and other non-human forms of life. Warning that the ecological crisis threatens the survival of humanity, Arne Naess identified the deeper roots of the crisis in Western culture and in particular in the cultural values legitimising the domination of nature (Charkiewicz, et al., 1994). Hence, biocentric egalitarianism is the principle of deep ecology that regards all life having deeper value, equal right to live and blossom (Naess, 1973; Devall and Sessions, 1985; Nelson, 2008). Rooted in the ontology of connectedness and holism, Naess coined the term “ecological self”, where a human being experiences and acknowledges deep empathy towards other beings, human and non-human, sensing the interconnection and interdependence of all. Coming to such a realisation, the self widens, broadening its ontological boundaries to the rest of the lifeworld (Nelson, 2008). Naess argues that our self can be mature only when we connect to nature, see ourselves as part of nature, identifying our self with all living beings. According to Naess, such identification needs deep questioning where the understanding that we are all connected, that everything “hangs together”, as he says, is central. The notion of ecological self is manifold. Naess (1987/1995) argued that ecological self is a deepened self of a person who feels and understands that any destruction of that natural ecology is a destruction of one’s self. Seeing oneself in others, relying on reason, feeling and experiencing also means being more open to the suffering in the world. Ecological self could also be explained by the limits of the felt pain for others. If one feels sorrow, pain for the animal dying or the tree being harvested, it may be the reflection of one’s ecological self, broadening its boundaries.

Reconstructing new, more sustainable societies means reconstructing also our identities to more holistic, ecological, authentic selves, new selves. Besthorn (2002, p. 59) notes that there is the ancient origin of this new self by stating that we are seeing the re-emergence of a very old identity since many dimensions of this new self have very ancient origins. This new sense of self is important because it presupposes much more than the old categories of ego-self, social self and physical self. In fact, a new category of ecological self is arising, which changes the character of a range of different work activities. For example, the ecological self influences the specialists’ understanding of the scope and breadth of professional education. It suggests that our educational enterprise should change from being grounded in a techno-specialist, anthropocentric orientation toward an orientation, which is far more generalist and ecologically relevant. It suggests the need to adapt curriculum requirements and practicum settings to include a focus on
issues of the natural environment, e.g., integrating issues of environmental hazard and environmental racism into students’ educational experiences (Besthorn, 2002, p. 62). William Pinar (1994, p. 203) brings out the related challenges set by our modern world, stating that a capitalist economy with its tendencies to commodify psycho-social processes, including personality constitution and identification, contributes actually to self-estrangement. He points out that within educational institutions there are a few prospects of “authentic being” and “authentic self-knowledge”. He calls for a “return to things themselves”, to the discovery of “authentic voice”, which will have political as well as epistemological and pedagogical content (ibid., p. 203). Speaking of authenticity of self, Iliško (2007) states that self-formation begins with the position that each of us is born with an innate core that is authentic. As a desired end of formation of an authentic person, authenticity is seen as the genuine, real, or inner self that is whole and good (ibid., p.18), holistic and ecological. Authentic, we might say ‘ecological’, voice of a teacher is, therefore, the object of revelation during teacher education and it requires targeted support, time, space and reflection for that purpose.

Supporting the Development of Teacher Ecological Self in TE

Ecological, holistic view on meaningful learning in the context of ESD should be formed not only by cognitive ways of knowing but also by intuitive and spiritual knowing that is informed by cultural, environmental and community values (Badjanova et al., 2014). In the times of transformation, philosophical-ontological questioning in TE is essential. According to Mandolini (2007), philosophical questioning in pedagogy is twofold, it can be considered as a science of being (ontology), exploring some common fields with pedagogy. On the other hand, it can be considered as a precise intellectual investigative attitude, which can be used to reflect upon any experience and applied to any field (ibid., p. 6). Gedžune (2015, p. 111) says that educators should turn to philosophy for guidance on how to teach for and about sustainability and human inclusion in nature, and Mandolini (2007, p. 11) highlights that good teacher education is not attainable without considering the moral and personal backgrounds of student teachers. As TE should start with the investigation of developing student teacher identities (Raus & Falkenberg, 2014), in the context of SD we should share light on different dimensions of teacher ecological self (Naess, 1973, 1987/1995, 2005; Raus & Falkenberg, 2014) and the models that help realise the learning journey towards teacher ecological self during TE. The ecological identification process can be conceptualised as a transformational learning journey for a student teacher/a teacher (Raus & Värrri, in press). Therefore, besides clarifying the understanding of ecological self and arguing for the benefit of this notion in teacher education at large, we should look at further ways of learning how to connect to individual ecological selves.

Coming from an ontological concept of holism, where the whole world is seen as the connected holistic ecological system (Esfeld, 2004) and supported by the questioning of teacher education pedagogy by Korthagen (2004, p. 77), the questions in the present context should be elaborated further:

- What should TE do so that teacher ecological self could emerge?
- What are the characteristics of TE learning process so that it supports the emergence of ecological self?
Revealing authentic selves, holistic selves, ecological selves in the process of teacher education, we prepare future teachers also to support the revelation of such authentic, ecological selves in their students. This in turn would support the development of a person, realising his/her full potential in a sustainable society. Understanding the complex interplay between the social and personal aspects of identity formation also allows for a fuller appreciation of the complexity, with which various overlapping professional roles emerge (Jarvis-Seling et al., 2012, p. 42).

The conceptualisation of ecological identity/self-development is complex. Esbjörn-Hargens & Zimmerman (2009) focus on the work of many predecessors attempting to model the ecological identity development, e.g., Kellert, Kahn, Geselle, Cook-Greuter and many others. According to them, ecological consciousness cannot be accounted for or explained by the framework of ecology only. A successful approach to exterior ecology is dependent on the interior development of individuals towards world-centric and planet-centric identities. Just because two people share the same exterior landscape in no way means they must inhabit the same interior cognitive or moral landscape. We cannot simply dialogue ourselves into eco-awareness as they claim (Esbjörn-Hargens & Zimmerman, 2009, p. 217). Therefore, Esbjörn-Hargens and Zimmerman developed the model of 8 ecological selves, which illustrates their statement (presented in Figure 1) and describes how an individual at specific levels of ego development identifies with the aspects of natural world. Each eco-self has a unique way of relating to itself, others and the natural world, where integrally aware individuals are able to relate to all eight of these perspectives (ibid., p. 226). All these eco-selves are critically viewed as both potentially contributing and violating ecological balance. Although the model provides a useful framework for analysing environmental problems and the connection to self, these examples are not exclusionary (ibid., p. 228) and can be further developed in different contexts, especially in teacher education. Their work forms a valuable tool for negotiating evolving ecological selves of teacher students during teacher education programmes since it enables different levels of discussions and reflections connected with a diverse set of topics upon professional and free choice of teacher educators. The model below can be used as one framework for courses targeted on the development of a teacher ecological self.

As brought out by Esbjörn-Hargens & Zimmerman, fully understanding the mechanism of ecological self and ‘guaranteeing’ the emergence of certain ecological self in a specific setting may probably be out of our reach but the attempt to do that is a value in itself. Reitan (1996) adds to that attempt that a person with realised ecological self is a person with virtue, striving for ecological and environmental justice and stewardship because of inner inclination, not just out of obligation (p. 424) or responsibility, which makes the journey towards broadening teacher ecological self as a value in itself. This means that one task for teacher education is to nurture such an inclination, motivation and intention. According to Besthorn (2002, p. 53), ecological self suggests that nature constitutes both the beginning and the ongoing essence of full human development and potential. He says that the contemporary self is also identified with our personal or individual frame of reference, self being that represents unique individual qualities often associated with the one’s physical attributes or abilities (ibid., p. 56), which suggests that every ecological self is unique and not easily subjected to categorisations or modelling.
<table>
<thead>
<tr>
<th>Type of Ethos</th>
<th>Environmental Ethic</th>
<th>Ecological Violation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eco-Sage (Unity Ethos)</td>
<td>An ego-aware self who integrates multimodal and multidimensional elements across contexts in the service of humanity. Does not judge others. Experiences the world as an immanent expression of timeless spirit.</td>
<td>Experiences the unity of all and identifies with the totality of manifest creation. Is too otherworldly. Can be disembodied and removed from pragmatic action in the world.</td>
</tr>
<tr>
<td>Eco-Integralist (inclusive Ethos)</td>
<td>Opening the heart to widespread suffering around the planet without being consumed by it. Committed to the integration of transcendence and innocence.</td>
<td>Honours and integrates multiple approaches to the environment. Sees value in all perspectives. Includes too much and gets bogged down in conflicting views.</td>
</tr>
<tr>
<td>Eco-Holist (Holistic Ethos)</td>
<td>Autonomous self, embracing many layers of self. Recognises the importance of various, even contradictory values. Holistic-complex perspective towards nature.</td>
<td>Maps the complexity of relationships within and between ecosystems. Overrelies on exterior systems and, as a result, commits subtle reductionism.</td>
</tr>
<tr>
<td>Eco-Strategist (Rational Ethos)</td>
<td>Orientation towards scientific empiricism. Value independence and confidence. Emphasises efficiency and efficacy. The world as being measurable.</td>
<td>Conserves resources for consumption over the long term. Exploits nature as a result of greed and a focus on short-term profits.</td>
</tr>
<tr>
<td>Eco-Manager (Stewardship Ethos)</td>
<td>Rule-oriented, gets self-identity from others. Follows the law – either the divine order or the laws of the state. Honour and obedience are prized.</td>
<td>Passes laws and establishes institutions to act as stewards over nature. Promotes domination of humans over the natural world.</td>
</tr>
<tr>
<td>Eco-Warrior (Heroic Ethos)</td>
<td>Focuses on supporting an idea of the self, acting to serve to magnify own status. Lack of trust of others. Emphasises power, possesses macho qualities.</td>
<td>Challenges the system through tactical and non-conventional ways. Mistakes one’s own will for nature’s. Can be aggressive: striving to conquer nature.</td>
</tr>
<tr>
<td>Eco-Guardian (Romantic Ethos)</td>
<td>Impulsive, balancing good forces against evil dynamics. Focuses on satisfying safety and basic needs. Emphasises magic, ancestral ways, mystery of nature.</td>
<td>Performs rituals to maintain control and power. Sees nature as ensouled. Is one with aspects of nature but not one with humanity. Approaches nature with slash-and-burn tactics.</td>
</tr>
</tbody>
</table>

Figure 1. The ethos, dignity and disaster of each ecological self. Based on Esbjörn-Hargens & Zimmerman, 2009, pp. 227–236

Still, for the practical purposes of modelling of the learning journey for ecological self/selves, Jakob Saks’ work is contributing to such an effort. Saks discusses self-awareness and self-development from an interesting point of view. As many others, he sees the root cause of our ecological crisis in the consciousness and mind of the individual, the deficit in logics of the mind and feelings (empathy), greed, egocentrism, reluctance to do right things, with a right motivation, at the right time, in the right place and above all – doing it with right methods, in a right way (Saks, 2005, p. 18). This process is
characterised by a formula (ibid.) and can also be used as input to design specific teacher identity courses:


In this formula ‘choice’ forms a central part that changes an intention into a decision and a decision into action, whereas all actions have consequences. Therefore, the destiny and future of the human being depends on individual and collective choices, which can be addressed in TE as well. Saks illustrates two different approaches to education, where the old approach derives from an ego intention and the new approach from a soul intention (Figure 2) which shows the importance of a spiritual dimension in the development of a mature person.

*Figure 2. Two approaches to education based on intentions (Saks, 2005)*

Considering the argumentation presented above, these models elaborated by Esbjörn-Hargens & Zimmerman (2009) and Saks (2005) may be taken as a basis for supporting the development of teacher ecological self during teacher education although fully realising the inadequacy of incorporating only those.

In addition, Jakob Saks (2005, pp. 19–20) offers a profound list of key features, competencies that are connected to the field of education and personal development, the development of the ecological self:

- Being able to ‘see’ and accept the existence of higher consciousness, becoming aware that love forms the essence and being of the universe and is a creative force in all its dimensions;
- Being aware of and following universal principles and laws;
- Knowing oneself, self-awareness of one’s inner, microworld to be able to know and be aware of the dualistic, outer, macroworld;
- Opening the consciousness, the mind to the existing transformation, acceptance, adequate reacting;
- Broadening the mind and awareness, flexibility and elasticity of mind and consciousness, opening the potential of the heart;
- Developing a holistic worldview;
• Cultivating self-awareness and self-discipline on all levels, horizontal (reality) and vertical (universal, cosmic);
• Acknowledging patriarchic crisis and finding optimal ways to overcome it.

This list well contributes to the sustainability competence described by Arjen Wals (2010, 2015), where sustainability competence is discussed as an integrative switch between five different mind-sets: trans-cultural, trans-spatial, trans-disciplinary, trans-temporal and trans-human mind-sets. In short, this means the ability to see and understand the world from the perspective of different cultures, times and disciplines, understanding the connection between different eras and generations as well as enables to see the world from the position of other species. Supporting the development of such mind-sets and competences forms a part of teacher education programme for SD.

Conclusion and Discussion

The present article attempted to illuminate ways to address teacher identity issues during teacher education in the context of ESD. According to Armstrong and LeHew (2011) we need to empower individual educators to make change at the course level, even if the entire curriculum can not be changed. Such a change should be reframed with the philosophy of sustainability (p. 18) which makes us also ask what kind of teacher identities we aim at. The transformation of our educational systems to support sustainable development is a complex endeavour where changes in solitary methods or tools a teacher uses do not bring along the needed change. It is the teacher him/herself, teacher identity where the change begins. According to Miller (2007), holistic education is based on three man principles: balance, inclusion and connection. Acknowledging the wholeness of the learner, a student teacher in the context of TE, Miller reminds us that teacher development should be a transformational process, transformational learning process hence also the learning process for identity (re)construction. The focus of holistic education is on relationships: the relationship between linear thinking and intuition, the relationship between mind and body, the relationships among various domains of knowledge, the relationship between individual and community, the relationship to the Earth and our relationship to our souls (Miller, 2007, pp. 11-13). Needless to say, that such an approach requires a lot of professional freedom and contributes to increased responsibility for one’s own learning. This is especially important in the context of ESD, because realising the pain in the world, the problems and the vastness of crisis may easily cause rejection or denial of the whole agenda. Connecting to one’s ecological self means endorsing sustainability and connectedness. Through that we regain something that contributes to our own balance and well-being. Exercising stewardship towards the world does not mean sacrificing our own good, on the contrary, it is returning to our happiness, joy and our authentic, genuine place on this Earth.

Opening up individual potential and consequently also collective potential for sustainable development requires dealing with the ontological, epistemological and methodological considerations in an integrated manner. The key message from different researchers and philosophers is that context and self matter and may make a radical difference for our future. In that attempt, we come to the notion of ecological self. The answer to our personal and collective problems lies in our self, which makes a teacher for future, a teacher for sustainability, an important agent in revealing and supporting the potential of our evolving ecological selves. Despite the array of different constructs,
e.g., ecological self or educational being (e.g., Barnett), we should attempt not to further fragmentise our understanding of the world and ourselves but instead taking a holistic approach, attempt to find similarities and connections in those notions. The implication for teacher education for SD, future teacher’s personal and professional development means first and foremost regaining the consciousness of self, negotiating meaning of self-realisation and addressing all aspects of personality potential, where the models developed by Saks and Esbjörn-Hargens & Zimmerman may serve as a tool. We may say that the self emerges, evolves in the process of opening one’s potential, which can occur by a person him/herself or with the support of another, e.g., a teacher/teacher educator.

Realising the full potential of self, ecological self, for any person (individual sustainability) that contributes to the realisation of the full potential of the society (collective sustainability) should and could be a priority for TESD.

References


Modelling a Learning Journey towards Teacher Ecological Self


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Teachers’ Perceptions of the Relationship between Inclusive Education and Distributed Leadership in two Primary Schools in Slovakia and New South Wales (Australia)

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Ilektra Spandagou
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Abstract

The academic literature on the practice of inclusive education presents diverse and at times contradictory perspectives in how it is connected to practices of distributed leadership. Depending on the approach, on the one hand, inclusive educational practice may enable distributed school leadership, while on the other hand, it may allow for hierarchical management styles if staff members do not implement inclusive practices. This paper explores how school staff members perceive and understand the relationship between practices of inclusive education and distributed leadership in two public primary schools: one in New South Wales (Australia) and one in Slovakia. These two schools were identified by external informants as good practice examples of inclusive education. Using qualitative research methods based on interviews, this paper identifies two main understandings of this relationship. First, although distributed leadership may encourage the goals of inclusive education, it may in some circumstances also hinder their achievement. Second, distributed leadership can be constructed as an indispensable component of inclusive education, and this has implications for how the target groups of inclusive education are conceptualised. This paper also discusses the wider social and political contexts of the two primary schools and how in each case context significantly constrained and shaped understandings and practices of inclusion and distributed leadership in the practice of teachers and principals.

Keywords: inclusive education, distributed leadership, policy, practice
Introduction

In many countries there continues to be an increase in the number of students assessed as having special educational needs (SEN), including Australia (Graham & Jahnukainen, 2011) and Slovakia (Žovinec & Seidler, 2010). Despite, the global rhetoric of inclusive education, fuelled primarily by the Organisation of United Nations and its international policy initiatives, such as UNESCO’s Salamanca Statement on Principles, Policy and Practice in Special Needs Education (Armstrong, Armstrong, & Spandagou, 2010), many practitioners and academics have questioned the extent to which inclusive education practices occur in schools. It is important to clarify inclusive education as discussed in this paper. Many authors have made the point that there isn’t a commonly accepted definition of inclusion (Armstrong et al., 2010). While the authors of the paper support a broad understanding of inclusion relevant to the reform of educational systems and schools, it needs to be acknowledged that in the two educational systems examined in this study, inclusive education tends to be focused on students with special educational needs and/or disabilities. This is also the case of the literature on inclusive education discussed in the paper.

Regardless of what is seen as the focus of inclusion, there is consensus that practising inclusion is not only about teaching and adjusting the curriculum, but that it is also a whole-school matter very closely related to how leadership is organised and practised in the school (e.g., Booth & Ainscow, 2011; Ward et al., 2015). That is also to say that inclusive education calls for the redirection of the whole school culture, especially for the change to be sustainable (Bérziña, 2010). In this sense, ‘sustainable’ in the context of ‘inclusive education’ does not only mean to make a change in school climate, policies and practices or the whole state school system towards inclusion, which remains to be in place in a long run (Ballard, 2013; Gill, Sherman & Sherman, 2009; McMaster, 2015; Sindelar, Shearer, Yendol-Hoppey & Liebert, 2006), but also to provide basis for responsibility, activism, critical inquiry and social equality as such (Kairiene & Springdziunas, 2016; Nelson, Cassell & Arnold, 2013; Starks, 2013; Záke, 2010).

If considering the literature, which focuses on inclusive education at a school level, the form of school leadership is often scrutinised. Besides investigating the role of principals in bringing about inclusion in their schools (e.g., Cobb, 2015; Riehl, 2000; Wood, Spandagou & Evans, 2012) and their attitudes towards inclusive education (e.g., Graham & Spandagou, 2011), several authors have insisted that in looking at school inclusion the meaning of school leadership must be extended beyond the role and influence of the principal. For instance, the Index for Inclusion (Booth & Ainscow, 2011, p. 99) presents an ‘inclusive approach to leadership’ as one of the indicators that should be adopted when considering the development of inclusive policies and practices. In the context of the ‘Index’ this indicator involves a form of collaborative leadership amongst the school community, in contrast to what can be called an autocratic approach to leadership. In the former case, knowledge-sharing takes place amongst staff, and staff members are able to contribute to decision-making processes and their input is respected.

Developing a similar line of argument, Angelides, Antoniou, and Charalambous (2010) portray principals as the ones who should empower others. Kugelmass and Ainscow (2004) go even further in this respect. While calling for the ‘positional’ leaders (the principals) to support ‘distributed leadership and participative decision-making’, they argue that principals should be ‘autocratic’ when introducing the values and beliefs central to inclusive education (pp. 139–140). In a more recent study, Ainscow and
Sandill (2010) advocate for ‘distributed leadership’ (p. 405) but they still portray principals as the only ones responsible for challenging the hierarchical structures in schools whilst promoting inclusive values and encouraging other school stakeholders to participate in leadership functions. These studies gloss over the relationship between distributed leadership and inclusive education and particularly the question of whether or not the former is a condition of the latter being genuinely achieved in a school setting.

However, the extensive research on teachers’ attitudes towards inclusive education shows that teachers often feel that they do not have sufficient time, skills and training to support their attempts to introduce inclusive educational practices in their classrooms and schools (Rajovic & Jovanovic, 2013). In principle teachers may be supportive of inclusion, in these studies understood as the education of students with SEN or disabilities together with other students in regular classrooms of regular schools. However they also frequently express rather negative attitudes toward the inclusion of students with more severe disabilities or students with behaviour difficulties because of concerns about the impact upon the education of other children in the class (Avramidis & Norwich, 2002; de Boer, Pijl & Minnaert, 2011). Therefore, in some circumstances, distributing school leadership may work against the broader interests of school inclusion because it places too much responsibility in the hands of those who lack the skills and experience to lead whole school change. In this case, consensus between the school community, and especially staff, may support a status quo that is derived from a fear of the consequences of change and an inability to see beyond the present situation. It may simply reflect the absence of transformational leadership and the latter it might be argued is more significant to bringing about inclusive practices in schools than a vaguely democratic notion of distributive leadership. In other words, in the situation where school stakeholders have reserved attitudes towards inclusion, distributed leadership may result in obstacles against inclusion.

In response to these concerns, it might be argued that they rest upon a very limited view of the concept and dynamics of distributed leadership. In the academic field of school leadership and administration, the concept of distributed leadership has been defined in very different ways (Bolden, 2011). It can be understood as a purely descriptive term (Spillane, 2010) or normative as a potential strategy for school improvement (Harris, 2013; Woods & Gronn, 2009). As in the case of inclusive education, several theorists of distributed leadership also critically scrutinise the socio-political context and point out the impact of power relations on the application of the concept in the everyday practices of schools (Hall, Gunter, & Bragg, 2013; Hartley, 2010; Lumby, 2013). Neoliberal discourses of managerialism, efficiency, and individualism in the educational policies of countries like Australia (Welch, 2010) and Slovakia (Kaščák & Pupala, 2012) may create an insurmountable barrier to the practice of distributed leadership (Hall et al., 2013; Hatcher, 2005; Leo & Barton, 2006; Ward et al., 2015) and inclusive education (Armstrong, Armstrong & Spandagou, 2011; Ballard, 2013; Hardy & Woodcock, 2015; Slee, 2013). These wider socio-political factors are often not spoken of in discussions of sustainability of collaboration, distribution of responsibilities, involvement in decision-making processes and inclusion of all students in schools.

In this article we explore the relationship between teacher understanding of inclusive education practices and distributed leadership as presented by staff members from two public primary schools – one in New South Wales (NSW), Australia and one in Slovakia. The schools were chosen on the recommendation of senior education administrators in
each location as exemplifying good practice examples of inclusive education. The article considers the proposition that inclusive education requires distributed leadership in school management if inclusion is to be enhanced and properly supported (e.g., Ainscow & Sandill, 2010; Booth & Ainscow, 2011; Kugelmass & Ainscow, 2004). Our study aims to provide an insight into how these two concepts relate to each other, and to contribute to the theorisation of this relationship.

Methods

The two public primary schools were selected for this study through ‘purposeful sampling’ (Schensul, 2012, p. 84). A number of academics, non-governmental organisations and public administration institutions dealing with issues of inclusive education were contacted to identify ‘good practice’ examples of inclusive public primary schools in Slovakia and NSW. The research itself makes no judgment about whether or not these schools did exemplify good practice. The intention was rather to examine the practice of distributed leadership and inclusive education and the features we wished to observe were judged more likely to be evident in schools that were generally considered by knowledgeable insiders to be exemplars of ‘good practice’.

The NSW school had approximately 100 students, four regular classrooms (Kindergarten, Year 1–2, Year 3–4, Year 5–6), five full-time teachers and one teaching principal and it was located in urban area. The Slovak school had approximately 250 students, nine regular classrooms (one classroom per year from Year 1 to Year 9) and sixteen special classrooms only for students diagnosed with SEN or disability. The school had approximately 30 full-time teachers, one teaching principal and one teaching deputy principal and it was also located in the urban area. Neither of these schools is ‘typical’ of their setting and there were, of course, significant differences between these schools in terms of size, structure, and the policy contexts of operation. These factors were not unimportant in respect of the comparison of practices between them. However, the intention was not to examine differences and similarities in these respects or to generalise from one school to all schools in each context. Rather, we were concerned with the inter-relationship between distributed leadership and inclusive education in the practice of teachers and principals.

After staff members of both schools expressed their consent to participate in the study, the first author spent four months in each school (from mid-July till mid-November 2011 in the NSW school and from mid-November 2011 until end of March 2012 in the Slovak school) as a volunteer teacher’s aide (two days per week). This article focuses on the data from interviews with staff members of the two schools. In the NSW school all staff members (the principal, four classroom teachers, an English as a Second Language (ESL) teacher and a non-teaching staff member) were interviewed, while in the Slovak school a selection of staff members (the principal, deputy principal, special education teacher and five classroom teachers) participated in the semi-structured individual interviews. The interviewees were asked three main questions and prompted to elaborate on them in detail: 1) how they understand the term ‘inclusive education’ and how it is practised in their school; 2) how they understand the term ‘distributed leadership’; and 3) the relationship between these two terms.
Results

Understanding the Concepts of Inclusive Education and Distributed Leadership

When being asked about their understanding of the concept of ‘inclusive education’, staff members in both schools consistently constructed it as a set of goals or aims to be fulfilled. These goals included (listed from the most frequent answers to the least): 1) enhancing educational results and skills of all students; 2) developing all students’ unique potential; 3) developing good and ethical behaviour in all students; 4) enabling all students to experience happiness, belonging, and self-worth; 5) enabling them to actively participate.

By contrast, staff members in both schools understood ‘distributed leadership’ as a set of processes. These processes involved primarily (listed from the most frequent answers to the least): 1) collaboration among all staff members; 2) staff equal involvement in decisionmaking processes; 3) taking on responsibilities and projects by all individual staff members. Thus, while inclusive education was constructed as a set of goals targeting exclusively students, distributed leadership related exclusively to processes involving staff members.

Understanding Distributed Leadership as a Means to Inclusive Education

After being asked about their understanding of the concepts of ‘inclusive education’ and ‘distributed leadership’, the interviewees were also questioned about how they understood the relationship between the two concepts. The majority of staff members in both schools (five out of seven in the NSW school; six out of eight in the Slovak school) perceived distributed leadership as a means to practise inclusive education. They considered the main processes of distributed leadership as conducive and beneficial to the practice of inclusive education.

For instance, teachers in the NSW school particularly strongly associated distributed leadership with the process of performing leadership responsibilities and leading various school projects and subsequently connected this manifestation of distributed leadership with what they saw as the practice of inclusive education.

The more people [staff members], I think, that you’ve got involved in projects and programs for our kids, it stands to reason that the more you are going to be able to diversify the opportunities. So I think it works for the kids, because you are getting increased expertise and access for the children. (Principal, NSW school)

I think from a purely pragmatic point of view it is too much for one person to handle. I also think that it’s important as, if we believe in inclusive practice, then we believe in providing students with opportunities that extend beyond the classroom. And in order for those opportunities to be realised and to be realised across the school, it involves us working together as teachers to provide those opportunities. (Staff member, NSW school)

Besides associating the concept of distributed leadership with performing various leadership responsibilities, staff members in both schools understood it as ‘sharing’ various responsibilities and ‘collaborating’. The deputy principal of the Slovak school expressed a view that collaboration among teachers and between staff members and
parents plays a crucial part in attempting to achieve the inclusive goal of enabling students to ‘thrive’ or ‘prosper’. In this way, the interviewee alluded to the goal of enhancing students’ educational outcomes and skills.

It is also about when they [teachers] see, for instance, that a child is thriving when working in this particular way, they share it amongst each other. And in our school the work would not be possible without mutual collaboration, because what we do here is really teamwork. That special education teacher, parent, teacher, there really must be collaboration. We see that with children, where there is no collaboration, they do not prosper. (Deputy principal, Slovak school)

A NSW teacher described how collaboration between staff supported the achievement of inclusive education goals.

I am convinced that we discuss issues of inclusive education to a great extent here. We usually do so at professional development meetings, but also during informal break times. At staff meetings we discuss individual cases of students so all teachers are informed about various students, even if we are not part of their classrooms. In this sense all teachers act as a resource for each other. They give particular advice to each other by saying, for instance, ‘You can try this or that’. (Staff member, NSW school)

Last but not least, staff members, who associated the concept of distributed leadership primarily with the process of involvement in decision-making, also saw it as connected to inclusive education. For example the school principal argued that

You [as a principal] simply cannot direct and encompass everything, you have no chance to encompass what happens in the classroom. ... Because when you sit in the principal’s office, you cannot decide about, for instance, what the teacher should reduce or expand the lesson content for a particular student or if she/he should be sent for [assessment]. I just can’t imagine that. Or how to adjust her/his plans. It must be in the jurisdiction of that teacher and dependent on her/his decisions whether the child should be sent for an assessment or whether that child should be transferred to [a special classroom]. (Principal, Slovak school)

This principal aptly pointed out that decisions, which extended beyond everyday teaching situations, such as placing or transferring a child in a special or regular classroom, have to be made by a range of school stakeholders acting in collaboration with one another.

Constructing distributed leadership in terms of it being a means for attaining the goals of inclusive education implies that the processes of distributed leadership are distinct and external to practices and goals of inclusive education. This understanding may also imply the existence of other means for the attainment of these goals, such as professional learning or support services. Hence, in these terms the processes of distributed leadership might be considered as merely conducive to the goals of inclusive education, hence, not necessary or unavoidable. For instance, a scenario might emerge in which teachers holding disapproving attitudes towards inclusive education would put their position into practice through distributed decision-making processes. Hence, through
distributed decision-making regular classroom teachers might instigate and bring about the transfer of student ‘diagnosed’ with SEN or disability to a segregated special classroom when this is an option. Thus, although inclusive practices may be enhanced through the operation of distributed leadership, the former is by no means ensured by the practice of the latter.

**Understanding Distributed Leadership as a Component of Inclusive Education**

Apart from those participants in the research who constructed distributed leadership as a means to achieving the goals of inclusive education, two research participants in each school, including the principals, also constructed it as an indispensable component of inclusive education itself.

I think if you value that, people are going to be respected, they are going to be treated fairly, they are going to at least be included – that to me is part of what we are defining as an inclusive school, that people have to feel that they are involved in the process of evaluation and of comment and of providing ideas. (Principal, NSW school)

I think they are very intertwined that without [distributed leadership], inclusion would not work as it should. I think it is very intertwined and without everybody being involved it would not work. (Principal, Slovak school)

In the first quote, the principal of the NSW school constructed the meaning of inclusive education, or an ‘inclusive school’, as comprising the involvement of all school stakeholders, (teachers, parents and students) in decision-making processes as one of the essential features of distributed leadership. In the second quote, the principal of the Slovak school did not specify a particular characteristic of distributed leadership, but constructed it as an indispensable component of inclusive education.

In addition to the decision-making processes, the principal of the NSW school and one staff member in the Slovak school also referred to teamwork and collaboration as important components of inclusion.

I would have to identify teamwork as a crucial component of successful inclusive schools. I truly believe that, but I would also have some evidence to also show that’s the case. (Principal, NSW school)

The inclusion should be like that where we live as in one family, that people have those mutual relationships. At least I imagine it this way... that the leadership would closely collaborate with teachers and the teacher with leadership. (Staff member, Slovak school)

These two research participants understood ‘collaboration’ or ‘teamwork’ to be a form of distributed leadership. Yet, they also constructed this particular form of distributed leadership as overlapping with the meaning of inclusive education; not as an unrelated or secondary benefit, but as an indispensable component of a truly inclusive educational environment.

Without referring to particular processes of distributed leadership or goals of inclusive education, another staff member in the NSW school conveyed the meanings of distributed leadership and inclusive education as overlapping in their ‘value’ basis.
If we didn’t have the sort of approach to leadership that we do have, we wouldn’t be reflecting what our values are. And if we are not reflecting what our values are, then our practice changes. And our practice starts to become less inclusive and it starts to become more autocratic... and if it’s becoming autocratic then that’s got to be sort of an opposing dialectic to inclusivity.
(Staff member, NSW school)

This participant conveyed her/his view that there are different ‘approaches’ to leadership; her/his own was fundamentally grounded on inclusive ‘values’ in contrast to more ‘autocratic’ models of leadership that were perceived as being directed towards a value system seen as being opposed to the principles and practices of inclusivity. In other words, in her/his understanding of distributed leadership it is by definition inclusive – at least inclusive towards the adults or teachers. However, the possibility remains that while distributed leadership may be based on inclusive values in relation to interactions between teachers or between adults more generally, at the same time it may also be directed towards non-inclusive goals or outcomes when approaching students.

Therefore, we would argue that one can distinguish two forms of processes in the practice of distributed leadership: 1) those that incorporate inclusive goals and which are directed towards inclusive goals and outcomes; and 2) those that are not directed towards any particular goals and can equally lead to instances of exclusion of particular students. In other words, the first form of distributed leadership is understood not only in terms of processes, but also as a set of values and goals. The second form of distributed leadership is constructed as a mere set of processes without any directedness towards agreed values of inclusivity. In this respect, only the first form of distributed leadership should be considered as a component of inclusive education and overlapping with it.

In this broad understanding of inclusive education and distributed leadership the process becomes as important as the goal. In this sense, the process itself becomes one of the goals, which makes the boundaries between the concepts of a goal and process blurry and malleable. This understanding not only challenges the dominant construction of inclusive education (among the research participants) as a set of goals, it also challenges the exclusive target group of these goals to be the students and brings adults both in and outside the classroom into the picture. If distributed leadership represents an indispensable component of inclusive education, the latter must target not only students but also adult school stakeholders. Thus, the broad understanding of inclusive education must be conceptualised as representing both processes and goals and be concerned with the experiences and outcomes for both students and adults. While distributed leadership, understood as a mere process, can be perceived as inclusive in the limited sense we have described in the absence of inclusive value directedness and ‘goal’ orientation, it falls well short in supporting and enhancing a genuinely inclusive classroom and school. In other words, in this broad understanding of inclusive education the use of any practices of autocratic leadership have to be deemed to be non-inclusive; no matter what the intended goal of these autocratic processes. This remains the case even if the goal is that of the inclusion of students.
Discussion

The narrow understanding of distributed leadership as a means for attaining inclusive goals is also dominant in academic literature, which focuses on inclusive education practised at a school level (e.g., Ainscow & Sandill, 2010; Booth & Ainscow, 2011; Kugelmass & Ainscow, 2004). Some respondents, however, went beyond this narrow understanding of distributed leadership and inclusive education and constructed the former as an indispensable component of the former. This broad understanding of inclusive education and distributed leadership problematises the invitation to practise autocratic leadership as justifiable for the inclusive ends (Kugelmass & Ainscow 2004, pp.139–140). This advice leaves an impression that without the principal’s support for inclusion, there is no opportunity for teachers to pursue the goal. Inevitably this perspective undermines other school community members in their attempts to pursue inclusive goals. In particular, it disregards the extent to which both leadership and school practices and outcomes may be realised through disputed positions and interactions. These may themselves contribute to alternative constructions of ‘school leadership’ which challenge the dominant position of the principal.

Endeavouring to practise inclusive education or distributed leadership cannot be considered as something isolated from the social and political context. This claim was confirmed by some participants of this research study, as well.

The other thing you might need to know too is in terms of our NAPLAN results, we are expected also to monitor some individual programs – individual targets for individual kids who may not be at a minimum national standard.

That’s a requirement also of our system in terms of monitoring things like that. ... We would be required for accountability purposes to show ways that we are setting targets for kids on minimal levels of achievement and we need to show how we’ve progressed their development. (Principal, NSW school)

In this statement the principal referred to NAPLAN (National Assessment Program – Literacy and Numeracy) which is an annual assessment for all students in Year 3, 5, 7 and 9 in Australia. It was launched in 2008 (http://www.nap.edu.au/). In a staff meeting exclusively devoted to discussing the NAPLAN results, a number of staff members in the NSW school implied a dilemma. While on the one hand they expressed inclusive intentions to accept every single student who applied to their school, on the other hand they worried that accepting too many ‘low achievers’ in NAPLAN might create a negative reputation for the school as being underperforming or failing, discouraging more affluent or ‘aspirational’ parents from enrolling their children in the school. Although none of the research participants directly articulated this perspective in their interviews there was consistency in the interviews in teachers’ conceptualisation of inclusion as in some way an endeavour to continually improve and change the school, including improving its appeal to a wider group of parents. In fact, in neither of the researched schools did the participants express deeper critical reflection of their practices and perceptions of inclusive education from a wider social, political or philosophical perspective (Ryan, 2006). This suggests some level of disconnect between the principles that teachers hold in relation to inclusivity in their classrooms and schools and the reality they experience in the face of external pressures over which they perceive themselves to have little or no control. These contextual variables are likely to be significant factors impacting upon practices within schools in relation to inclusivity.
A number of academics in the field of inclusive education do not consider inclusion to be adequately analysed when considered only as a matter of organisational adjustments at a school level. From this socio-critical perspective, inclusion is also ‘a theory and tactic for education and social reform’ (Armstrong et al., 2010; Ballard, 2013; Fulcher, 1989; Hardy & Woodcock, 2015), a ‘political struggle’ (Slee, 2011, p. 110), and a continuous struggle without any fixed outcome (Armstrong et al., 2010, p. 33). They critique the neoliberal discourses of ‘school improvement, performativity, and standardisation’ as impeding inclusion and social justice (Allan, 2008) and hindering the acceptance of difference and diversity (Grimaldi, 2012, p. 1131). The research participants in our study placed emphasis on enhancing students’ educational outcomes as the primary goal of inclusive education and only occasionally referred to other goals (e.g., developing ethical behaviour in all students, enabling them to actively participate and experience happiness, belonging, and self-worth). This could be interpreted as reflecting the dominance of the ‘educational excellence’ discourse.

The wider social and political context, dominated by the neoliberal value system and deficit discourses of disability and special educational needs, both in NSW (Graham & Jahnukainen, 2011; Slee, 2011) and Slovakia (Kaščák & Pupala, 2011; Žovinec & Seidler, 2010), may be inconsistent with an inclusive value system and may pose significant challenges to the sustainability of inclusion in schools (Armstrong, Armstrong & Spandagou, 2010, p. 110). Thus, one needs to be careful not to put all the responsibility on teachers and schools for failing to practise inclusive education. Nonetheless, despite the potency of exclusionary ideologies and discourses in our societies, even those school principals and teachers who are conscious of these still have to face the reality of ‘what to do on Monday morning’ (Allan, 2008). The debate over what it means to practise inclusive education in classrooms and schools remains significant. While the concept of inclusive education might refer to a much larger socio-political reform project, to which each of us may contribute in her/his own way, teachers and other school stakeholders have a critical voice and role to play in conceptualising inclusive education and developing ways that can best support their schools in practising inclusive education.

Conclusion

This article has provided some insights on the linkages between inclusive education and distributed leadership. It has been argued that inclusive education can be understood, broadly, both as a set of goals and processes and as targeting student and adult stakeholders. However, it was also argued that practising inclusive education at school and classroom level cannot take place in isolation from the wider socio-political context, which promotes very powerful ideas and discourses that may be inconsistent with the inclusive ideals of teachers. That is why, practising an endless ‘critical reflection’, understood as ‘the examination of personal and professional belief systems, as well as the deliberate consideration of the ethical implications and effect of practices’ (Ward et al., 2015, p. 342) is necessary if one wishes to minimise the impact of wider socio-political exclusionary discourses and pursue the inclusive values, goals and processes in everyday lives of schools. Seeing this as not simply an individual exercise but rather as a collaborative project is essential in problematising in practice the linkages between inclusive education and distributed leadership.
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Teacher Training Programs for Gifted Education with Focus on Sustainability

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Abstract

Scholars, psychologists, and teachers from around the world have been dealing with the topic of giftedness for many years. Also in Slovakia, development of giftedness is a highly topical issue and gifted education has earned its place in the current curricular documents issued by the Ministry of Education. The national curriculum specifies education objectives, teaching plans, requirements for personnel, organizational and material-technological requirements for gifted education. However, the personnel requirements are problematic not only in Slovakia, but also in other countries. Most attention is paid to identification and development of gifted children, but very little consideration is given to the training of teachers for gifted children. The lack of justifying teacher training does not guarantee sustainability of gifted education. The aim of this paper is to map and describe gifted education, teacher training programs and qualifications for teachers of intellectually gifted pupils in Slovakia, Austria, Belgium and Finland. These countries were chosen because of very different perceptions of the gifted education and teacher training. These systems are compared and a proposal for sustainable teacher training is offered.

Keywords: teacher training programs, sustainable gifted education

Introduction

Until recently the common assumption prevailing in most European countries was that gifted learners do not have any specific needs and thus do not need any special attention. It was believed that gifted learners would progress in regular classes on their own without further assistance. Gifted education was thus neglected. The issues of gifted pupils have increasingly gained ground in Europe in recent decades. In order to maximize the potential of gifted learners and make the gifted education sustainable, it is essential to improve flexibility of schools, to diversify teaching methods and techniques, to enrich the content of the curriculum and to increase the qualifications of the teachers who work with gifted learners.

To be specific, teacher training represents an area that is most neglected in spite of a general effort to improve the education of the gifted. Although there abounds a considerable number of research on sustainable teacher training programs for general education...
(Gadušová, Hašková, Malá, Munková, 2013, Flores, Santos, Fernandes, Pereira, 2014, Iliško, Skrinda, Mičule, 2014, Klímová, 2015, Pipere, Veisson, & Salite, 2015, Gedžūne, 2015, Hanesová, 2015, Zygmunt, 2016) there is a limited amount of research done on sustainable teacher training programs for gifted pupils. A large-scale European wide research was conducted in 2005 (Monks, Pfluger, 2005), which provides information about the status and systems of gifted education in 21 European countries. However Slovakia did not participate in the research. The conducted research points out that only 9 out of 21 countries (Austria, Germany, Spain, Hungary, Luxembourg, the Netherlands, Romania, Slovenia and the United Kingdom) provide teacher training for those working with gifted pupils. In Europe we have a common language policy in the form of Common European Framework for Languages (2001), which determines concepts of foreign language teaching in European countries. Gifted education and teacher training of gifted pupils is so diverse in every country, so we believe that there should be in Europe at least some common principles on how to work with gifted pupils and requirements for teachers’ qualifications with the aim to sustain the development of gifted children. Sterling (2008) emphasised that sustainable education moves towards deeper education itself including policies, purposes and practices. Education should sustain and realize human potential in relation to the need. There is a need to re-evaluate gifted education and teacher training concerning its existence and sustainability. This article presents information about the current state of teacher education for gifted pupils in Austria, Belgium, Finland and Slovakia with the focus on sustainability. The choice of these countries was purposeful as they offer very diverse understanding and system of gifted education and their systems of teacher training leads to a different level of sustainability of gifted education.

The Training of Teachers for Gifted Children in Austria

Austria is a country which has developed a nationwide gifted education program, including qualifications for teachers working with gifted children. Austrian legislation supports the education of gifted children via integrated instruction in traditional classrooms. This education takes the form of individual approach, acceleration, deepening of the curriculum, skipping a year, completing courses at a university and earlier enrolment into university. A segregated model of education is rare. Identification of gifted learners is carried out by teachers and psychologists who use standardized tests. Indicators for the identification of gifted learners are excellent academic results, which has not proven to be the most reliable indicators. (Oswald et al, 2005).

The training of teachers for gifted children in Austria is becoming increasingly topical. A large part of the curriculum at some faculties of education is aimed at gifted education. Universities provide lectures, seminars and workshops focused on theoretical and practical aspects of giftedness and gifted education. Faculties of education and educational institutes organize lectures and seminars for teachers within the scope of lifelong learning to ensure sustainability in their gifted teaching practice. Training of teachers for gifted learners emphasizes an inclusive approach; it trains future teachers for work with gifted pupils integrated into regular classes. OEZBF (Austrian Centre for Training and Research of Gifted Pupils) cooperates with faculties of education and universities in the curricula design of teacher training for gifted learners. They also
cooperate in the development, implementation and evaluation of curriculum of teacher training for gifted learners at pre-school age (OEZBF, 2014). The topical nature of the issue of teacher training of the gifted pupils and the need for its sustainability resulted in the launching of a postgraduate training program for professionals in the education of gifted learners (e.g. a Master degree program for training of teachers for gifted children at the Danube University in Krems). Postgraduate education is possible at more than ten educational institutes; it is partially funded by the Ministry of Education and until 2005 more than 600 students graduated successfully (Oswald et al, 2005). The positive development in the field of gifted education is supported by the fact that educational standards, graduate programs, and particularly the White Paper in 2011 were established (White Paper Promoting Talent and Excellence). The White Paper is an extensive nationwide valid document which emphasizes the need for training of teachers for the gifted and specifies the education legislation at all levels – training of teachers for gifted children, system of education of gifted learners, etc. (Weilguny et al, 2011). The aim of the Austrian education policy is to provide at least one expert in the field of education of gifted pupils for each school. It is apparent that gifted education and adequate teacher training have become important issues of education in Austria and these can lead to great progress and sustainability of gifted education.

The Training of Teachers for Gifted Children in Belgium

Belgium is a case of a country, which delivers a totally opposite kind of approach to the education of the gifted. According to Kumpsa (2008) a long-term view has persisted in Belgium that the issue of giftedness is a luxury “nice to have” problem. Therefore Belgian legislation does not define giftedness or gifted education. However, the Ministry of Education has been involved in creating conditions for education of gifted pupils over the last decade, but still has not come to any decisions. There are no standards at the national level in Belgium which would determine the identification and subsequent education of gifted pupils. Schools have full autonomy and determine criteria for identification of and working with gifted pupils.

In Belgium, there are neither courses at faculties of education, nor compulsory disciplines aimed at gifted education. Teacher trainees can only attend optional courses focused on giftedness. University of Antwerp offers counselling to parents and teachers at the Centre for research of giftedness (Kieboom, 2005). With so little support of gifted children and lack of teacher training there cannot be any reference of sustainability of gifted education, as it virtually does not exist. There is however eagerness to improve this situation. For example, at a national conference in Belgium, organized by the Belgian association of professionals and parents of gifted children in 2011, the Minister of Education expressed the necessity of supporting gifted children and training of teachers for gifted children in the Belgian education system. Apart from earlier admission to school and skipping a year, there are no specific procedures and methods of gifted education and training of teachers for gifted children in Belgium. However Professor De Corte (in D’Hondt, 2012) came to conclusions that are now widely accepted. University teacher training requires much more attention in the field of gifted education and issues of giftedness should have a more prominent position in the Belgian school system. Otherwise, sustainable gifted education is not feasible. Just the opposite to the Austrian system of gifted education and teacher training, the Belgian system is underdeveloped.
For the progress and sustainability of the gifted pupils, legislation changes, perception of the gifted, gifted programs and teacher training need to be made.

Training of Teachers for Gifted Students in Finland

Finland is a country with a specific system of education in general. Its gifted education is very different because it has no special status. Even though the Finnish legislation does not specify the gifted as learners with special educational needs, their pupils reach one of the best results in the world. The Finnish education system is strongly decentralized and only general guidelines are provided at national level. A specific feature of the Finnish education system is the recognition of the individual needs of all learners, differentiation of schools and school instruction according to the age and abilities of individual pupils. The schools provide individual training programs that enable differentiated learning process. The differentiated education represents a general policy of Finland and every learner (also gifted) benefits from the individualization of education. Learners are not marked and this fact allows them to accelerate according to their individual abilities. According to Tirri (2013) there are however some scholars in Finland who acknowledge the importance of recognizing the social and affective needs of gifted learners. Special schools, programs and summer camps for gifted children, which promote academic and creative giftedness of learners, are being organized.

In Finland there are not any programs aimed at educating gifted learners. In general, the qualification of teachers is based on individual interests and needs of learners. Current trends of differentiation and individualism are reflected in the possibilities of planning the curriculum and teachers are expected to find the most appropriate ways of developing the potential of all learners. Teacher trainees receive background information about giftedness and gifted learners as part of their study. The University of Helsinki and the University of Tampere provide courses for working with gifted pupils for in-service teachers according to their interests (Tirri, 2005). In spite of absence of legislation related to the gifted education in Finland, the education system (not only for gifted) operates as one of the best in the world. This system is clearly very efficient and Finland’s results indicate great sustainability in all spheres of education, which is proved by top results in international testing. Finnish pupils achieve regularly the best results in international PISA testing out of all countries in the world (OECD, 2014).

Training for Teachers of Gifted Students in Slovakia

Slovakia was chosen because it is our home country and also has a specific system of gifted education. This system is compared with the previously mentioned systems. Slovak legislation (School Act no. 245/2008 § 2 letter j on education and training) defines a gifted learner as a child with special educational needs. Gifted children must be identified by centres of pedagogical-psychological advisory services. Gifted children must be identified by centres of pedagogical-psychological advisory services. According to the Act 103 article 1 education of gifted learners is conducted in schools with a focus on the development of:

1. intellectual giftedness of children (general and intellectually specific giftedness)
2. the artistic giftedness of children
3. sport giftedness of children.
Learners with a general intellectual giftedness (GIG) have a special state education program, but the principles are the same as those valid for other learners. However the education of pupils with a general intellectual giftedness has to consider the special educational needs in the form of appropriate forms, methods and techniques of teaching practice. Special schools or classes for children with a general intellectual giftedness (under Act no. 245/2008) are set up in Slovakia, after completion of the fifth year further study at a grammar school is expected. The educational process at schools for gifted learners is highly individualized. Learners may be reclassified into a higher grade, attend several grades at the same time, take some subjects from a higher grade, or they may have an individual learning plan. However, in general an expanding or enriching education is preferred. The maximum number of pupils per class is 12. National curriculum (ŠKVP) allows schools to individualize the school curriculum and organisational forms of education for gifted learners. There are also special textbooks for Slovak language and mathematics available, which are used at the primary level of education for gifted learners (VÚDPaP, 2008). Moreover, education of gifted learners can take a form of integrated education in regular classes. In such case, an individual or group educational program is developed for integrated gifted pupils. Teachers in cooperation with an Institute for educational counselling and prevention are responsible for their development (Dock, 2005; Duchovičová, Babulicová, 2010). The system of gifted education in Slovakia is elaborated in a great detail and should guarantee sustainable gifted education.

However, the teacher training and qualifications of teachers of gifted learners do not have exact criteria and conditions. According to the national curriculum teachers of gifted pupils should meet the following qualification requirements: teaching qualification for primary level, or teaching qualification for specific subjects. Learners with GIG can be taught also by a university teacher or an expert with research experience/practice or special pedagogue. Teachers are chosen by the school director and they should be provided with special training for working with intellectually gifted learners. According to Páleník (2011) from Research Institute for Child Psychology and Pathopsychology (VÚDPaP) teachers in teaching practice are not prepared adequately for working with intellectually gifted learners and university education provides them only with minimum information on how to work with gifted pupils. The VÚDPaP has been focusing on the education of gifted children for over thirty years. VÚDPaP has included the issue of education of gifted learners into lifelong learning programs, particularly into the continuous education of teachers. The aim is to prepare primary school teachers for educational work with gifted children (Páleník, 2011). However, there are not any study programs aimed at training of teachers for gifted learners in Slovakia. Universities and faculties of education provide some courses designed for working with gifted children within the scope of academic subjects related to pedagogical and psychological matters, but the field didactics do not have to include issues concerning working with gifted learners. It depends on the individual universities and study fields whether they consider education of gifted learners necessary. The lack of teacher training in gifted education does not fit in with the elaborated system of gifted programs and the two together do not lead to sustainable education.

Teachers’ qualification for working with intellectually gifted learners is at a low level. It is definitely an area that needs to be addressed. From the research, the existence of a special national curriculum and special classes for pupils with GIG, it is clear that the education of gifted children is a priority of the Slovak education system, but the
actual teacher training is neglected. Even though Porubská proposed already in 1997 quite a detailed plan for teacher training of gifted children, in-practice teacher training is continuous education, there is not a noticeable improvement in gifted teacher training, which is considered as a problem and it needs to be dealt with. The only complex courses for teachers of gifted learners known to us are the training courses provided by VÚDPaP. Similarly to the VÚDPaP courses, universities, faculties of education, and methodological centres should be providing special courses and study programs for future teachers and in-practice teachers of gifted children. Master programs focusing on working with gifted children should be established at faculties of education and field didactics of particular major subjects should include working with gifted children. To reach progress and sustainability of gifted education, there is a great need to create and improve teacher training courses in the area of gifted education. Gifted children are the future of every country and therefore their education must not be neglected.

**Conclusion and Suggestions**

It is clear from this brief review of the issues of teacher training for gifted pupils that despite the great attention provided to the education of gifted pupils, the education of teachers of gifted learners has been neglected. Out of the mentioned countries, the training of teachers for gifted learners is firmly established and receives a considerable attention only in Austria. Austria is on the best path to gain progress and retain sustainability in teacher training and gifted education. Belgium is a country that has so far failed to address giftedness, gifted education, as well as teacher training for gifted pupils. Belgium is now at a starting point in the issue of gifted education. It appears that Belgium is still only finding ground in gifted education and there cannot be talk about sustainability of gifted education. Finland has long been one of the best in terms of education results in general, despite the absence of gifted education per se. It is likely due to the overall education system based on individual approach to learners, which is one of the specific features of working with gifted learners. Finland is one of the most successful countries concerning education in general and it has been gaining progress and sustainability in teacher training and education in general. Slovakia with elaborated gifted programs is missing programs in the area of teacher training for gifted pupils. The elaborated gifted programs and missing teacher training programs are in contrast and cannot succeed with the current system in ensuring sustainable gifted education. Scholars deal with topic giftedness (Porubská, 1997, Duchovičová, Babulícová, 2010, Veselá, 2010, Bírová, 2013, Reid, 2014, Kováčiková, 2015), but very little has been done in practice concerning training of teachers of gifted learners. For progress of the gifted pupils in special classes there needs to be courses provided not only in general pedagogy but also in the field of didactics with the aim to make gifted education sustainable.

There was a considerable review carried out by Reid and Boettger (2015), which analysed gifted education in ten European countries. The outcomes demonstrate a great variety in gifted education. With the aim to bring some system into understanding of gifted education, we recommend some common terminology, understanding, principles and requirements concerning gifted education in Europe. It would not be anything new in Europe, as European countries already share a common language policy (Common European Framework for Languages) which serves as recommendations for creating national curricula for foreign language learning in European countries. Similar policy
could be applied in gifted education, which would bring unity in understanding gifted education and possibly its sustainability.

Concerning teacher training within the scope of academic subjects related to pedagogical and psychological matters, all faculties of education should offer courses on giftedness, peculiarities of gifted children, principles on working with the gifted, etc. What is definitely missing is training teachers in the field of didactics. This field includes working with pupils with special educational needs, but gifted are often avoided. Teachers and teacher trainees are experts in their subject matter (Soobik, 2014), but because the gifted children require special attention and have specific needs, the teachers need to be able to shift from the traditional approach towards the more constructivist approach and to adapt to differences of gifted children with the aim to reach sustainability of field didactics within gifted education.

At the university or institutional level, there is a need to create graduate and post graduate programs, courses in teacher training programs and courses for in-service teachers specialising on gifted education. Specialised courses should significantly contribute to sustainable gifted education, where sustainability is integrated into schools, classrooms, subjects, etc. (Redman, 2013). In service teacher trainings are very important for professional development of teachers, where they can not only escalate their knowledge, but also re-examine, re-evaluate their beliefs, which would lead them to self-reflective awareness (Kabadayi, 2016). This all should contribute to sustainable gifted education in practice (Iliško, 2007). The Austrian system of having specialists on gifted education in every school could be given as a model for sustainability of gifted programs in schools. It is common that schools employ special pedagogies, but their work focuses more on pupils with special educational needs in the form of learning disabilities, communication disorders, emotional and behavioural disorders, physical and developmental disabilities and gifted pupils’ needs are neglected.

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References


Teacher Training Programs for Gifted Education with Focus on Sustainability


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The Transformation of Traditional Universities into Entrepreneurial Universities to Ensure Sustainable Higher Education

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Abstract
This paper aims to investigate the experience and to identify the drivers of transforming traditional universities into Entrepreneurial Universities for ensuring sustainable higher education in Latvia. Due to the wide scope, Entrepreneurial University characteristics, the present research study is limited and focuses on the university providing access to students to business incubation facilities, relationships with business incubators for students, as well openness of university to collaboration and knowledge co-creation with its external stakeholders. Analyses of the experiences of universities of Latvia business incubators providing services to students, as well cooperation between higher education institutions (HEI) and local governments and entrepreneurs show that there is a positive trend. In opposite, such a trend can’t be observed towards building Entrepreneurial Universities in Latvia over the past 5 years. The results of the survey show that there is a need put higher efforts to assist young entrepreneurs in building cooperation networks and strengthening knowledge co-creation with external stakeholders.

Keywords: Entrepreneurial University, student business incubators, entrepreneurship education, Quintuple Helix Model, Sustainable higher education

Introduction
Nowadays the role of universities is facing rapid change in the context of expansion of their tasks, leading to development of an Entrepreneurial University, creating business incubators for students to ensure sustainable higher education. The importance of an Entrepreneurial University by providing students with new ideas, skills and the ability to think and respond entrepreneurially to societal challenges, enhancing co-creation with external partners is becoming a driving source for achieving sustainable higher education, and it has received considerable attention over the last years. Education as
sustainability is the mean through which we educate our citizens to the values, opportunities, and choices each person has to develop one’s self as an aware, independent, responsible, and active agent of one’s own fate and hence contribute to the future of our society (Medrick, 2013).

The traditional university is usually involved in two main activities: teaching and research. A new approach to the role of universities envisages a structural shift from their traditional missions to a third task: the commercialization of new knowledge for economic development (Etzkowitz et al., 2000). Integrating economic and social development into university’s mission urges universities towards transformation from being traditional teaching and research universities towards becoming Entrepreneurial Universities (Dino Arnaut. *Towards an Entrepreneurial University*). Thus universities play an important role in providing the necessary education for future entrepreneurial persons with developed intuitive decision making, the capacity to make things happen autonomously, networking, initiative taking, opportunity identification, creative problem solving, strategic thinking, and self efficacy, upon the ability of an individual to cope with an unpredictable external environment and the associated entrepreneurial ways of doing, thinking, feeling, communicating, organisating and learning (*The Entrepreneurial University: From concept to action*, 2013).

A business incubator is an important tool that can be used by universities to support new start-ups and spin-offs, as well as to build links with industry (EC/OECD, 2012), thus ensuring economic development of certain territories at regional and even national level. In this respect, the task of business incubators is to foster the creation and development of new, innovative, sustainable companies by providing favourable business conditions. An essential condition for business incubator development is to enhance networking with different institutions, ensuring protection of the environment in a broader sense by applying the Quintuple Helix Model, delivering eco-innovation and eco-entrepreneurship that should be processed in such a broader understanding of knowledge, production and innovation (Carayannis and Campbell, 2010; Carayannis et al., 2015). This means that the sustainability context must be central to twenty first century education. Moreover, the approach to business must be just as transformational as the approach to pedagogy. Students need to learn about and develop skills relevant to the emerging green economy not just the old business model of the 20th century, because their innovation and creativity will help the new form of sustainable enterprise (David V. J. Bell, 2016). Education for Sustainability enables people to develop the knowledge, skills, values and competencies that promote sustainable actions and lead to improved quality of life now without destroying the environment for future generations (Besong & Holland, 2015).

The idea of business incubators emerged in the United States of America in the middle of the last century after the Second World War as a new instrument for reviving abandoned factories and industrial districts, offering new entrepreneurs office premises and resources for shared use. The fastest expansion of business incubators was observed beginning with the 1970s, owing to the development of service sectors that created the need for more micro-, small and medium enterprises. At present, business incubators are spread worldwide.

In Latvia, the first business incubator (the Latvian Technological Centre) was established in 1993 under the programme of the Latvian Investment and Development Agency. At present, 10 business incubators actively operate under the European Regional Develop-
ment Fund in 20 Latvian towns; however, in addition to the ones mentioned, there are a number of private initiatives and university-based business incubators (http://www.liaa.gov.lv/lv/biznesa-abc/biznesa-inkubatori).

In Latvia, as in other European countries, the founders of business incubators are mostly universities, municipalities and entrepreneurs, thereby providing sufficient financial and intellectual resources to successfully implement business incubator projects. Business incubators can help not only new entrepreneurs but also university scientists and academic staff to turn their discoveries and ideas into an economically successful product or services, they can also strengthen cooperation between scientists and entrepreneurs in general.

Nowadays, a significant challenge of the educational system is to create favourable preconditions enabling young people themselves to create jobs, thus preparing students for the modern business world and practices. It requires re-orienting the study process towards entrepreneurship education, involving students in new training modules such as university-based business incubator activities and encouraging them to become entrepreneurs, thereby contributing to personal development, job creation and sustainable economic development.

This paper aims to investigate the experience and to identify the problems related to the transformation of traditional universities into Entrepreneurial Universities for delivering sustainable higher education in Latvia, thus demonstrating higher education institutions commitment to become an Entrepreneurial University.

The questions addressed in this paper are as follows: What are the main characteristics of the Entrepreneurial University? Are there Entrepreneurial Universities in Latvia? What lessons can be learnt from the experience of developing their links with university-based business incubators, cooperation between regional higher education institutions (HEI) and with local governments and entrepreneurs to deliver sustainable higher education?

What are the Main Characteristics of the Entrepreneurial University?

In specific literature, a number of different features of an Entrepreneurial University can be found. For example, Dino Arnaut provides the main characteristics of an Entrepreneurial University from different aspects based on views of different authors (Burton, Clark, 2004; Etzkowitz, 2004; Hannon, 2008; Robertson, 2008; Gibb, Haskins and Robertson, 2009). Arnaut points out that “In order to be entrepreneurial, the university must embed entrepreneurship in every part of itself, from its leadership through to its teaching and student impact. It needs to demonstrate excellence in strong leadership at all levels, innovative faculties and a clear, tangible impact on staff, stronger engagement with students in a diversity of learning opportunities, business and the local community, and it needs to demonstrate a long-term commitment of higher education institutions to engaging in enterprise and entrepreneurship, which will consequently help to develop the economy” (Dino Arnaut, 138–139).

Other authors (Guerrero et al., 2015) have summarized characteristics of an Entrepreneurial university based on findings of various authors’ publications from 1998 up to 2012. The above-mentioned authors have developed characteristics of an Entrepreneurial University based on six features (Table 1). After summarizing the findings, they concluded that the Entrepreneurial University generates several direct outcomes from teaching, research, and entrepreneurial activities. These outcomes could be transformed
into a determinant of economic development. In addition, Thorp and Goldstein (2010) identified quite different features of an Entrepreneurial university (Table 1).

More specific characteristics of the Entrepreneurial University, comprising seven features, have been developed by the European Commission’s DG Education and Culture in collaboration with the OECD LEED forum. As a result, a Guiding Framework for Entrepreneurial Universities was delivered in 2012 (Table 1).

Table 1
Characteristics of the Entrepreneurial University as Given by the European Commission, OECD (2012) and Holden Thorp and Buck Goldstein (2010) and Maribel Guerrero et al. (2015)

<table>
<thead>
<tr>
<th>European Commission’s and OECD LEED forum</th>
<th>Holden Thorp and Buck Goldstein</th>
<th>Maribel Guerrero et al.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Leadership and Governance</td>
<td>1. It recognizes that liberal arts education has fuelled American innovation.</td>
<td>1. Its organizational adaptation to environmental changes (Clark, 1998),</td>
</tr>
<tr>
<td>2. Organisational Capacity, People and Incentives</td>
<td>2. It thrives on big problems.</td>
<td>2. Its managerial and governance distinctiveness (Subotzky, 1999),</td>
</tr>
<tr>
<td>3. Entrepreneurship development in teaching and learning</td>
<td>3. It values both innovation and execution.</td>
<td>3. New activities oriented to the development of entrepreneurial culture at all levels (Kirby, 2002),</td>
</tr>
<tr>
<td>4. Pathways for entrepreneurs</td>
<td>4. It places culture ahead of structure.</td>
<td>5. Its contribution to economic development with the creation of new ventures (Chrisman et al., 1995),</td>
</tr>
<tr>
<td>5. University – business/ external relationships for knowledge exchange</td>
<td>5. It encourages partnerships between academics and entrepreneurs.</td>
<td>6. The commercialization of research (Jacob et al., 2003).</td>
</tr>
<tr>
<td>6. The Entrepreneurial university as an internationalised institution</td>
<td></td>
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<tr>
<td>7. Measuring the impact of the Entrepreneurial university</td>
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</table>

Summarising the research done on the characteristics of the Entrepreneurial University by various authors, it is important to mention that there are several attempts to identify the features of an Entrepreneurial University in literature. However, there is still no consensus among authors about the main characteristics of the Entrepreneurial University. Consequently, further comparative studies and consideration of the practical aspects of the Entrepreneurial University could be problematic.

Our position on the features of an Entrepreneurial University identified by various authors could be supported in general. At the same time, the authors consider that more authentic and more practical are the features of an Entrepreneurial University developed by the EC and the OECD in a Guiding Framework (2012). It has been argued that as a self-assessment tool, the framework has the simple purpose of helping universities identify their current situation and potential areas of action, taking into account their local and national environments (EC/OECD, 2012).

According to the Guiding Framework, there are several activities which are established and managed by a university in order to justify the status of Entrepreneurial University:
- an entrepreneurial strategy;
- the formation of a model for coordinating and integrating entrepreneurial activities at all levels across the university and a wide variety of funding sources, including investment by external stakeholders;
• investment in staff development to support its entrepreneurial agenda;
• stimuli and support for the development of entrepreneurial mind-sets and skills throughout the entrepreneurship education by using a variety of teaching methods including: case studies, games and simulation, real experience reports by start-ups and studies of business failure;
• provision of opportunities to experience entrepreneurship: free access to business incubators, science parks, laboratories, research facilities and IT services, coaching, mentoring, training and access to financing and taking part in entrepreneurial activities with business/the external environment;
• knowledge exchange and relationships with the public sector, regions, businesses, alumni, professional bodies etc.;
• support for international mobility and active participation in international networks by its staff and students;
• regular monitoring and evaluation of the impact of entrepreneurship education, knowledge exchange activities and start-up support activities (EC/OECD, 2012).

Thus, a university is entrepreneurial when it employs a holistic approach to ensuring the implementation of all the above-mentioned activities. As a result, it is any university that undertakes entrepreneurial activities with the objective of improving regional or national economic performance (Philpott et al., 2011).

The Guiding Framework may well serve as a starting point to investigate the application of activities by universities to comply with characteristics of an Entrepreneurial University. Due to the wide scope of the characteristics, the present research study is limited and focuses on the following characteristics of an Entrepreneurial University: the university has strong links with student incubators, science parks etc. and provides access to business incubation facilities; the university is committed to collaboration and knowledge exchange with its external stakeholders; the university is a driving force for entrepreneurship development and can play an important role in development of sustainable higher education.

Research Methodology and Participants

The research methodology implemented for this study is based on the theoretical concepts of an Entrepreneurial University and its links with student business incubators and development of sustainable higher education.

In order to determine the extent of collaboration and knowledge exchange with universities and the external stakeholders, a survey was conducted (in October 2015). The survey was conducted by creating a questionnaire. Questionnaires were given to the enterprise managers incubated and developed in the Kurzeme Business Incubator. The survey was conducted electronically by using the platform: docs.google.com/forms. A questionnaire consisted of 28 questions. The content included open and closed questions. In total, 129 managers of enterprises that are being and have been incubated in the Kurzeme Business Incubator were invited to participate in the survey. Replies were received from 80 entrepreneurs or 62% of the total.

The data of the survey was processed by the authors within the national research programme EKOSOC-LV at the Institute of Management Sciences of the University of Liepaja.
To obtain a deeper insight into the research problem and the interaction amongst an Entrepreneurial University, student business incubators and development of sustainable education, the experience of university-based business incubators in Latvia is analysed in this research.

There are 57 public and private higher education institutions (and two affiliates of foreign universities) in Latvia, including 26 colleges and 6 universities. Five university-based business incubators operate at universities in Latvia. These universities are as follows: Riga Technical University, the University of Latvia, Turiba University, BA School of Business and Finance, Riga International School of Economics and Business Administration (RISEBA). Five additional business incubators have been established in cooperation with regional higher education institutions and operate outside the remit of the institutions. The business incubators provide their participants with the environment needed for entrepreneurship: premises; accounting and communication services; consultancy services in marketing, product technology improvement, legal and business matters provided by experts; Internet portal hosting; mentoring; the Internet, stationery and office equipment (printers, copiers and scanners) etc.

The Experience of University-based Business Incubators in Latvia for Development Sustainable Higher Education

University-based business incubator activities focus on how to provide opportunities for staff and students to take part in entrepreneurial activities during the study process; (EC/OECD, 2012) to make strong links with external stakeholders and entrepreneurs to serve in a mentoring role, helping a university to identify and further develop commercialization opportunities and other initiatives (The Innovative and Entrepreneurial University: Higher Education, Innovation & Entrepreneurship in Focus, 2013). Thus, to ensure the integrity of theory and practice in the study process, enabling students to learn by doing and to demonstrate their skills in a particular activity through searching for an innovative approach to tackling economic problems. Another important precondition is the creation of an environment contributing to creative thinking which would promote the generation of new ideas that fascinate, make individuals act, and shape their lifestyle. According to the survey by the Global Entrepreneurship Monitor, 87% of EU respondents who have started or taken over a business say that having an appropriate business idea was important to their decision to do so (European Commission, 2012).

There are good practices in Latvia for implementing the Entrepreneurial University approach which considerably contributes to providing strong links with business incubators during the study process. For example, the student business incubator of Turiba University was founded in 2006. At present, about 80 future and new entrepreneurs are involved in it. The university has started implementing a study approach based on practical education. The future professionals who study in the professional undergraduate, master or doctoral programme of all the faculties are offered practical studies in a business incubator where, along with acquiring knowledge on entrepreneurship, they also implement their business ideas by creating enterprises. The university provides premises and a mentor’s advice – all that is necessary for founding and managing an enterprise. Students are given an opportunity to establish an enterprise by uniting in teams or to establish sole proprietorship. If the students work in teams in the process of establishment
of enterprises, each of them has to choose to perform some steps of the activity so that each can learn management, marketing, finance and accounting and other entrepreneurial skills. For successful entrepreneurship, along with practical activities, students hold meetings with experienced entrepreneurs, attend lectures, independently study special literature, learn to process information – to assess, analyse and systemise it, and to find creative solutions in order to enhance the services offered by their enterprise and to ensure its expansion. Thus students develop a wide range of valuable skills including business-plan development, marketing, networking and financing, and gain experience in working in a team, they jointly plan, conduct, and manage their work, they learn to cooperate, agree, make compromises, jointly make decisions and connections with local business leaders (http://www.turiba.lv/lv/dzive-augstskola/biznesa-inkubators/116/).

A student business incubator was established also at the University of Latvia (LU) Faculty of Economics and Business Management in 2013. This was aimed at providing support to University of Latvia students and to make them interested in starting and expanding a business. Within an academic year, the business incubator offers two options for students of all the LU faculties:

- Those who intend to found their own enterprise in the future, to materialise and develop their business idea into a finished product and to become confident in their abilities and ideas are given the opportunity to study in the programme Student Entrepreneurial Spirit;
- Those who already have a business idea the opportunity is given to work in the business incubator to found their own enterprise.

The programme Student Entrepreneurial Spirit is implemented within the study course Economics of Entrepreneurship in which students, along with acquiring theoretical knowledge, may practically act and implement their business idea by founding an enterprise. Students working in the business incubator acquire the knowledge needed for entrepreneurship and build their skills and experience in developing a product, they also participate in a grant contest and establish their own enterprise. In the academic year 2015/2016, 175 students from various LU faculties have been taking this programme. They work in teams of five students, design a business plan, interview potential customers, create and develop their business idea and materialise it in new innovative products. A grant contest is held at the end of the academic course. An experienced entrepreneur commission evaluates the contestants. Four teams whose products obtain the highest scores are granted €6000 each for starting up a business, as well as the opportunity to work in the LU Student Business Incubator for an extra four months.

However, those students who already have a business idea and are working in the business incubator can found their own enterprise. In October 2015, the business incubator admitted 240 students from various LU faculties and established 60 teams. The students had to develop a new innovative product within three months and found their own enterprise over the next nine months. To build up skills in entrepreneurship, the students work in teams, hold mastermind group meetings and participate in individual coaching sessions with Riga Coaching School coaches. During the incubation period, all the students are provided with premises, access to a prototyping studio and facilities for taking videos and their processing, a multimedia centre, an enterprise data centre, an Internet portal and mentoring consultations on various business-related issues (http://www.biznesainkubators.lu.lv/par/pakalpojumi/).
The new approach to studying entrepreneurship which is essentially different from traditional academic studies is applied in Riga Technical University (RTU). Within the course, Economics of Entrepreneurship based on an “Opportunity-oriented problem-based learning model (OOPBL)”, students learn by doing and reflecting, based on their experience, and by solving real life problems in order to create new products and services that could be commercialised. The studies according to the OOPBL model were provided for second year bachelor students (N=85). The students worked in teams of 3–6 to get used to working together and realising all the steps of the OOPBL model in order to find some new opportunities for the perfection of the product/service-to-be and for enhancing its potential of commercialisation. The study course was realised in collaboration with three entrepreneurs who represented different fields of business. They shared their experience and also participated in the evaluation of the final presentations of the students and the prototypes of the products/services elaborated by them (Oganisjana, Laizans, 2015). Further, the students are given the opportunity to implement their business ideas, working in the Student Business Incubator which has been functioning at RTU since 2010. The students – future entrepreneurs – are provided with the necessary support for starting a business, usually for a year, i.e. the incubation period (http://karjera.rtu.lv/lv/ieraksts/rtu-studentu-biznesa-inkubators).

Nowadays, sustainable higher education is one of the key factors fostering economic growth in the country through collaboration with internal and external stakeholders. An important prerequisite is the formation of links among universities, business incubators and the economy, particularly links with the environment of the creative industries, as it can ensure much a higher value-added for any business. In this respect, valuable experience has been accumulated at Riga International School of Economics and Business Administration (RISEBA). It delivers a study programme in audio-visual media arts and architecture in cooperation with professionals of the creative industries. In 2013 the Creative Business Incubator was established to ensure the unity of theory and practice and to give students an opportunity to realise their creative ideas in particular projects and to create conditions for business start-up already during their studies. At present, it is developing nine business ideas in the field of creative industries, social entrepreneurship and consultancy. The incubator’s motto is ‘Create and Start!’ This means contributing to the creativity of students and their wish to start up a business. The business incubator is actually the entire university – the university’s premises and infrastructure, its creative potential and its students and academics. That is why the incubator’s name reflects the synergy of creativity and the business environment. There is strong cooperation between the Creative Business Incubator and the students and academics of RISEBA creative study programmes to assist in developing products with higher value-added in design, IT and other creative service industries for enterprises to be incubated. It is envisaged that the incubator will have an idea laboratory and a service centre where services are provided to new entrepreneurs by RISEBA students and academics (http://www.riiseba.lv/lv/riiseba-radosais-biznesa-inkubators/inkubatora-dalibnieki.html; http://nekrize.lv/augstskola-ka-vienots-biznesa-inkubators/).

The examples mentioned prove that it is essential for higher education institutions to provide student business incubator services. It provides conditions for the study process to be designed in a way that, along with acquiring knowledge, students can develop their unique abilities by using the possibility of working practically during the entire period of their studies. This allows them to express themselves in a creative way, to make
decisions and draw conclusions independently, to develop their ability to take responsibility and the initiative and not to be afraid of the unknown, and builds confidence in achieving what was intended (Bikse et al., 2013).

Establishing student business incubators is not a sufficient prerequisite towards building an Entrepreneurial University. A complex approach to the transformation from a traditional teaching university to an Entrepreneurial University involves: starting to redefine the university’s mission statement, developing strategic development plans, implementing the necessary organizational changes, introducing new training modules of entrepreneurial education and involving students in the new organisational mechanisms such as university-based business incubators, technology transfer contact offices and innovation centres, and developing the networks among them. Otherwise it is a too narrow and fragmented approach towards creating an Entrepreneurial University and not systematic by nature. The educational system mainly focuses on preparing highly qualified professionals to become qualified employees in a certain field, rather than developing an individual’s entrepreneurial competences along with educating them in a certain speciality so that young individuals are ready to start their business, becoming employers. The transformation of traditional universities into Entrepreneurial Universities is beneficial not only for universities themselves, students and graduates, but also for society in large.

A Survey of Cooperation between the New Entrepreneurs of Kurzeme Business Incubator and Universities and Municipalities, and of Attitudes to Preserving the Environment

One of the fundamental characteristics of an Entrepreneurial University is the collaboration with the external environment and its external stakeholders — with communities, local organisations, local government chambers of commerce and alumni (EC/OECD, 2012). Cooperation with business incubator alumni — new entrepreneurs who incubated their businesses in an incubator and are working independently — is of great importance. The gain is mutual. For the university, the new entrepreneurs’ experience that can be used in entrepreneurship education is important. They could be engaged as visiting lecturers, in designing and enhancing development of study programmes, and as providers of internships for students at their enterprises. The new entrepreneurs, in their turn, would not lose their links with universities and would gain from cooperation with researchers and the commercialisation of their innovative research into new goods or services, technologies, solutions and processes, as universities are responsible for knowledge creation and transfer and for potential entrepreneurs’ education (Norat Roig-Tierno et al., 2015). National, regional, and local governments are also providing support to facilitate university and business interactions, such as designing regulations, laws, policies, and programmes that promote responsible innovation and economic development goals (The Innovative and Entrepreneurial University: Higher Education, Innovation & Entrepreneurship in Focus, 2013).

To identify what kind of cooperation and contact exists between new entrepreneurs and universities and local governments, and their attitudes to preserving the environment, a survey of entrepreneurs that are being and have been incubated at Kurzeme Business Incubator was conducted, as this incubator is one of the best in Latvia.
The key function of Kurzeme Business Incubator (hereinafter KBI) is to contribute to the formation of new and innovative enterprises by providing the enterprises with premises, infrastructural services and consultancy in basic issues of entrepreneurship for four years, so that they become capable of operating independently and being financially self-sufficient. The purpose of KBI is to foster and support eco-entrepreneurship in certain industries of the national economy, in the region this activity is particularly important. Since its establishment in 2009, KBI has been one of the largest in Latvia in terms of the number of enterprises being incubated and the ones that have been incubated in the past. For example, 31 new enterprises are operating in the incubator, and 129 had already been incubated and left KBI in 2014.

Most the respondents were men, comprising 52%, while women accounted for 48%. The respondents were quite young with an average age of 30 years. Those holding a bachelor’s degree were 25%, those with a master’s degree made up 75%. The respondents’ employment status was as follows: 75% were micro-enterprise managers and 25% were small enterprise managers.

An analysis of the kinds of goods and services produced by the enterprises represented in the survey (n=80) shows that the assortment is diverse. The largest group of entrepreneurs provided IT services (16%) involving the production of software, websites etc. This was followed by art, design, entertainment and recreational services (10%), as well as the manufacture of food products and beverages (also 10%). The entrepreneurs also produced unique (innovative) construction materials, wood-processing products and furniture, organic food for babies, confectionary goods and other kinds of products as well as advertising and marketing services.

According to the survey, more than half of the entrepreneurs questioned sold their products in Latvia (57%), mainly within their municipality. This could be partly explained by the fact that in the Kurzeme region, as in the whole of Latvia, the foundations of the economy are composed of small and medium enterprises. The entrepreneurs questioned quite actively used the markets of the Baltic States (selling 29% of their products there) and of the EU Member States (14%). In this way, they offset the relatively small market of Latvia.

The survey (n=80) indicated that the entrepreneurs very rarely cooperated with universities in the field of further education, training placements for students, enhancement of the study process/programmes, and the attraction of professionals from universities. However, the majority of the respondents pointed out that their enterprises had never cooperated in knowledge transfer and innovation issues and in financing research studies, and had never participated in research projects and university career day activities or in granting scholarships, nor had they ever acted as sponsors.

During the survey, respondents were given the opportunity to answer an open question about whether they wished to cooperate with universities. Two thirds of the 53 entrepreneurs said they would cooperate with universities with pleasure. The entrepreneurs most often stated that it was important to provide training placements and to cooperate with universities concerning the further education of their employees and the attraction of employees from the universities. They wished to have stronger cooperation in implementing the study process to contribute to the preparation of professionals needed for the local region, and also to contribute to cooperation in the fields of scientific and practical research (student/doctoral student papers) and the development of new products. From this we can conclude that universities should collaborate much more
actively with new entrepreneurs, maintain regular contact with them and organise activities that integrate their experience and expertise into entrepreneurship education and start-up support services (EC/OECD, 2012).

An important task of the national government is to foster entrepreneurship in the region, as the state cannot be strong if some its smaller links are not viable. The survey showed that new entrepreneurs had almost no regular cooperation with local governments, and the same situation was observed for their cooperation with universities. However, their cooperation with local governments was relatively better, as they had some cooperative activities on rare occasions. Of the new entrepreneurs surveyed, 62.5% had had some opportunity to receive financial or other kinds of assistance from local authorities; 52.5% of the respondents engaged in joint activities, and some maintained business contacts, as tackling problems were important for both sides (Table 2).

Table 2

<table>
<thead>
<tr>
<th>Cooperation between KBI Enterprises and Local Governments (% of n=80)</th>
<th>Never</th>
<th>Rarely</th>
<th>Regularly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business contacts, tackling problems important to both sides</td>
<td>75</td>
<td>25</td>
<td>–</td>
</tr>
<tr>
<td>Contribution to knowledge transfer, innovation and cooperation with universities</td>
<td>100</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Financial and other kinds of support to new entrepreneurs</td>
<td>37.5</td>
<td>62.5</td>
<td>–</td>
</tr>
<tr>
<td>Participation in the preparation of new entrepreneurs</td>
<td>100</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Engagement of new entrepreneurs in joint activities</td>
<td>43.8</td>
<td>52.5</td>
<td>3.7</td>
</tr>
<tr>
<td>Joint implementation and control of the environmental management system</td>
<td>83.7</td>
<td>16.3</td>
<td>–</td>
</tr>
<tr>
<td>Contribution to the production of eco-innovative products</td>
<td>88.8</td>
<td>11.2</td>
<td>–</td>
</tr>
</tbody>
</table>

As seen in Table 2, the respondents had never contacted local governments in tackling such important problems as the preparation of new entrepreneurs, knowledge transfer, innovation, and cooperation with universities. The respondents similarly rated the role of local governments in the production of eco-innovative products.

The analysis performed leads to a conclusion that business incubators must be persistently interested in new entrepreneurs and in helping them. In the authors’ opinion, the operation of business incubators could be developed as a university-based incubator and as well as an organisational unit of municipalities established in cooperation with Universities thus ensuring broader access to municipality and university infrastructure and financial resources. In this case, municipalities would have broader base for support of an innovative businesses and economic growth in their region.

Nowadays, as significant global climate changes are observed, affecting the surrounding environment, an essential global problem is the preservation of the environment; therefore, it is important to take care of it according to the principles of the Quintuple Helix Model. In this respect, the respondents were asked to answer a question about their attitude to the preservation of the environment. The respondents’ replies are summarised in Figure 1.

From this survey the authors found that the business incubator’s (KBI) entrepreneurs cared about the environment through carrying out a number of environmental protection and improvement activities at their enterprises. Printing documents in economy mode was practised at all the enterprises. Of the enterprises, 77% used environmentally friendly
paper and 54% contributed to the recycling of paper. However, not a single enterprise sorted its waste, and almost 19% of the entrepreneurs did not implement any environmental protection activities and measures at their enterprises.

![Figure 1](image-url) Respondents’ replies concerning their attitude to the preservation of the environment (% of n=80)

**Conclusions**

The research findings show that the transformation of traditional universities into Entrepreneurial Universities to ensure sustainable education in Latvia is at an early stage. The authors conclude that Latvian university-based business incubators have been significantly developed over the past 5 years and are now working well and making efforts towards becoming Entrepreneurial Universities: starting the introduction of new training modules of entrepreneurial education and involving students in the university-based business incubators activities. The present research findings show that Turiba University, the University of Latvia, Riga Technical University and RISEBA were the most successful in implementing new training modules and demonstrated commitment towards building an Entrepreneurial University. The rest of the higher education institutions are considering transformation towards becoming an Entrepreneurial University, as it is vital to achieve sustainable economic growth in their region.

One of the fundamental characteristics of an Entrepreneurial University is the collaboration with external stakeholders, particularly young entrepreneurs, as they need mentor advice and business contacts the most of all. However, the present research on the cooperation and contacts of the entrepreneurs of KBI with universities and local governments indicates that it is a very rare phenomenon or does not happen at all. In contrast, a positive fact is the respondents’ care about the preservation of the surrounding environment: the respondents had carried out several environmental protection and improvement activities at their enterprises.

Overall, the authors can conclude that the contribution of the Latvian universities and student business incubators to ensure sustainable education is essential. In cooperation with business incubators, the universities contribute to the engagement of new entrepreneurs in business; incubated enterprises create new jobs and develop products of various kinds, and these in turn play a considerable role in the sustainable higher education development. Nevertheless, according to the survey, new entrepreneurs need assistance in creating networks of cooperation with various institutions, particularly local governments, as local government support as well as cooperation with universities –
upon which knowledge transfer to production, innovation and eco-entrepreneurship is dependent – are important to the new entrepreneurs, nowadays the most important prerequisite for economic growth.

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Internet resources


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Using Excel in Teacher Education for Sustainability

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Abstract
In this study, the feasibility of using Excel software in teaching whole Basic Statistics Course and its influence on the attitudes of pre-service science teachers towards statistics were investigated. One hundred and two pre-service science teachers in their second year participated in the study. The data were collected from the prospective teachers before and after the compulsory Basic Statistics Course. This is a course offered in the third term aiming at introducing the most basic concepts and operations in descriptive and inferential statistics. In the context of this course, it could be argued that in most universities basically four concept groups are addressed: 1) Data and distributions, 2) How values cluster and/or disperse, 3) How variables move, classify or cluster jointly and 4) How the means between different groups differentiate.

The statistics course with the content mentioned above is usually handled theoretically and nearly no statistical software is used considering the needs and expectations of pre-service science teachers. In case a software is used, it is generally SPSS in Turkey. SPSS is nearly the standard in the field here and dominates all other software such as SAS etc. On the other hand, Excel with much of its capabilities, accessibility and ease of use, is not considered by most of the academics as sufficient statistical software.

In this paper the capabilities, accessibility and practicality of Excel program in teaching most basic statistics course topics to pre-service science teachers were demonstrated and its superiority to other softwares and traditional instruction were discussed. In addition, the positive effect of such an instruction on the attitudes of pre-service teachers towards statistics was shown.

Keywords: Teacher Education, ICT, Excel, Statistics, Attitudes

1. Introduction

“That’s one primary reason that an application such as EXCEL, or an application specifically and solely designed for statistical analysis, is so helpful. It takes the drudgery of the arithmetic off your hands and frees you to think about what the numbers actually mean.
Statistics is conceptual. It’s not just arithmetic. And it shouldn’t be taught as though it is.”

(Carlberg, 2014)
Microsoft EXCEL is a versatile software which offers a wide range of applications ranging from data management to statistical analysis (Gomes, Passeri and de Albergaria Barbosa, 2006). Ms EXCEL provides tools for simple statistical analysis, such as t-tests, F-test, correlation and regression (Slezák, Bokes, Námer, and Waczulíková, 2014). Duller (2008) believes that Excel can be used to teach statistics in many ways. By using Excel in teaching statistics, one can use simulations to teach distributions (Carlberg, 2014; Doane, 2004) or to demonstrate the statistical power of an experiment and to explore experimental variability (Horgan, 1999). Bartz (2007) showed how to use Excel to calculate and illustrate probabilities. In some studies Excel was used to illustrate combinatorial ideas (Kühleitner, 2007; Borovcnik, 2007).

More importantly than the variety in the ways Excel can be used in teaching statistics, statistical softwares such as EXCEL have the capacity to promote conceptual learning in statistics (Carlberg, 2014). Price and Zhang (2007) used Excel to enhance understanding important ideas in statistics and Nash and Quon (1996) implemented Excel to develop statistical thinking. Newfeld (2016) used Excel assignments to quickly cement in the students’ minds both the applicability of statistics course materials in the real world as well as their own ability to master it. In a series of studies, Hunt (2003, 2005, and 2007) used Excel to prepare individualized tasks for students. Therefore, it can be seen that Excel can be used in teaching several statistics topics in a variety of ways and for developing various skills and attaining various practical benefits.

Despite all these benefits, Duller (2008) states that teaching statistics is a big challenge and teaching it with Excel is even a bigger one. However, he adds that one has to accept to use it because the other special softwares are either expensive or requires technical expertise such as using command line interfaces (Duller, 2008). In other words, he finds Excel the easiest and most accessible – one might prefer to call it sustainable – software in teaching statistics. Considering that one in seven people on the planet (Microsoft, 2016) uses Excel and in most cases all university students possess that software, it would be wise to attempt to use it in teaching statistics in teacher education.

Research on Education for Sustainable Development (ESD) reveals that instructors mostly do not buy expensive or learn techno-rich software and technologies and thus can not use ICT and transfer it to real life situations sufficiently for ESD (Makrakis, 2011). One of the most important points in ESD for teachers is the diffusion of ICT to teachers which requires wider use of available technology. One important keyword is “access” and another is “wider use” as can be seen from the following quote. Makrakis and Makrakis (2012) summarize the major challenges that need to be addressed to merge ICT successfully to ESD:

- Education sectors are lagging behind to capitalise on ICTs potential in promoting ESD.
- ICTs can empower and help to facilitate greater access to ESD learning by disadvantaged people, marginalised groups and communities. However, the ‘digital divide’ still remains a major challenge.
- ESD planning with new pedagogy is an essential part of building a whole school approach to ICT-enabled ESD.
- Dissemination and communication of information on innovative ICT-enabled ESD examples and practices may provide opportunities for embedding ESD in the curriculum supported by ICTs.
- A vision that facilitates an education model responsive to the development of ICT-enabled ESD is often missing among education planners and policy makers.
Using Excel in teacher education for teaching most (if not all) statistics topics can be thought of as one possible solution for some of the challenges listed above. Although, there are some useful applications and benefits of using Excel in teaching statistics, there’s some points worth considering in which further empirical research is still needed. The literature on using Excel in teaching statistics is still:

- Incomplete about the topics in which Excel can be used (diffusion),
- Sparse about how Excel influences student learning and development,
- Inconclusive about how Excel influences student beliefs, emotions and attitudes,
- Scarce about using Excel in teacher education, specifically in science teacher education (wider use),
- Replete with inconsistent and contradictory findings regarding its merit relative to other commercial softwares,
- And finally underdeveloped in terms of using empirical evidence.

Despite all these gaps in the literature there’s still not much work in reaction. Although the discussions above show that Excel can be used in teaching several statistics topics, developing various skills and attaining various practical benefits, the problem is there’s still not much evidence whether it can be used to teach a whole undergraduate statistics course. There’s also not a substantial evidence how this will effect attitudes towards statistics. Therefore, the purpose of this study is to demonstrate the feasibility of using Ms Excel in teaching whole Basic Statistics Course to pre-service elementary science teachers and then to show the effects of this treatment on pre-service teachers’ attitudes towards statistics. In this way, new empirical evidence will be provided about the problem. Therefore the research questions of this study are:

1. What is the feasibility of using Ms Excel software in teaching a whole course (Basic Statistics) to pre-service elementary science teachers?
2. What is the effect of this instruction on pre-service science teachers’ attitudes towards statistics?

2. Method

The study uses both a case study approach and a pretest-posttest quasi-experimental design. In the case study the feasibility of using Ms Excel in teaching whole Basic Statistics Course to pre-service elementary science teachers were portrayed. After the portrayal, the effects of this treatment on pre-service teachers’ attitudes towards statistics were shown using a control group-treatment group quasi-experimental design. In the experimental phase

1. Attitudes towards statistics and mathematics are measured,
2. Theoretical instruction in control group and use of Excel in experiment group were performed,
3. Attitudes towards statistics and mathematics are measured.

2.2. Study Group / Sample of the Study

The sample of study is 102 pre-service teachers studying at a state university in the west of Turkey. The pre-service teachers were naturally as two different classes. The groups were assigned as control and test groups randomly. The sample of the study is shown in Table 1.
2.3.2. Instruments / Scales

The attitudes of pre-service teachers towards statistics were measured using the Turkish version of the Survey of Attitudes toward Statistics-36© (SATS-36©). It was developed by Schau (2003) and adapted into Turkish by Emmioğlu (2011). It is a recent instrument developed to assess attitudes toward statistics. Psychometric properties of the instrument are well documented and supported by confirmatory analysis techniques (Chiesi and Primi, 2010; Tempelaar, Schim and Gijseelaers, 2007). The subscales were based on a theoretical background (Schau, 2003). It includes 36 items with a seven-point response scale (1 = strongly disagree, 4 = neither disagree nor agree, 7 = strongly agree) in which higher scores correspond to positive attitudes in six subscales: difficulty, value, cognitive competence, affect, effort, and interest.

The instrument was applied to both groups twice. Once as a pretest before the instruction and as a posttest after the instruction.

3. Results

The findings of the study will be revealed in two parts. First the findings related to the feasibility of using Ms Excel in teacher education will be presented. Then its effects on pre-service teachers’ attitudes will be discussed.

3.1. The Feasibility of Using Ms Excel in Teaching (all) Most Topics of Basic Statistics Course

The feasibility of using Ms Excel in teaching (all) most topics of Basic Statistics Course will be shown in three stages. Firstly, the method used to teach basic statistics course to pre-service science teachers will be explained. Secondly, the topics of basic statistics that were taught in this context were listed. Thirdly, the feasibility of using Ms Excel in teaching most topics of Basic Statistics Course and the points where Excel has superiority or inferiority to other software will be discussed.

3.1.1. The Method Used in This Study to Teach Basic Statistics Course to Pre-service Science Teachers in Treatment and Control Groups

Basic statistics course is a one term 2 credits must course offered every third semester of science teacher preparation program. In this course basically four concept groups are addressed in Turkey: 1) Data and distributions, 2) How values cluster and/or disperse, 3) How variables move, classify or cluster jointly (including correlation and regression tests) and 4) How the means between different groups differentiate (including parametric and non-parametric tests such as F-test, t-test, Chi-square or Kruskal Wallis-H test.) The statistics course with the content mentioned above is usually handled theoretically.

Table 1

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Experiment</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>35</td>
<td>36</td>
<td>71</td>
</tr>
<tr>
<td>Male</td>
<td>17</td>
<td>14</td>
<td>31</td>
</tr>
<tr>
<td>TOTAL</td>
<td>52</td>
<td>50</td>
<td>102</td>
</tr>
</tbody>
</table>
and nearly no statistical software is used. It’s usually seen as unnecessary to show pre-service science teachers how to use SPSS or other statistical software. Other software which require more technical skills SAS or Matlab etc. are not also widely used in statistics courses of pre-service teachers. On the other hand, Excel with much of its capabilities, accessibility and ease of use is not considered by most of the academics as a sufficient statistical software.

In this study, the study group was divided into two subgroups. One group was randomly chosen as control and the other group as the treatment group. In both groups the instruction was based on the textbook by Carlberg (2011) named Statistical Analysis: Microsoft® Excel 2010. The book has a conceptual instruction method and additional datasets for each chapter to practice the concepts taught in each chapter. In the control group the concepts of basic statistics, statistical tests, formulas and their interpretations were taught theoretically. In the treatment group all concepts, tests, graphs, tables and interpretations were given using Excel applications in the class. All pre-service teachers brought their notebooks, Excel software installed, datasets ready for each topic. Once the concept was introduced by the instructor, the Excel applications were examined by the pre-service teachers on their notebooks with the guidance of the instructor. In this way all the topics were covered in the treatment and control groups.

In addition, the pre-service science teachers in the treatment group were assigned application tasks in which they should find the dataset assigned for them from the website of Turkish National Statistics Institute. Then they should calculate, draw, illustrate, test or interpret a concept that was taught on the last lesson in the class. For example, if standard deviation was addressed on the last lesson, the pre-service teachers should use their unique datasets that they should download from Turkish National Statistics Institute to elaborate further at home and then to present to their peers in the next session. All students were assigned different and unique datasets to download for each application. The Excel files for these tasks and pre-service teachers’ presentations of their tasks were evaluated and scored. The course grades were obtained totally from these tasks in the treatment group which were initially designed to be 12 times but in practice could only be performed 6 times.

### 3.1.2. The Topics that Were Taught Using Excel Applications

The following table will show you how Excel was and could be used in teaching most topics of basic statistics course in the treatment group.

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>Objectives</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data and Distributions</td>
<td>Recording Data, Variables, Charts and Graphs, Data fit</td>
<td>easily enter and analyze data, distinguish between different variable types, summarize the data using charts, graphs and tables, understand the fit between the data and graphs</td>
</tr>
</tbody>
</table>

Sequel to Table 2 see on the next page.
Sequel to Table 2.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observe regression</td>
<td>understand basic concepts of correlation and regression with trendlines on graphs</td>
<td></td>
</tr>
<tr>
<td>Frequency distributions</td>
<td>understand frequency distributions</td>
<td></td>
</tr>
<tr>
<td>Frequency distributions</td>
<td>understand normality, skewness and kurtosis</td>
<td></td>
</tr>
<tr>
<td>Excel formulas</td>
<td>use FREQUENCY() formula for grouping</td>
<td></td>
</tr>
<tr>
<td>Distribution simulation</td>
<td>show how a frequency distribution assumes a normal distribution shape as the number of underlying records increases using formulas such as RAND()</td>
<td></td>
</tr>
<tr>
<td>Measures of Central Tendency</td>
<td>Calculate the mean calculate the mean using the AVERAGE() function</td>
<td></td>
</tr>
<tr>
<td>Excel formulas</td>
<td>use array formulas for measures of central tendency</td>
<td></td>
</tr>
<tr>
<td>Excel SOLVER</td>
<td>use Excel SOLVER to minimize the spread</td>
<td></td>
</tr>
<tr>
<td>Calculate the median</td>
<td>calculate the median using the MEDIAN() function</td>
<td></td>
</tr>
<tr>
<td>Mean vs. Median</td>
<td>observe that the mean and the median are always different in asymmetric distributions</td>
<td></td>
</tr>
<tr>
<td>Calculate the mode</td>
<td>calculate the mode using the MODE() function</td>
<td></td>
</tr>
<tr>
<td>Excel formulas</td>
<td>look inside Excel formulas for central tendency</td>
<td></td>
</tr>
<tr>
<td>Measures of Dispersion</td>
<td>Calculate range can measure variability with the range</td>
<td></td>
</tr>
<tr>
<td>Comprehend range</td>
<td>understand that when the distribution is approximately symmetric, the range is a useful descriptor</td>
<td></td>
</tr>
<tr>
<td>Understand standard deviation</td>
<td>understand when standard deviation is a useful measure</td>
<td></td>
</tr>
<tr>
<td>Calculate standard deviation</td>
<td>can measure variability with the standard deviation using Excel functions</td>
<td></td>
</tr>
<tr>
<td>Calculate variance</td>
<td>can measure variability with the variation using Excel functions</td>
<td></td>
</tr>
<tr>
<td>How Variables Move Jointly: Correlation</td>
<td>Understand correlation distinguish positive, negative and no correlations on graphs</td>
<td></td>
</tr>
<tr>
<td>Calculate correlation</td>
<td>calculate correlation using Excel’s CORREL() function</td>
<td></td>
</tr>
<tr>
<td>Calculate correlation</td>
<td>calculate correlation using Excel’s Correlation tool</td>
<td></td>
</tr>
<tr>
<td>Understand regression</td>
<td>observe and understand regression on scatter-plot graphs</td>
<td></td>
</tr>
<tr>
<td>Calculate regression</td>
<td>calculate regression function using Excel’s TREND() function</td>
<td></td>
</tr>
<tr>
<td>Calculate multiple regression</td>
<td>calculate multiple regression function using Excel’s TREND() function</td>
<td></td>
</tr>
<tr>
<td>Testing Differences Between Means: The Basics</td>
<td>Standard error understands the term standard error of the mean</td>
<td></td>
</tr>
<tr>
<td>Compare two distributions</td>
<td>compare two distributions by visualizing</td>
<td></td>
</tr>
</tbody>
</table>

Sequel to Table 2 see on the next page.
Using Excel in Teacher Education for Sustainability

Sequel to Table 2.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>z-test</td>
<td>understand and use z-test</td>
<td></td>
</tr>
<tr>
<td>t-test</td>
<td>understand and use t-test</td>
<td></td>
</tr>
<tr>
<td>F-test</td>
<td>understand and use F-test</td>
<td></td>
</tr>
<tr>
<td>Statistical power</td>
<td>visualize statistical power using spinners</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 shows that Ms Excel can be used to instruct most of the Basic Statistics Course content conceptually. Some sample screenshots can be presented for illustrative purposes. Figure 1 shows sample screenshots from the topic of frequency distributions.

![Normal distribution](image)

![Negatively skewed distribution](image)

![Positively skewed distribution](image)

*Figure 1. Screenshots of various distributions in Ms Excel*

Figure 1 make it easier to comprehend intuitively what it means to be normal distribution or a skewed one. The figures help understand for example why negatively skewed distributions are encountered less in real life. Other screenshots can be shown in the topic of dispersion.

Figure 2 shows two distributions. The former distribution is an example where the range provides a meaningful statistics. The later one is an example where the range has little or no meaning.
3.1.3. The Feasibility of Using Ms Excel in Teaching Whole Basic Statistics Course and the Points where Excel has Superiority or Inferiority to Other Software

It was shown in this study that the topics shown in Table 2 could be taught and applied using Excel. These topics are almost all the topics that could actually be dealt in classes in science teacher training whether Excel was used or not. Excel’s most important superiority is pre-service teachers’ wide access to the software. All the pre-service teachers in the study had Excel 2010 installed on their computers. Another advantage and superiority is that pre-service teachers needed minimum guidance to basic skills to run the program, enter data, open and save files and create graphs. Excel has marvellous graphs and a user-friendly interface that allowed pre-service teachers to understand the concepts such as mean, standard deviation, variance, correlation and regression visually and intuitively.

Besides the advantages there are also some disadvantages in using Excel to teach basic statistics to pre-service science teachers. First, Excel still has no built-in function for finding the mode of categorical variables (Carlberg, 2014). The precision in calculating the \( p \)-value is \( 10^{-3} \) where it is \( 10^{-4} \) in SPSS or SAS (Carlberg, 2014). However, this level of precision seems irrelevant by the author for providing conceptual statistic learning to pre-service science teachers. Another source of difficulty was the huge amount of time needed occasionally to solve even tiny technical problems such as difficulty in opening a file, finding the add-in like solver, detecting small errors that could prevent to run an important test. These difficulties showed that an assistant technician for each 3–4 students if not for all students would be very helpful to be able to cover all the topics and assessment planned beforehand.

---

**Figure 2.** Screenshots of distributions in Ms Excel where Range is/isn’t useful
3.2. The Effects of Using Ms Excel in Pre-service Teachers’ Attitudes towards Statistics

In this part of the study, the effects of using Ms Excel in teacher education on pre-service teachers’ attitudes towards statistics will be presented. There are six steps in this procedure. First, the Turkish version of the Survey of Attitudes toward Statistics-36© (SATS-36©) was applied to 102 pre-service science teachers before the instruction as a pre-test. A dataset was obtained from the answers to the survey. Using the dataset i) Exploratory Factor Analysis (EFA) was performed to reveal the factor (latent trait) structure, ii) Confirmatory Factor Analysis (EFA) was performed to confirm the factor (latent trait) structure, iii) Latent trait analyses (test and item levels) was performed using Item Response Theory (IRT) Rasch model to confirm the factor (latent trait) structure and check the scale, sub-scale and item level parameters for adequacy, iv) the means of pre-test scores in treatment and control groups were compared using t-test for independent samples. Then the Basic Statistics Course began and the pre-service teachers who were split into two natural groups were assigned as treatment and control groups randomly. In the two groups the instruction was carried as described above in the method section. After the instructions in both groups, the Turkish version of the Survey of Attitudes toward Statistics-36© (SATS-36©) was applied to 102 pre-service science teachers once more as a post-test v) the means of post-test scores in treatment and control groups were compared using t-test for independent samples, vi) The common effect of receiving a different instruction and being in a different group were investigated using F-test for mixed measurements. The findings from these steps are presented in the following sections in more detail.

3.2.1. Exploratory Factor Analysis (EFA) Findings

EFA showed different factor structures: For example, according to Kaiser’s eigenvalue test: 10; Cartell’s scree pilot test: 6; Velicer’s MAP test: 5; and Horn’s PA test: 4 factors were determined. The total variance explained with 6 factors is % 62.

Table 3
Factor Loadings for 6-factor Solution in EFA

<table>
<thead>
<tr>
<th>Effort</th>
<th>Affect</th>
<th>Value</th>
<th>Cog. comp.</th>
<th>Interest</th>
<th>Difficulty</th>
<th>Communities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I tried to complete all of my statistics assignments</td>
<td>.859</td>
<td>.771</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I worked hard in my statistics course</td>
<td>.741</td>
<td>.676</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. I tried to study hard for every statistics test</td>
<td>.766</td>
<td></td>
<td>.691</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. I tried to attend every statistics class session</td>
<td>.768</td>
<td>.641</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I like statistics</td>
<td>.404</td>
<td></td>
<td>.512</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I feel insecure when I have to do statistics problems</td>
<td>.527</td>
<td>.723</td>
<td></td>
<td>.593</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. I get frustrated going over statistics tests in class</td>
<td>.602</td>
<td>.593</td>
<td></td>
<td>.705</td>
<td>.705</td>
<td></td>
</tr>
<tr>
<td>18. I am under stress during statistics courses</td>
<td>.693</td>
<td>.705</td>
<td></td>
<td>.686</td>
<td>.686</td>
<td>.757</td>
</tr>
<tr>
<td>19. I enjoy taking statistics courses</td>
<td>.735</td>
<td>.686</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. I am scared by statistics</td>
<td>.444</td>
<td></td>
<td>.757</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sequel to Table 3 see on the next page.
Sequel to Table 3.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Statistics is worthless</td>
<td>.440</td>
<td>.636</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Statistics should be a required part of my professional training</td>
<td>.568</td>
<td>.475</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Statistical skills will make me more employable</td>
<td>.405</td>
<td>.428</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Statistics is not useful to the typical professional</td>
<td>.614</td>
<td>.508</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Statistical thinking is not applicable in my life outside my job</td>
<td>.624</td>
<td>.459</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. I use statistics in my everyday life</td>
<td>.371</td>
<td>.462</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Statistical conclusions are rarely presented in everyday life</td>
<td>.738</td>
<td>.563</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. I will have no application for statistics in my profession</td>
<td>.619</td>
<td>.627</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33. Statistics is irrelevant in my life</td>
<td>.545</td>
<td>.582</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I have trouble understanding statistics because of how I think</td>
<td>.400</td>
<td>.562</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. I have no idea of what’s going on in this statistics course</td>
<td>.559</td>
<td>.471</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. I make a lot of math errors in statistics</td>
<td>.633</td>
<td>.558</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31. I can learn statistics</td>
<td>.586</td>
<td>.739</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32. I understand statistics equations</td>
<td>.368</td>
<td>.686</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35. I find it difficult to understand statistical concepts</td>
<td>.355</td>
<td>.518</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I am interested in being able to communicate statistical information to others</td>
<td>.581</td>
<td>.584</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. I am interested in using statistics</td>
<td>.616</td>
<td>.620</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. I am interested in understanding statistical information</td>
<td>.794</td>
<td>.798</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. I am interested in learning statistics</td>
<td>.595</td>
<td>.736</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Statistics formulas are easy to understand</td>
<td>−.377</td>
<td>.421</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Statistics is a complicated subject</td>
<td>−.454</td>
<td>.493</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Statistics is a subject quickly learned by most people</td>
<td>−.418</td>
<td>.506</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Learning statistics requires a great deal of discipline</td>
<td>−.422</td>
<td>.525</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. Statistics involves massive computations</td>
<td>−.470</td>
<td>.438</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34. Statistics is highly technical</td>
<td>−.489</td>
<td>.525</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36. Most people have to learn a new way of thinking to do statistics</td>
<td>−.551</td>
<td>.414</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis. Rotation converged in 30 iterations.

When looked at the total variance explained, the communalities, and the factor loads, 6 factor solution was preferred for theoretical reasons. The original version and Turkish adaptation of the scale was reported to have a 6-factor structure. In order to retain comparability, 6-factor solution was thought to be more appropriate in this study.

3.2.2. Confirmatory Factor Analysis (CFA) Findings

CFA confirmed 6 factor solution with sufficient overall goodness-of-fit parameters. In other words, sufficient χ²/sd = 3.79, good RMSEA = 0.06, good GFI = 0.96, good AGFI = 0.96 and good CFI = 0.97 (Sümer, 2000).
3.2.3. Latent Trait Analysis (LTA) Findings

**Dimensionality**
Latent trait analyses using Rasch model in Item Response Theory confirmed that each factor is unidimensional and independent with RMSEA values \(< 0.05\) for all six factors.

**Item Quality**
Latent trait analyses using Rasch model in Item Response Theory revealed sufficient item parameters (discrimination \(a \geq 1.00\) for all items), difficulty (balanced distribution of popular and unpopular items) and information).

**Standard Scores**
Calculation of Rasch scores for each 6 factors proved and provided standard scores for persons.

3.2.4. Reliability Analysis
**Item-Total Correlations**
For all factors item-total correlations varied between .47 and .77 which indicate good internal reliability.

**Point Estimates**
Emmioğlu (2011) reported alpha between .69 and .90. In this study Cronbach’s alpha, Mc Donald’s omega and GLB point estimates were found between .72 and .85, which indicate acceptable to good internal reliability (Peters, 2014).

**Confidence Intervals**
In this study Cronbach’s alpha, Mc Donald’s omega confidence intervals were found between [.72, .74] to [.84, .86] which indicate good internal reliability (Peters, 2014).

3.2.5. Pretest Scores for t-tests for Independent Samples
The findings of pretest scores for six factors of the scale for control and treatment groups are shown in Table 3.

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Pretest Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rasch Mean Scores for Control Group</td>
</tr>
<tr>
<td>Affect</td>
<td>9.87</td>
</tr>
<tr>
<td>Cognitive Competence</td>
<td>9.93</td>
</tr>
<tr>
<td>Value</td>
<td>10.25</td>
</tr>
<tr>
<td>Difficulty</td>
<td>9.96</td>
</tr>
<tr>
<td>Interest</td>
<td>10.03</td>
</tr>
<tr>
<td>Effort</td>
<td>10.14</td>
</tr>
</tbody>
</table>
The pretest scores show that there are no significant difference between control and experiment groups in terms of the six factors of attitudes towards mathematics.

### 3.2.6. Posttest Scores for t-tests for Independent Samples

The findings of pretest scores for six factors of the scale for control and treatment groups are shown in Table 3.

<table>
<thead>
<tr>
<th>Rasch Mean Scores for Control Group</th>
<th>Rasch Mean Scores for Experiment Group</th>
<th>I - J Exp. - Cont. Mean</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affect 9.91</td>
<td>10.34</td>
<td>0.43</td>
<td>-6.91</td>
<td>.00</td>
</tr>
<tr>
<td>Cognitive Competence 9.94</td>
<td>10.32</td>
<td>0.38</td>
<td>-6.61</td>
<td>.00</td>
</tr>
<tr>
<td>Value 10.26</td>
<td>10.5</td>
<td>0.24</td>
<td>-3.69</td>
<td>.00</td>
</tr>
<tr>
<td>Difficulty 9.98</td>
<td>10.25</td>
<td>0.27</td>
<td>-3.85</td>
<td>.00</td>
</tr>
<tr>
<td>Interest 10.02</td>
<td>10.33</td>
<td>0.31</td>
<td>-4.81</td>
<td>.00</td>
</tr>
<tr>
<td>Effort 10.12</td>
<td>10.3</td>
<td>0.18</td>
<td>-2.28</td>
<td>.00</td>
</tr>
</tbody>
</table>

The pretest scores show that there are significant differences between control and experiment groups in terms of the six factors of attitudes towards statistics.

### 3.2.7. General Mixed Model Intercept Findings

The findings of pretest scores for six factors of the scale for control and treatment groups are shown in Table 3.

<table>
<thead>
<tr>
<th>Mean square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affect</td>
<td>19,395.497</td>
<td>13,820.832</td>
</tr>
<tr>
<td>Cognitive Competence</td>
<td>19,413.307</td>
<td>14,180.857</td>
</tr>
<tr>
<td>Value</td>
<td>19,281.235</td>
<td>11,439.609</td>
</tr>
<tr>
<td>Difficulty</td>
<td>20,394.965</td>
<td>23,939.044</td>
</tr>
<tr>
<td>Interest</td>
<td>19,442.705</td>
<td>10,655.726</td>
</tr>
<tr>
<td>Effort</td>
<td>19,519.563</td>
<td>13,962.002</td>
</tr>
</tbody>
</table>

Table 5 shows that the common effect of treatment and cohort was found significantly positive in all 6 dimensions of attitudes towards statistics.

### 4. Discussion

There are two types of results in this study:

#### 4.1. Use of Excel

Quoting from Mitlin, Hickey, and Bebbington (2006), that “...it is far more important to ask how the term “development” is used to serve particular (increasingly global) interests rather than to ask what it means”, Ketonen (2016) uses the term “sustainable
development” in the meaning of “sustainability”. According to Ketonen (2016), the idea of sustainability is either a characteristic to legitimize actions or something hands on, a tangible result that is created through a creative process, not something theoretical, which can be calculated or measured. In this study, the term ESD was taken as Education for Sustainability which was used in the meaning of “Education for Generations”. ICT integration to ESD was taken as finding and using ICT tools that can be accessed widely and used for generations. ICT integration to ESD was addressed in this study at teacher training level since it’s considered as one of the most effective ways of sharing professional experiences and a medium of sustainable education in the society (Kabadayi, 2016).

Using Ms Excel in basic statistics (Gomes et al., 2006; Slezak et al., 2014), especially in teaching statistics (Carlberg, 2014) was previously shown as feasible. This study confirmed the same argument that using Excel in Teacher Education in Statistics Course is feasible in most topics. Excel seems to have some advantages over the other commercials. For example, since Microsoft Windows is a standard in most countries of the World, most pre-service teachers seem to possess Microsoft Office and Excel. Teaching a subject using a software which could be bought and possessed by everyone meets the social aspect of sustainable development which contains ideas of equality and social justice (Hopwood, Mellor and O’Brien, 2005). Excel has eye-catching tables and graphs which help construct new concepts easily. Researchers claim that good graphs should summarize data without distortion (Cleveland, 1994; Oliver, 1998). In this sense, Excel can be argued to provide good graphs. Most pre-service teachers have basic file-management skills in Excel which is a real time-saver in such an effort to instruct a whole course using a software. Natek and Zwiling (2014), mentioned the same advantage of Excel that it can be used in statistical analysis because it’s normally available to most professors. Thus, when designing a course that will be fully instructed with a software, it should be considered that being widely available is an important criteria. Despite this advantages, Duller (2008) recommends teaching statistics using Excel with a critical point of view for a few reasons i.e., he finds some Excel functions a little bit tricky, unmeaningful or inaccurate. On the other hand, he agrees with the proposition suggested in this study that Excel is and ICT for generations (sustainability) because it’s a well known and frequently used software (Duller, 2008).

4.2. Attitudes

Attitudes towards statistics is important. The more the students have positive attitudes towards statistics the higher statistics outcomes they had, for example higher statistics grades at the end of taking statistics course or a willingness to use statistics in the future (Emmioglu, 2011). In this study, using Excel applications and homework assignments and class presentations in Teacher Education in Statistics Course improved attitudes towards statistics in the experiment group more than the control group. This improvement happened in all six factors of attitude as affect, cognitive competence, value, difficulty, interest and effort. This result contributes to the results of previous work which reported mostly intellectual (Carlberg, 2014; Nash and Quon, 1996; Price and Zhang, 2007) or practical (Hunt, 2003, 2005, 2007; Newfeld, 2016) gains. The “Statistics Attitudes-Outcomes Model” proposed that effort had significant effect on statistics outcomes (Emmioglu, 2011), and the Eccles’ Model proposed that spent effort was the predictor of students’ achievement in statistics (Eccles and Wigfield, 2002). Tempelaar et al. (2007),
found similar results that effort had direct significant effect on students’ statistics achievement. Therefore, the reason why attitudes improved in this study might be the increased spent effort or effort beliefs in the treatment group where Excel applications and tasks were used. Garfield and Ben-Zvi (2007), reported that “Students who may not be strong in mathematics may work hard and enjoy statistics”. This confirms the former sentence that in the treatment group pre-service teachers spent more effort and thus might have enjoyed statistics more. They claim that students learn and enjoy statistics by active involvement in learning activities. After reviewing current literature on teaching statistics, the authors also suggest using technological tools to teach statistics to help students visualize and explore data for making sense (Garfield and Ben-Zvi, 2007). The findings in this study about improved attitudes are also in line with the findings of Garfield & Chance (2000), who stated that learning is enhanced if students have ample opportunities to express ideas and get analytical and timely feedback on their ideas. The pre-service teachers in the experiment group have ample opportunities to express ideas and get analytical and timely feedback on their ideas when working on Excel applications after the instruction, and during completing and presenting their tasks on the same statistics topics.

4.3. Recommendations for Further Studies

In this study it was shown that using Excel in Teacher Education in Statistics Course was effective and improved attitudes of pre-service elementary science teachers towards statistics. Similar experiments might be performed for other undergraduate courses in other departments. Emmioglu (2011) recommends that the attitudes towards statistics be investigated in nation-wide and cross-cultural contexts. The researchers might also look for the answers of how, who and how long questions in the future. In other words, the mechanisms behind attitude improvement might be explored. For example, one possible mechanism behind attitude improvement might be individuals’ performances and achievement choices (Eccles & Wigfield, 2002). The researchers might want to look at in which groups of pre-service teachers attitude improvement happens. Moreover, it’s important to examine how long the improvements in attitude last. Kabadayi (2016), developed an innovative instructional In-service Training Model (INSET) model in Turkish context where he showed that the participant pre-service teachers want to be equipped with prerequisite skills to prepare projects in teaching and to manipulate the technological devices for sustainable education. It’s important to reveal pre-service teachers’ willingness to take part in any effort to foster sustainable education and this might provide insight into how long the improvements in attitudes last.

References


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Preconditions for Sustainable Changes in Didactics Applying Self-Directed Learning in the General Education School

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Abstract
Implementation of the result-oriented (self-)education paradigm in the general education school requires sustainable changes in didactics not only on the strategic document plane but also in educational practice. However, its implementation in practice is complicated. The success of the interaction between theory and practice largely depends on the teacher’s professionalism. Therefore, the insights that have emerged in the context of teachers’ practical experiences applying self-directed learning are important identifying preconditions for sustainable changes in didactics. The semi-structured written survey and the content analysis enabled the authors to find out preconditions for changes in didactics, manifesting themselves through the teacher’s personal self-actualisation, the student’s empowerment to learn and redistribution of powers of participants of the educational process. Research results suggest that identified preconditions for changes in didactics are interrelated and illustrate manifestation of sustainable changes in didactics.

Keywords: self-directed learning, didactics, (self-)education process

Education and improvement of quality of education remain the priority aims of the national policy. One of the aims of the National Strategy on Education for the years 2013–2022 (The National Strategy on Education for the years 2013–2022) is to improve quality of education, which is not accidental because according to international research results (Trends in International Mathematics and Science Study (TIMSS), Progress in International Reading Literacy Study (PIRLS)), in spite of all efforts, students’ literacy in Lithuania is worsening (TIMSS 2015 Assessment Frameworks; PIRLS 2016 Assessment Framework).

In the success trajectory simulated at the National Progress Strategy “Lithuania 2030” (The National Progress Strategy “Lithuania 2030”), the most important role is given to the society’s education: education of the society must enable us both to bravely face new challenges and manage them. However, many recent studies list a number of educational problems: “the current system of education is rigid, too little attention is paid to enhancement of critical thinking abilities, students are sufficiently encouraged to create and implement ideas. Often teaching programmes are based on repetition,
they do not stimulate thinking, analysis and creative processes” (The National Progress Strategy “Lithuania 2030”, p. 4).

In education, reorienting to the result-oriented (self-)education paradigm (Rethinking Education: Investing in Skills for Better Socio-Economic Outcomes, 2012; Shewbridge, Godfrey, Hermann, & Nusche, 2016), approaches of didactics are also essentially changing. In Lithuania, the necessity for such systemic changes at the strategic level is perceived and recorded in the main documents governing education (LR Law on Education, 2011; Good School Concept, 2015), but in the educational practice its implementation is complicated.

The study of the National Agency for School Evaluation (Quality of Activity of General Education Schools, 2015) demonstrated that the majority of Lithuanian schools could not adapt quickly and their curricula were focused on students’ knowledge and development of academic abilities. Assessment of students’ attainments and application of feedback in education remain the most problematic lesson components. Meanwhile, studies have shown that higher educational attainments are more determined by feedback, meta-awareness, the ability to manage one’s learning and the like (The Teaching and Learning Toolkit, 2014). Slightly better evaluated areas are only the ones that are directly unrelated to the (self-)education process (social partnership, traditions, and rituals, etc.). In addition, studies conducted on teaching aids (textbooks) demonstrate that the latter are prepared regardless of the diversity of students’ learning styles, are not suitable for individualisation and differentiation of learning; therefore, it is difficult to apply them for students’ independent learning (Bernotiene, Briediene, Gerulaitis, Gutauskaite, Zaukiene, & Jasinauskas, 2014).

One of the instruments that helps implement manifestation of result-oriented paradigm in educational practice can be self-directed learning (Blaschke, 2012; Dick, 2013; Ehlers, 2013; van Velzen, 2016), because the identified key aim of the twenty-first century education is not only to teach students to learn but also to self-manage their learning (Brown, 2011; Gaucaite, Kazlauskiene, & Poceviciene, 2012; Gros, Kinshuk & Maina, 2016; Helmke, 2012; Kazlauskiene, Masiliauskiene, Gaucaite, & Poceviciene, 2010; Thomas, Trilling, & Fadel, 2009). The said strategic documents regulating education, approved in Lithuania, state that (self-)education should be based on self-directed teaching and learning.

Identified disadvantages of quality of education and challenges of coping with them are systemic in nature, while the success of their implementation largely depends on the teacher. According to Bagdziuniene, et al. (2014), analysing factors of improving quality of education, researchers repeatedly provide evidence that the teacher’s professionalism has a greater impact on students’ learning compared to curricula, learning environment, funding, number of students in the classroom or parents (Barber &, Moursched, 2007; Hattie, 2009; Stronge, 2010). In practice, changes in didactics are based on the interaction between theory and practice. This provokes the use of specific educational strategies or systems (in this case, self-directed learning) and practical implementation of result-oriented education ideas. Insights that have emerged in the context of practical experiences of participants of the educational process are significant not only for making generalisations and episodic adjustment of processes but also for identifying preconditions for sustainable changes in didactics.

In order to enable the teacher to more effectively change educational practice, it is proposed to view this change as a sustainable process. Education for the 21st century
should follow societal goals and support individuals and communities in sustainable ways of living, decision-making and actions (Delors, et al., 1996). The primary goals of ESD are the need to ensure human dignity in all aspects of life and to build respect for other cultures and next generations in a context specific way. To achieve these goals, it is necessary to transform teaching and learning processes at all educational levels (Tilbury, 2011). This requires the development and application of new educational principles based on active and participative approaches to learning and teaching, and consequently also complex transformation of the entire educational system from its policies and priorities, principles to curricula and teaching learning activities in the classroom (Kapitulčínova et al., 2015). Such transformations and sustainable development require systemic thinking (Tilbury, & Mula, 2009).

ESD competences combine the demand for ability to act (a desired educational goal) with the understanding of why and how to act so that crucial problems of today are addressed (desired societal goal). The concept of competence is based on holistic and future oriented thinking; in practice, it should underpin decision-making structures, especially competences such as critical weighting of viewpoints and possibilities, clarification of values and commitment to engage and undertake risk. To address the need for competences and to establish adequate learning processes, educators need the ability to plan innovations in their own teaching, to become self-directed teachers, able to set pedagogical goals related to sustainable development and adjust their teaching accordingly. This moves ESD pedagogy to a new level as opposed to traditional teaching where improved competences are typically expected to be acquired by students while educators only deliver knowledge (Kapitulčínova et al., 2015; Pipere, Salite, & Veisson, 2015).

The review of empirical research data and documents show that implementation of the result-oriented (self-)education paradigm requires sustainable changes in didactics not only on the plane of strategic documents but also in educational practice. This leads to a more detailed analysis of the scientific problem: What preconditions for sustainable changes in didactics emerge, applying self-directed learning in educational practice?

The aim is to identify the preconditions for sustainable changes in didactics analysing teachers’ approach to application of self-directed learning in the educational process.

Research Methodology

The preconditions for changes in didactics are disclosed on the basis of the following approaches:

- to actualise preconditions for didactic changes through the principle of sustainability that moves ESD pedagogy to a new level, as opposed to traditional teaching where improved competences are typically expected to be acquired by students while educators only deliver knowledge (Kapitulčínova et al., 2015; Pipere, Salite, & Veisson, 2015);

- in this study self-directed learning is perceived as learning, in which learners find out their own learning needs, set goals and objectives, plan learning, create or choose learning environment and measures to afford adequate learning strategies, self-evaluate achievements and progress, continuously reflect and provide constructive arguments (Gaucaite, Kazlauskiene, & Poceviciene, 2012).
Data Collection

Data were collected using a semi-structured written survey (Turner, 2010) that enabled the authors of the present research to identify the preconditions for changes in didactics using teachers’ experiences of applying self-directed learning in the (self-) educational practice. During the course of the research, the researchers had a possibility to supplement data without referring to preconceived theories about data (Brinkmann, & Kvale, 2014). As teachers had a possibility to apply self-directed learning approaches in the educational process throughout the whole school year, it enabled the researchers to foresee topics and problems to be investigated during the survey in advance. The instrument of the written survey consisted of four open issues: distinguishing of indication of changes that took place in the teacher’s teaching process; distinguishing of indication of changes in students’ learning process; identification of arising barriers; projection of one’s as a teacher further steps. Survey questions were designed based on Rithie and Lewis’ (2003) methodological recommendations and the following principles: comprehensibility, clarity, and ease (Brinkmann, & Kvale, 2014). Each research participant was introduced to the purpose of the survey and its questions; the course of the survey was discussed, and confidentiality was assured.

Data Analysis

Data analysis was conducted employing the content analysis method, combining the analysis of meaning and the qualitative content analysis (Mayring, 2014). The qualitative data analysis software “Kokybis” (version 0.1.0) was used that allowed identifying the analysed qualitative characteristics (Bitinas, Kazlauskienė, & Jazgevičius, 2012). Respondents’ answers were grouped by semantic-lexical similarity. These data groups were named (nomination of categories), giving the name that reflected the essence.

Research Participants

Throughout the whole school year, general education school teachers worked systematically applying (self-)directed learning in the (self-)educational process: each month, teachers, students, parents had training seminars on specific topics, which they later tried out practically in subject lessons. Teachers could consult advisers and discuss their successes and failures in subsequent training seminars. The research involved 28 teachers representing all subjects at the basic stage of education (5–8 forms).

Research ethics was based on the following principles: anonymity (research participants were assured that their personal information would not be announced; during the written survey, they were not asked to write personal data); confidentiality (respondents knew that their unbroken texts would not be distributed, they would be transcribed and presented in a generalised form for scientific purposes; safety of access to primary sources would be ensured).
The Analysis of Manifestation of Preconditions for Changes in Modern Didactics

Throughout the whole school year, applying the self-directed learning in the educational process, respondents had to summarise changes in their experience organising the said process. It was identified that the change was oriented to the teacher and the process taking place (Fig. 1).

### How did teachers’ teaching practice change?

<table>
<thead>
<tr>
<th>Changes oriented to the teacher</th>
<th>Changes oriented to the process</th>
<th>Changes did not take place or were insignificant</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Changes in personal features;</td>
<td>- Maintaining students’ independence;</td>
<td>- Always worked like that;</td>
</tr>
<tr>
<td>- Changes in the teacher’s attitude to teaching and learning;</td>
<td>- Changes in goal setting;</td>
<td>- Cannot indicate features.</td>
</tr>
<tr>
<td>- Changes in the teacher’s attitude to the student;</td>
<td>- Changes in planning learning;</td>
<td></td>
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<tr>
<td>- Attention to the analysis of one’s activities.</td>
<td>- Changes in students’ self-evaluation possibilities;</td>
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<td>- Changes in questions and questioning;</td>
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<td></td>
<td>- Diversity of methods involving students;</td>
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<tr>
<td></td>
<td>- Organising learning according to the style;</td>
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<td></td>
<td>- Organising learning according to the student’s experience and abilities;</td>
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<td></td>
<td>- Maintaining of learning motivation;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Acquiring new knowledge, learning new technologies.</td>
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</tbody>
</table>

*Figure 1. Changes in teachers’ attitude and activities (teachers’ opinion, N = 28)*

The topic: Changes oriented to the teacher. Training seminars and trying out of practical tasks, which took place during application of self-directed teaching in the educational process, presupposed changes in the very teacher as a personality: “I became braver allowing not only the strong students to work in a self-directed way.” [14]; “I started treating noise in the classroom differently: if you want students to express their thoughts, share them, noise is inevitable; thus, I am no longer stressed due to it.” [7]. Teachers became more self-confident, braver choosing (self-)education methods, creating conditions for students to learn and manage their learning process on their own. Teachers became open to changes and innovations as well as to certain unexpected situations that naturally might occur when the process was being created here and on purpose rather than implemented exactly according to some pre-established pattern. These are changes that take place with most difficulty but are most significant for changes in the teacher’s activity; after all, the person behaves and acts the way he/she thinks. Research results showed that teachers who worked according to this system acknowledged that their attitude to the very teaching and learning as a process had changed: “I always treated students’ learning as taken for granted; how to learn if you don’t learn? But during the seminars I have realised that children’s learning depends on everyone: both children...
and teachers, that it is not only the child on whom everything depends, maybe even more depends on the teacher. More confidence in students resulted in their increased willingness to perform assignments” [27]; “I pay more attention to students’ cognition, organisation of students’ activity in the lesson and the like. Earlier, perhaps I paid more attention to the way I would like to give a lesson, whether I would be able to deliver everything.” [10]. It is important to emphasise that the teacher organising the students’ activities according to the approaches of self-directed learning began focusing not on himself / herself or the subject content, which he / she needed to deliver to the students during a certain period of time, but on what and how the student should and could assimilate teaching materials, how long it could take and in what ways he / she can do his/her best and the like. This takes place only having acknowledged the student’s personal qualities and experience as values that are important for education. These changes presuppose changes in the attitude of part of teachers to the very pupil. They began to trust that the student is a learner who can learn independently and not only according to the teacher’s instructions and under his / her control (“First, I started to trust students more that they themselves can learn if I organise work well....” [22]). Trust in each other allowed for more active manifestation of collegial relationship sharing responsibilities (“.... relationships with students slightly changed: there were more collaboration, discussions; students felt more responsible for their learning outcomes, learned to evaluate and evaluate themselves” [20]). Changes in the attitude to the student as a self-directed learner resulted in changes in the teacher’s personal qualities (“I became braver allowing not only the strong students to work in a self-directed way” [14]).

Creation of conditions for students to experience their learning experience and for teachers to experience both their students’ and their own as teachers’ teaching and learning experience (“I have started paying more attention to reflection on how I work myself, whether I am more “feeding students with a spoon” or they work independently. I am observing students how dependent or self-directed they are, I note all of it in my notes...”[3]) opened up the possibility to actualise and acknowledge personal features of the student as a person and a learner, recognise experience as an educational value, and change the very learning as a process. At the same time, the very teacher’s personal learning experience was changing.

To summarise the range of changes related to the teacher’s personality, it can be assumed that students’ teaching and learning to manage their own learning created preconditions for manifestation of the very teacher’s personal learning management experience. In addition to educational goals, teachers set goals of teaching to learn, more often reflected on their activities, shared their experiences with other teachers, etc. This is another value that has additionally opened up, applying self-directed learning in the lesson.

The topic: Changes oriented to the process. Due to the limited scope of the article, it can only be mentioned that changes in the teacher’s attitude to learning as a phenomenon, to the student, his / her activities at school influenced changes in the organisation of students’ learning. It is a pledge for transition from the teaching paradigm to the learning paradigm. The analysis of teachers’ reflections highlighted changes in the learning process, manifesting themselves through changes in the very teacher’s and students’ actions and activities. As it can be seen from the subsystems concretising the topic changes in the learning process, presented in Fig. 1, they encompass key components of the education process. Teachers’ reflections highlighted that students were provided with
conditions for independence, supporting their initiatives, trusting them. This manifested itself in creation of possibilities for students to set their learning goals, foresee ways of seeking them, self-evaluate the results in the context of the aim of learning. This was determined by the fact that the teacher had to change lesson plans, integrating components of students’ learning to manage their learning, i.e., to plan students’ learning (not only learning), leaving possibilities for them to choose, decide, make mistakes, search for solutions, get/give feedback, evaluate themselves, etc. As it has already been mentioned analysing the first topic, in lesson planning the teacher focuses not on what he / she will do in the lesson but on what and how students will do.

As it was noticed by teachers, this was a time-consuming process; therefore, organisation of such learning also required certain organisational changes (e.g., extension of perception of time frame of the lesson). It is also important to note that teachers emphasised that organisation of such teaching and learning resulted in students’ higher motivation (“Students are working more, they cooperate, their activities are more independent. Students are more interested in the subject, they willingly take action themselves, I no longer have to prove them constantly how important this is” [23]). Ensuring possibilities of choice, conditions were created to assume responsibility for achieved results (“...The student becomes an active participant of the (self-)education process who is responsible for his / her learning. The student’s dependence on the teacher becomes much less...” [13]). This way, motivation turns not into the aim but into the consequence, when students perceive what and what for they are doing since choices are made by themselves.

Freedom and responsibility in the self-directed learning system presuppose both possibilities for students to make responsible choices and decisions with regard to their learning and its management and clear redistribution of the teacher’s and students’ responsibilities. The results of the empirical study demonstrated changes in the teacher’s role in the teaching and learning process. This, in turn, suggests that in the context of changes the very teacher’s attitude towards the student is changing: confidence in the student as a learner is increasing.

At the same time, giving freedom and responsibility in the teaching and learning process also creates trust-based relationships between the teacher and students as well as among students themselves. On the other hand, the increase of confidence enhances the attitude to give the students more freedom while making decisions related to management of their learning.

This also changed the teacher’s role: the teacher became more as a mediator between knowledge and the student, creating a certain support system. This creates conditions to organise students’ learning considering the student’s individual experience and abilities, the individual learning style and to base the teaching and learning process on them (“Students are provided with favourable environment to disclose their experience in the lesson, which is the basis for creation of new knowledge, enabling students to teach each other, to present their individual experience.” [5]).

Teachers noticed changes in assessment strategies: more opportunities were left to the very students to evaluate themselves, reflect on results, projecting further improvement possibilities (“Improved goal setting in the lessons, the division of the goal allowed students to plan their learning in the lesson; not only I evaluated, there were more possibilities to self-evaluate one’s knowledge and achievements, identifying where they succeeded and were they didn’t, what and how something could be learned, where the gaps were, analyse all of it.”[16]). Such (self-)evaluation becomes important to the very
learner as a feedback form, here and now foresees further steps; it is not limited to its numerical expression, which is often important for educators, parents but not for the very learner. In addition, such evaluation allows assessing the very student’s progress, is focused on the learner’s improvement possibilities rather than his / her comparison with others.

During application of self-directed teaching in the educational process, teachers were offered a diversity of methods, while their practical application was also expressed in teachers’ reflections (“...I used more diverse methods in the lesson, I learned to use more diverse software, acquired new psychological knowledge.” [4]). The teachers’ efforts to promote students’ analytical thinking by asking more open-ended questions, provoking the learners to actively give questions also showed up (“... I am trying to ask Why? How? more often in the lesson. Students also ask more often, they are not afraid of asking questions” [3]).

The teacher’s confidence in students and self-confidence allowed for manifestation in students’ possibilities related to learning and managing their learning. Teachers’ reflections highlighted students’ increased possibilities to set goals, to pursue implementation of goals by planning activities, to self-evaluate their knowledge, to find out what still needs to be learned, etc. (“Improved goal setting of the lesson, the division of the goal allowed students to plan their learning in the lesson, self-evaluating their knowledge and achievements, foreseeing what else still can be learned” [16]).

It was also stated that the change had not taken place or had changed insignificantly (“Because I am constantly learning and improving, I can state that my learning in the class has not changed due to that.” [1] “Changes are insignificant, maybe it has become more interesting to work, but I cannot indicate any distinct features.” [17]). Since reasons of such attitude were not investigated and links with answers to other questions were not analysed, there were no possibilities to interpret these statements in more detail.

It can be assumed that implementation of self-directed learning in the educational process at school changed both the teacher’s and students’ activities. The presence of these changes requires changes in the very teacher’s personality: this is one of the key factors of implementing the self-directed learning system at school; i.e., the teacher’s perception of the (self-)education process determines the degree to which he / she will allow students to be self-directed, the extent to which he / she will be willing to share responsibilities with students, their parents and the like. This is a sustainable (systemic) change when components of the change determine each other and changes in one of them result in changes in others: changes in the teacher’s attitude determined changes in the very process of (self-)education.

The fact that the attitude of the participants of the learning process is a significant factor implementing the idea of self-directed learning in the lesson is also demonstrated by the analysis of factors ensuring its application (Fig. 2).
As in the context of this research changes in teachers’ attitude are considered most important, we will analyse the topic factors dependent on the teacher in more detail. Reflecting on changes, teachers noticed that instead of the formerly dominating attitude of “blaming” the external environment (educational policy, system and the like), unmotivated students, administration and the like for learning failures, teachers began to think more about themselves as teachers, go deep into their role as an important factor of organising the (self-)educational process, which determined success of the implemented self-directed learning model. The attitude that success depends on the teacher’s positive attitude, thinking was proven (“Students’ positive thinking.” [9]; “Not to be afraid of experimenting, to believe in success, to provide possibilities for each student to experience success and rejoice together” [20]). It is important that the teacher should not be afraid of experimenting, making mistakes and, most importantly, believing in success because having encountered first difficulties in the educational practice, the set goals are often refused. The teacher’s initiative and wish are also positioned as a component ensuring successful organisation of self-directed teaching and learning (“Knowledge, initiative and wish are needed” [3]; “Wish, responsibility for oneself and others, love for work” [15]; “The wish to work differently, innovatively, to teach students to learn” [18]). These initiatives are expressed together with the condition of assimilating new knowing, manifesting itself by new knowledge about self-directed learning, its organisation (“Knowledge is needed; new sources of information are sought...” [7]). Constant interest in what is happening, openness to innovations actualise the need for the very teacher to be self-directed (“Motivated, self-directed students and self-directed teacher” [17]) because only then the self-directed student can be educated.

Teachers distinguish the factor of time and experience as one of the conditions for successful implementation of self-directed learning (“You need twice as much time to prepare for the lesson and you need experience. Having delivered some lessons, you cannot say that you are working in an innovative way and everything works” [18]).

**Figure 2.** Factors ensuring implementation of self-directed learning in the lesson (teachers’ opinion, N = 28)
Time input increases putting more efforts because you have to prepare for those lessons, think over strategies enabling the students to act in a self-directed way ("You need a lot of teacher’s efforts preparing for the lesson" [1]).

It is important to note that teachers treat the student’s features and experience as an important constituent of successful implementation of self-directed learning. The teacher sees positioned qualities in the student’s person as already brought “from somewhere” and that such student is not an aspiration but an initial starting point. The student’s activeness, curiosity, motivation, self-directed learning experience are treated as particularly important features of the student who is able to learn in a self-directed way (“Active and curious students’ efforts, motivated students”[1]; “Students’ motivation, abilities, skills to independently set goals and implement them on the basis of existing experiences.”[5]; “Willingness to learn.”[6]; “It is necessary to have more self-directed students in the class.” [13]). Such teachers’ expressed attitudes, which are related to students of the corresponding culture, slightly contradict to the idea of implementation of self-directed learning: this presupposes the idea that if we already had such students, it would probably be not necessary to look for ways how to educate them in order to be such because self-directed learning is an aspiration of the self-directed learning system. Apparently, it is difficult for educators to refuse the traditional attitude settled in the educational practice that the ability to learn is only the matter of the students.

Teachers treat the interaction of the participants of the educational process and teacher-student team activities as a success factor that allows co-reaching the set goals and sharing joint experiences (“Not to be afraid of experimenting, believing in success, enabling each student to experience success and to rejoice together. A friendly atmosphere in the classroom. The teacher and students are tantamount partners, share success. Mistakes are treated as the possibility to improve.” [20]). As we know, nothing brings team members together better than the possibility to share experiences, celebrate success and evaluate reasons of failure. This enhances confidence in each other, gives more self-confidence and confidence in other person’s powers, makes learning more attractive, while new knowledge constructed on the emotional basis is deeper and long-lasting.

Analysing difficulties experienced in the process of applying self-directed teaching in the educational process, in addition to lack of subject knowledge and practical skills teachers pointed out that it was most difficult to change the teacher’s and the student’s approach to learning (“It is most difficult to change the students’ settled attitude that they are learning not for a mark but for development of their personality. Students find it difficult to get rid of tension, fear of making mistakes, and it is difficult for the teacher to change the attitude (not to look for mistakes but rather try to see good things, treating mistakes as an opportunity to improve. This is difficult and takes long to achieve.” [20]). This suggests that teachers perceive the importance of the attitude of each participant of the educational process in the transition to a different (i.e., self-directed) learning and inevitability of processuality and durability of its implementation in practice. Besides, the necessity of changes in the attitudes of teachers, students and other actors of the educational process is actualised (“The self-directed learning process can lead to dissatisfaction of the administration about not that constrained students’ behaviour during lessons.” [12]; “It may seem to some “stricter” parents and teachers that the teacher listens to students’ opinions too much, indulges them, writes too little marks, particularly unsatisfactory, for non-performed assignments, etc.” [22]).
Preconditions for Sustainable Changes in Didactics Applying Self-Directed Learning

The fact that it is difficult to change the attitude is illustrated by educators’ doubts about selection of orientation of the educational process (“A large share of students prefer the traditional teaching principle because this way they learn more. If you want to make it more interesting and playful, self-directed learning suits well, but it becomes difficult if you seek more knowledge – often this teaching does not answer the purpose.” [11]). The latter doubts can be avoided not setting “playfulness” against knowledge but connecting them into one whole – to enhance new knowing with positive experiences, which is regarded as one of the fundamental bases for high learning motivation.

**Conclusion**

1. Changes in didactics in practice are based on the interaction between theory and practice, while the success of this interaction largely depends on the teacher’s professionalism. Therefore, through self-directed learning as a way of practical manifestation of result-oriented educational ideas teachers’ practical manifestation experiences are actualised as significant in identifying preconditions for changes in modern didactics.

2. In order to enable the teacher to more effectively change educational practice, it is proposed to view these changes as a sustainable process, which moves ESD pedagogy to a new level, as opposed to traditional teaching where improved competencies are typically expected to be acquired by students while educators only deliver knowledge.

3. Applying self-directed learning in educational practice, preconditions for changes in didactics showed up through:
   - the teacher’s personal self-actualisation that is determined by changes in the teacher’s attitudes, which enable possibilities to provide actual practical manifestation to the theoretical conception of result-oriented educational process in educational practice and to simulate students’ learning process coping with challenges significant for didactics;
   - redistribution of powers of participants of the educational process sharing responsibilities for learning (the teacher’s perception of the (self-)educational process determines to what extent the teacher will allow students to be self-directed);
   - the student’s empowerment to learn, when: an integrated approach to the meaning, value and manifestation of the learner’s freedom, responsibility, confidence in the educational process is followed; planning of the educational process is focused on the learner and not the teacher; motivation to learn is acknowledged as a consequence of perceiving meaningfulness of self-education rather than the end in itself; combined feedback strategies are applied, aimed at the very students’ initiatives to seek progress in learning.

4. Research results suggest that highlighted preconditions for changes in didactics are interrelated: changes in one of them lead to changes in others; e.g., the change in the very teacher’s approach to the learner is followed by changes in the (self-)education process. On the other hand, changes in the process further lead to changes in the teacher’s attitude. These links illustrate manifestation of sustainable changes in didactics.
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Transformation of the System of Values of Autonomous Learning for English Acquisition in Blended E-Studies for Adults: A Holistic Fractal Model

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Abstract
The present study is aimed at creating a holistic fractal model (HFM) of autonomous learning for English acquisition in a blended environment of e-studies in adult non-formal education on the basis of the theories and paradigms of philosophy, psychology and education for sustainable development to promote the development of adult learners’ experiences of English acquisition. Thus, the present research attempts to find out how autonomous learning influences transformation of the system of values and integration in the learning environment. The research is based on the holistic paradigm of science. Adults’ English learning experience, their readiness to learn the language in blended e-studies and the SWOT analysis of metacognitive strategies are investigated in the paper. The authors also put forward recommendations for facilitating the transformation of the system of values in the process of autonomous learning for English acquisition in blended e-studies. The research has resulted in the HFM that interprets the systemic view on the transformation of values in the environment in the classroom and virtual environment, shows more holistic comprehension of the deepness and structure of the complexity of language learning and makes a methodological basis for its holistic facilitation in blended e-studies for adults.

Keywords: autonomous learning, English acquisition, blended e-studies, system of values, holistic fractal model

This paper aims at providing the description of a holistic fractal model (HFM) of autonomous learning for English acquisition in blended e-studies that shows the process of transformation of the system of values in this process. Autonomous learning for English acquisition in blended e-studies is an English learners’ approach to the development of the experience, learning and language competence. It is a holistic approach that refers to the ecological level of education where the system of values is changing.

Renewed interest in autonomous learning for English acquisition has been promoted by the development of technologically supported learning environment. The learning environment gives the extension to a humanistic approach of autonomous learning
(Knowles, 1970; 1975; Maslow, 2004; Rogers, 2004); a cognitive approach of autonomous English learning (Holec, 1981) – to holistic autonomous learning for English acquisition in blended e-studies for adults.

Previous studies investigate the investment of the European language portfolio for adults (Dalbiča, Grinberga, Jundze, Ostrovska, Kārkliņa, & Zuicena, 2006) in increasing adult learners’ autonomy for English acquisition (Kārkliņa, 2013); application of the method of autonomous English learning for improving senior students’ general learning skills where autonomous learning means inside learning directed by a teacher (Deimante-Hartmane, 2013) and taxonomy of English learning strategies used by adult learners in distance learning (Norvele, 2005). There are no studies related to autonomous learning for English acquisition in blended e-studies of adult non-formal education in Latvia.

Literature Review

Several fractal models are described in the literature of pedagogics. Jonâne (2009) proposes a methodological model – a didactic fractal – for content-based education where the content takes into account the environment. A methodological model – a didactic fractal – interprets a systemic vision of educational categories of the context, the learner, the teacher and the content that makes the basis for selecting the content and organisation of learning (Jonâne, 2009). A methodological model – a didactic fractal – supports a humanistic paradigm of sustainable development of society.

Computer-assisted fractal design is used for a teaching model consisting of training activities (Compañ-Rosique, Molina-Carmona, Satorre-Cuërda, & Llorens-Largo, 2015) based on the principles of student-centred instructional theory supporting post-industrial paradigm of education (Reigeluth, 2012). It corresponds to the dimension of learning and training where learners’ progress is based on their own learning and knowledge as learning outcomes.

One more example of using fractal models is at the organisational level of education. The university of the future is considered to be a fractal organisation of knowledge. One of its principles is the principle of learning how to learn. It is considered to be “the ability of a team to self-organise, self-regulate and self-control depending on its ability to learn and use learning as feedback for further learning. It facilitates to solve more and more complex problems faced by research and didactic units” (Pausits & Pellert, 2007, p. 145).

Systematic view on fractal organisations is displayed by their main characteristics, including self-organisation, self-sameness, vitality and dynamics, self-optimisation and navigation. The fractal university model explains these characteristics in detail. For instance, self-organisation includes autonomy of didactic and research fractals, initiating the change “from inside” in order to react immediately to changes in the scientific and research environment. Self-sameness means that new didactics or research structure reflects the superior structure.

Broks (2000) introduces a concept of life fractal that reflects the universal structure of a person’s action: necessity – cognition – activity – satisfaction of the necessity. The next level of the life fractal makes the structure of scientific research. Its fractal is a necessity – academic science or theoretical research – applied sciences or empirical research – the result of the investigation (scientific description or model).
The Square of Big Thoughts of Physics is derived from the Square of Mankind’s Big Thoughts (the World – Human – Society – Life) by Broks (Broks, Jonāne, & Vilks, 2013). Methodology of teaching physics is based on the Square of Big Thoughts of Physics and life fractal at general vocational secondary schools in Latvia (Broks et al., 2013).

The present research on autonomous learning for English acquisition in blended e-studies for adults is based on a holistic scientific paradigm that provides a systemic approach to cognition of the world, investigation of the whole and its properties where the whole is more than the sum of its parts, but the interconnection of the systems is ensured by the environment. The development is considered to be the increasing complexity of interconnected phenomenon and processes.

It is visualised by the evolution of the didactic triangle (Figure 1), including a goal of acquisition of the content, the learner and the teacher. The Square of Big Thoughts of Pedagogics has been derived from it. The opening of the Square in the hexagon of action, fractal of action and development is shown in Figure 1.

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**Figure 1.** The evolution of the didactic triangle.
Non-linear development differs from linear cognitive development in learning (Garmashova, 2011) by the fact that

- changes in the system can happen at any stage of the process, which can be created by any subject of the action;
- changes in the system are not abstract; they are implemented by concrete subjects of the corresponding process that have their own goals and interests;
- not exactly subjects, but relationships between them are important in non-linear transition.
- the mechanism of transformation of values becomes essential in the process of transformation of values where the result depends on subjects’ mutual relationship and institutional circumstances.

By contrast with the regulation and directing of linear process where cognitive and emotional facilitation of separate subjects takes the most important place, attention should be directed towards systemic interrelationship between the subjects of the process and environment in the process of regulation of transformation of values under the circumstances of non-linearity. Therefore, interconnection between social institutions, which disseminate new values and knowledge and the subjects of education is essential (Garmashova, 2011).

The mission of pedagogics in the context of the environment is to help learners connect inside and outside, previous and new reality in the process of learning to promote the development of their experience, general and special learning competence. The pedagogical means for English acquisition is the holistic and complex pedagogically technological facilitation: technological support for the development of language competence and pedagogical facilitation of collaboration in the group and outside the environment.

According to Schwartz (1992), values are criteria used by individuals for the choice of action and estimation of events. They are not specific goals, but the basis of motivation and opinion for action towards reaching goals. The result of learners’ non-linear development in learning is a holistic system of emotional, cognitive, social and environmental values. It means that a learner uses emotional, cognitive, social and environmental resources for reaching the learning goal – acquisition of English for integration in the global multilingual environment.

Holistic education aims at calling forth from people an intrinsic reverence for life and a passionate love of learning (Miller, 1997). The goal of holistic pedagogy is a creative and integrated personality. Holism is viewed as an integrating and systematising function of personality (Martin, 2003). The facilitator’s task is not to show a specific choice, but to help a learner comprehend learning alternatives for improving his/her own choice (Mezirow, 1981).

The characteristics of holistic learning process (Martin, 2003), to a great extent, correspond to adults’ non-formal education. The comprehension of the information and knowledge has been constructed in the context of one’s own life. Everything is mutually connected: there is no division into forms; individuals of different ages and proficiency levels study in the same group; an integrated interdisciplinary approach; the possibility of new opportunities.

The undivided integral whole (Vilbers, 2011) embodies in education through a holistic integral educational approach (Salóte & Pipere, 2006). A holistic system is a self-developed, dynamic, non-linear, open, integrated, creatively adapted and evolutionary system due to the interaction with the environment. The learning motivation is the integration and
self-realisation, creative development in and with the environment by using knowledge and skills in new situations. The learning goal is suggested by self-determined subjects (Martin, 2003). Autonomy is subject’s quality (Corning, 2005).

A human is included in the common system (Ventcel, as cited in Nefedyev, 1999). The development of a person’s learning experience and competence, the process of learning foreign languages and the learning environment make a holistic system investigated in the research. Its holistic whole integrates an individual’s emotional development, intellectual development and self-determination in the environment for one’s own development in and with the environment.

The environment is a common sphere of interdisciplinary research that as transdimension has been distinguished in a transdisciplinary scientific approach. The complexity of society is increasing, and the methodological holism is widely used for its investigation in humanities. It is the consideration that the systems should be investigated as part of the whole system (Esfeld, 2004). Nowadays, holistic thinking substitutes fragmentary thinking, complementary connects traditionally opposed concepts and overcomes the duality of objectivity and subjectivity.

Holistic methodology is appropriate for investigation of holistic systems. “For every constituent part of a system, there is a family of qualitative, non-disjunctive properties that make something a constituent part of a system provided that there is a suitable arrangement. Holistic properties are relational properties. The more than the sum of the organisation of the system consists in the parts having themselves holistic properties” (Esfeld, 2004, pp. 13–14).

The top-down conception of the holism is used in the research that “begins with the whole and properties that are characteristic of the whole” (Esfeld, 2004, p. 13) because holism in science stresses complex study of the system from the point of view of the whole in contrast to its analysis.

“A model is a concept of the system theory” (Baranova, 2010, p. 161). The systems approach (Laszlo & Krippner, 1998) and methodology of complex processes (Vilbers, 2011) for using transdisciplinary and integrative connections in the learning environment of blended e-studies for adults are used for production of the holistic model.

**Research Model**

Adults’ inside resource of English acquisition is the experience of learning of foreign languages and the competence of their use. Autonomous learning for English acquisition in blended e-studies is the approach of learning proposed in the present research. Facilitation is a teaching method. Modelling as a method of transformative learning means that a facilitator becomes critically reflective about learners’ assumptions and practices for influencing the way of construction meaning of learner’s experience (Mezirow, 2000).

The system of the research, consisting of learners’ system of values, pedagogical facilitation and technological support, is created depending on the consideration that the systems should be investigated as part of the whole system (Esfeld, 2004). The metaphor of the model is Cosmos. Its geometrical form is a fractal because it corresponds to static visualisation of dynamic systems. Its graphical form is made on the basis of a variety of triangular topological grids by using Hish’s transformations with a turn on top of the figure and a turn in the middle of its side (Soldatjonoka, 2014).
The HFM of autonomous learning for English acquisition in blended e-studies for adults reflects the individual, pedagogical and environmental perspectives of learning. It is a multi-level complex system model where the changes in the learning environment create dynamic transformations in the learner’s system of values. Therefore, it is necessary to extend facilitation. The development of the fractal is shown top-down from general to specific. The levels of the action fractal are described step by step, but the comprehension level is divided into two sub-levels.

The systems of human activities define their goals at three levels: goals of the system, goals of its parts and the goal of the super-system whose part is the examined system (Ackoff, 1981, as cited in Laszlo & Krippner, 1998). Taking into account a person’s systemic characteristics (Petrovsky & Yaroshevsky, 1996), the goals of the levels of the system can be reached by realising appropriate tasks with an appropriate structure of the content, environment, organisation of the process and relationship.

The goal of society is sustainable development. The goal of holistic pedagogy is an integrated learner, and the learner’s aim is integration in the global multilingual environment. The hierarchy of goals makes a holistic system of goals depend on the needs of the environment, society and individual.

It follows that the Square of Big Thoughts of autonomous learning for English acquisition in blended e-studies consists of the aim of acquisition of the content, the English learner, the educator and the process/situation/action of learning (Figure 1).

During learning, it opens in the classroom and virtual learning environment and visualises the English learner’s action as well as the facilitator’s action in blended e-studies. Non-linear learning and development correspond to the theory of autonomous learning (Knowles, 1970, 1975; Rogers, 2004) at the scientific (conceptual) level that has transformed to autonomous English learning method (Deimante-Hartmane, 2013; Holec, 1981) in the classroom environment. Information and communication technologies (ICTs) have created learning opportunities in the open learning environment that makes the transformation of environmental perspective and holistic autonomous learning topical for English acquisition in blended e-studies. The context of the environment supports the differentiation of the whole of autonomous learning and its renewal.

Exploratory Level of the HFM

Investigation of self-reflection about the experience of participants of the research in the qualitative part of the research shows that experienced language learners use various opportunities for learning foreign languages. They are integrated English learners as they use emotional, cognitive, social and environmental resources and are able to integrate in the global multilingual environment due to the developed general language skills.

Comprehension Level of the HFM

The investigation of readiness for autonomous learning for English acquisition in blended e-studies is based on reflection about learning by doing (Dewey, 1916). Fullan (2006) also refers to it as thinking about what we do. Taking into account the uncertainty of the situation in the future, the complex theory supplements reflection about the experience
with reflection about assumptions or a mental model of the future. The attitude is influenced by changes in the environment. The facilitator’s inference is selective according to the patterns of qualitative behaviour that should be created by it (Stacey, 1992).

The English learner comprehends the influence of environmental changes on the transformation of the system of values by self-reflection. The investigation of readiness for autonomous learning shows the transformation of values from organisational forms of learning based on different levels of responsibility (the facilitator’s responsibility in self-regulated learning, the individual’s responsibility in self-directed learning and the group’s responsibility in self-determined learning) for learning and its result.

It determines two additional ways of the organisation of learning in the future: self-organised learning in a virtual learning environment where the facilitator has a role of a member of the group and blended e-studies where it is possible to get facilitation. Self-organised learning is not analysed in the present research, but self-determined learning is related to common responsibility for the process and result of learning.

Opening of the Square of Big Thoughts at the stage of comprehension of the strategies and in the action of facilitation shows the transformation of values from cognitive strategies of language acquisition to metacognitive strategies. Metacognitive strategies, ascertained in the quantitative part of the research, are priority metacognitive strategies of skills and knowledge and less recognised metacognitive strategies of participation and development. Less recognised metacognitive dividing strategies determine the directions of extending of traditional facilitation to holistic facilitation, including pedagogical and technological facilitation.

**Action Level of the HFM**

The deepness of the investigation of learning in pedagogy means that not only general competences of learning and communication, and special language competence develop, but also the development of the personality, changes in the perception, thinking, world view and problem solving occur. Transformation takes place at the dimension of comprehension of one’s own experience, assumptions and values, as well as at the dimension of behaviour or changing of the way of learning (Mezirow, 2000).

The SWOT analysis of metacognitive dividing strategies in the classroom and a virtual learning environment in the action research is performed for comprehension of the opportunities of the classroom and virtual learning environment and threats that can prevent using these opportunities. The attitude to the distinguished values shows the transformation of learners’ system of values from cognitive to ecological and social values. It influences the English learners’ action.

The strategies of its pedagogical facilitation (creating the environment for psychological facilitation, mind maps, individual action model for English acquisition, organisation of collaboration) promote the development of learners’ experience, learning and language competences. The collaboration is promoted by organisation of the SWOT analysis individually, in pair and in group within the framework of the research. The facilitator also performs this analysis to compare his/her assumptions about the English learners’ learning with their opinion and transform these opinions according to the situation in the group.

The opening of the Square of Big Thoughts of autonomous learning for English acquisition in blended e-studies makes a double fractal (hexagon) of action that reflects
the action of learners and facilitators. Its result is the transformation of the learners’ inside values from emotional to cognitive values and transformation to outside social and ecological values in blended e-studies. The outside values include inside values and make a holistic system of values that opens for collaboration in and with the environment.

**Feedback Level of the HFM**

At the level of feedback, the English learner gets pedagogical, technological and environmental feedback about the process and result of learning, about the process of transformation of values and the conformity of new values (assumptions) with the learning situation, environment and aim. During learning, the English learner’s experience, learning, language and technological competence develops integrally by transforming assumptions about English acquisition.

Formal feedback about participation in acquisition of language skills is ensured by a facilitator and ICTs, but non-formal – by a facilitator, a group and communication in an open environment supported by the Internet. Non-formal feedback among the English learner, the facilitator, the group and the environment indicates collaboration, which promotes development. An integrated and holistic English learner’s system of ecological, social, emotional and cognitive values is the result of learning. His/her integration in the global multilingual environment indicates reaching the learning goal that is evaluated by the environment.

The model shows the changes, created by the influence of autonomous learning for English acquisition, in the readiness to transform the action of learning. It is manifested in the transformation of values from divided responsibility (of the facilitator, the English learner or the group) for the result of learning or emotional value to cognitive participation, from cognitive to metacognitive strategies.

According to the HFM, holistic – technological and pedagogical – facilitation promotes the development of learners’ experience, learning and language competence in interaction with the social and technological environment. The English learner’s cognitive participation in learning is supported by ICTs.

It promotes the development of individualised competence of language and supports individual models of learning action and means, for instance, mind maps or tables for grammar acquisition. Communication, supported by the Internet, and pedagogical facilitation is directed to promoting of collaboration, for instance, by communication in learning, organisation of learning societies and synchronous lessons.

The created HFM of autonomous learning for English acquisition in blended e-studies promotes sustainable development of society by encouraging adult learners’ personal development. It means encouraging them to become as fully developed personalities as possible using the possibilities of life and reaching their own goals (Forbes, 2003). The model is open to new emotional and intellectual experience.

New experience is created by meeting a new problem, for instance, acquisition of another foreign language. Cognitive, emotional, social and ecological resources are used at the next step of the fractal of action for new transformation of the system of assumptions (values) to integrate in the new situation and environment. The result is a reason for the new open cycle of the life action where the fractal of learning divides into self-similar, but the whole of the cycle of the action creates self-similar wholes.
Methodology

The five research participants – motivated English learners with rich experience of acquisition of other foreign languages – were involved in the qualitative research, 210 respondents – in the quantitative research and a different number of participants – in the three cycles of the action research.

The quantitative research was conducted by the method of narratives about the experience of learning foreign languages to obtain the criteria for creating a scale of the quantitative research. Non-probability sampling of respondents was chosen for the quantitative research on the basis of the principle of accessibility. It consisted of volunteers who were ready to take part in the face-to-face research, and the survey was implemented through e-mails. Real participants of English acquisition programmes of adult non-formal education were invited to be the respondents of the research, but their number was insufficient for the research. After that, teachers, librarians and parents of school children as potential participants of the programmes were involved in the research.

The questionnaire is the method of the quantitative research. The readiness to autonomous learning for English acquisition in blended e-studies was determined during the research. The factorial analysis of the research instrument allowed making a short form of the questionnaire for practical use. The cluster analysis of the obtained data by SPSS 22.0 exposed (1) 4 groups according to the respondents’ attitude towards the proposed organisational forms of learning based on different levels of responsibility (on the part of facilitator, learner, group) for the process and result of learning in the classroom and a virtual learning environment and (2) learner’s attitude towards the determined metacognitive strategies depending on the group they belonged to.

The participants of the action research were chosen depending on the results of the quantitative research. 46 participants ($N_1 = 46$) were involved in the $1^{st}$ cycle of the research. They were participants of English acquisition programmes of adult non-formal education. 32 of them took part in the $2^{nd}$ cycle of the research ($N_2 = 32$), and 3 facilitators ($N_3 = 3$) took part in the $3^{rd}$ cycle.

46 questionnaires of the first cycle and 36 working lists of the SWOT analysis of the participants of English programmes and their facilitators were analysed in the research. Only 12 working lists of the SWOT analysis of the $2^{nd}$ cycle and three individual and two pair work SWOT analyses of the $3^{rd}$ cycle were analysed in the research according to the determined metacognitive strategies of English acquisition. Thus, the results of the research were obtained by conducting the quantitative, qualitative and action research.

Results and Discussion

The findings of the quantitative research show that experienced English learners were integrated learners as they used cognitive, emotional, social and environmental resources for acquisition of the language, which also meant their system of values was holistic. They could have their own model of language learning, and they were open to new experiences of acquisition of other foreign languages. A 6-step model based on individual skills is considered in the research.

The findings of the quantitative research also reveal that divided responsibility in the classroom environment is not present in a virtual environment. Learners’ attitude
towards metacognitive strategies is the same in the classroom environment, but it is different in the virtual environment. The decision-making process depends on the respondents’ occupation and education.

The librarians and school children’s parents show a more positive attitude towards self-directed learning and learning in the virtual environment, but the teachers prefer teacher-centred learning in the classroom. The attitude of the participants of English acquisition programmes of adult non-formal education is differentiated by their education. This group of respondents is chosen for further investigation in the action research.

The validity of the short form of the questionnaire was checked, and the results of the cluster analysis were similar to the results of the quantitative research. The SWOT analysis of metacognitive strategies in the classroom and a virtual environment was the next step of the action research. The metacognitive strategies of skills and knowledge are the most recognised metacognitive strategies, while the less recognised metacognitive strategies include participation and development. Their strengths were determined, and the weaknesses were excluded by the factorial analysis of the quantitative research.

The analysis of the opportunities of using metacognitive strategies in the classroom and virtual learning environment as well as the threats that could prevent using them were proposed to the participants of the research. Figures 2 and 3 demonstrate the system of values, attitude towards metacognitive strategies, influence of metacognitive strategies and learning environment on the system of values of the participants of the action research and its transformation.

In general, the SWOT analysis and the diagram (Figure 2) show that the English learners’ system of values is holistic. It is represented by emotional, cognitive, social and ecological values. Cognitive values are highlighted the most by their facilitators. The ecological values have not been received favourably in autonomous learning for English acquisition yet.

The comparison of positive/negative evaluation of metacognitive strategies in the SWOT analysis shows that cognitive values have the highest evaluation (Figure 2). A few negative opinions are given on them. Emotional and cognitive values have a higher difference in comparison with positive/negative evaluation. It allows concluding that there is considerable influence of the environment on the transformation of values, and the facilitation of using opportunities given by the environment is a resource for promoting autonomy and collaboration in learning.

Broadening of the facilitation means that the opportunities given by ICTs should be directed not only towards reaching the learning goal, but also towards collaboration. It creates the necessity for facilitators to revise their assumptions about adults’ learning and using learning opportunities given by the environment for facilitation of adults’ learning.

Social values are mainly stressed in the classroom environment (Figure 3), where the teacher’s responsibility for learning and its result is distinguished as a social value. Emotional and cognitive values follow them. Emotional threats are referred to losing interest, but social – to mutual concurrence by the participants of the research.
Transformation of the System of Values of Autonomous Learning for English.

Figure 2. The system of values of the participants of the research and evaluation of metacognitive dividing strategies in the SWOT analysis

Figure 3. The influence of the environment and metacognitive strategies on the transformation of the system of values

On the one hand, there is the possibility to learn without unnecessary effort, at one’s own speed and by watching videos. It promotes the development of English learners’ experience from teacher-centred learning in the classroom to autonomous learning in the environment supported by the Internet as well as promotes learner’s inclusion in the environment. On the other hand, the participants of the research recognise the role of their own investment, but, at the same time, they feel a lack of the facilitator’s help and collaboration with a group.

The participants of the action research think that cognitive values are most important in acquisition of language skills (Figure 3). It confirms the result of the quantitative part of the research where the English learners’ emotional value of responsibility for learning and result in the classroom environment transformed to cognitive values for acquisition of language skills in the virtual learning environment. The SWOT analysis of metacognitive strategies of participation shows a stronger connection with emotional and social values.
The summary of the influence of the environment on transformation of values exposed in the SWOT analysis of the action research and the results of the quantitative research show that changing the learning environment from classroom to virtual influences the transformation of inside values – from emotional values, expressed by responsibility, to cognitive values. Changing the learning environment from the virtual to the blended learning environment of e-studies influences the transformation of inside values to outside social and environmental values. It follows that the facilitation of the metacognitive strategy of participation in learning should promote using ICTs and integration in the virtual learning environment for development of the learning and language competence.

The facilitation of collaboration is important for the opening of English learners’ inside system of values for holistic and non-linear development of their experience. Table 1 summarises the transformation of values and facilitation in the process of autonomous learning for English acquisition in blended e-studies of adult non-formal education.

Table 1

<table>
<thead>
<tr>
<th>Values</th>
<th>From</th>
<th>To</th>
<th>The Direction of the Facilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecological</td>
<td>Development in the social environment</td>
<td>Development in the technologically-based environment</td>
<td>Technologically-facilitated environment</td>
</tr>
<tr>
<td>Emotional</td>
<td>Divided responsibility</td>
<td>Joined responsibility</td>
<td>Pedagogical facilitation for the development of experience of autonomous learning</td>
</tr>
<tr>
<td>Cognitive</td>
<td>Strategies for accomplishing tasks (mind maps, tables for the development of language competence)</td>
<td>Metacognitive strategy for self-organisation of learning (skills, competence-based individual models of action for the development of learning competence)</td>
<td>Technological facilitation of the metacognitive strategy of participation</td>
</tr>
<tr>
<td>Social</td>
<td>Collaboration with a teacher in the classroom; feedback from the teacher about the result of learning</td>
<td>Collaboration with a teacher and group in the learning environment supported by the Internet; feedback from the social environment about the result of learning</td>
<td>Pedagogical support of the collaboration in blended e-studies</td>
</tr>
<tr>
<td>Facilitation</td>
<td>Pedagogical</td>
<td>Technological</td>
<td>Holistic</td>
</tr>
</tbody>
</table>

The facilitation of the metacognitive strategy of skills promotes linear development of the experience of English acquisition and learning competence in transition from learning in the closed learning environment of the classroom to self-organised English acquisition in the open virtual learning environment. The influence of the environment on the learners’ system of values creates a necessity of broadening the facilitation of learning. Blended e-studies provide learners with holistic technological and pedagogical facilitation.
Technological support is attached to the development of language skills by broadening traditional pedagogical support of cognitive values using the metacognitive strategy of participation. Then, the pedagogical support can be directed to promoting development and collaboration using the opportunities provided by the Internet.

In that way, technological and pedagogical facilitation of metacognitive strategies includes traditional values and promotes strengthening of new values for reaching the tactic goal of holistic education. The development of an integrated learner in the environment corresponds to the HFM of autonomous learning for English acquisition in blended e-studies examined in the research.

Competition of English acquisition programmes for adult non-formal education is considered to be a favourable and sensitive moment for changes. Investigation of the participants’ readiness for learning action in the future, the analysis of learning alternatives and the use in learning represent the fractal action of facilitation of autonomous learning for English acquisition in blended e-studies. An integrated English learner’s attitude towards emotional, cognitive, social and ecological values promotes reaching the individual learning goal – integration in the global multilingual environment – and reaching the strategic goal – sustainable development of society.

Investigation/self-reflection of learners’ readiness for learning action in the future as well as filling the working lists of the SWOT analysis individually, in pair and in group, is a methodological strategy for pedagogical facilitation of the transformation of learners’ system of values in the process of autonomous learning for English acquisition in blended e-studies.

The learner receives mutual psychological facilitation during the process of self-reflection through awareness of threats of not using opportunities of learning and discussion of them with a facilitator, in pair and in group. Filling the working sheets of the SWOT analysis supplements the learning content with a topic about learning of languages and actualises creating of individual learning models for the development of learning competence.

The pedagogical function of investigation of the attitude of the participants of English acquisition programmes in adult non-formal education is self-reflection about one’s own learning; comprehension of learning opportunities for improving learning quality and removing threats that prevent realisation of these opportunities. The restriction of the action research is insufficient investigation of collaboration due to joining the factors of responsibility in the virtual environment in the factoral analysis of the quantitative research and not including collaboration in metacognitive strategies of learning.

The results of the research show that the learning environment influences the English learners’ system of values. It follows from integrative connections between the elements of the common system that autonomous learning can make considerable influence on the environment, which is important in the context of complex sustainable development of society.

It can be concluded that the value-based HFM of autonomous learning for English acquisition in blended e-studies for adults proposed in the research makes a contribution to supporting a complex paradigm of sustainable development of society instead of its strong economic knowledge-based sustainability (Compañ-Rosique et al., 2015; Pausits & Pellert, 2007).
Important further direction of the research is an in-depth study of collaboration in autonomous learning for English acquisition in blended e-studies. Such a study will allow developing the conception of autonomous learning from collaboration with a facilitator to collaboration with a group in the open learning environment supported by communication possibilities of the Internet. For this reason, it is necessary to improve the research instrument of the quantitative part of the research.

Implications and Conclusions

Having conducted the research, it can be concluded that the aim of subject’s cycle of life action is integration in the environment, but pedagogy is a means of facilitation of the transformation of subject’s system of values to connect the inside environment of attitudes with the outside environment of the action according to today’s situation.

The English learner’s system of values is holistic; it consists of cognitive, emotional, social and environmental values. Transformation of inside values from emotional to cognitive and transformation of inside values to outside social and environmental values take place in the process of autonomous learning for English acquisition in blended e-studies for adults.

The findings of the SWOT analysis of metacognitive strategies of skills and participation show that traditionally technological and pedagogical facilitation in English acquisition programmes of adult non-formal education is directed to facilitation of the development of language skills. It is recommended to broaden traditional facilitation to holistic (technological and pedagogical) learners’ facilitation in autonomous learning for English acquisition in blended e-studies.

The direction of transformation of pedagogical values is technological support to promoting cognitive participation for developing language competence and pedagogical facilitation to promoting collaboration for developing learners’ experience and learning competence with the aim to promote an individual’s integration in the global multilingual environment.

References


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Sustainability from the Transdisciplinary Perspective: An Action Research Strategy for Continuing Education Program Development

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Abstract

The need to focus on a transdisciplinary approach in education for sustainable development (EDS) has been reflected in research and especially action research as a possible solution, which can open a new perspective for understanding and interpretation of the complex phenomenon of sustainability as well as for developing new open continuing education programmes by integrating research and learning activities in the context of open transdisciplinary research.

The content structure of the article: (1) it describes the experience that has evolved at one faculty and its subordinate scientific institute and has been proposed to be used within the entire institution; (2) it generalises issues arising from the extensive experience, which in action research manifest themselves as issues relating to the appropriate perspective choice in terms of sustainability, approaches that in education make it possible to understand the sustainability phenomenon, as well as features that help identify sustainability at different levels. Well-known cases in the history of science, philosophy of science, and systems development research have been used to highlight the relationship among the dynamic interaction of complex problems that can systematically appear as sustainable or unsustainable. Therefore, the article provides insight into a specific relationship among science development, integration and Anthropocene phenomena with sustainability / non-sustainability phenomena and their interaction; (3) it offers the experience necessary for the creation of participatory action research ideas and research base to expand the cooperation of university and its graduates using a stakeholder approach and connecting it with a transdisciplinary research framework, which envisages an activity around the sustainability phenomenon and its deep relationship to the openness for the evolution of sustainability consciousness as concerns individuals and societies; (4) it describes the first three activities of the first phase of the undertaken action research, which allowed determining the participants’ motivation to take part in the action research, identifying participants’ attitude and understanding sustainability and Anthropocene phenomena, as well as establishing a strategic vision of open transdisciplinary framework benefits and opportunities through participatory action research to develop open evolu-
tionary study programs for continuing education, which would extend and deepen the cooperation of university and its graduates for social innovation creation and achieving quality education for sustainable development by reorienting the society and education towards sustainability and sustainable development.

The present article aims at establishing an open transdisciplinary research framework, which is necessary for undertaking action research, and outlining a strategic vision for developing continuing education programs in the participatory action research that will help reorient continuing education to sustainable development.

**Keywords**: participatory action research, sustainability phenomenon, transdisciplinary approach, continuing education, partnership

**Action Research Experience and Characteristics of its Expansion Intentions**

The article introduces the experience relating to changes, which gradually evolved at Daugavpils University (DU) at the end of the Decade of Education for Sustainable Development and emerged as a new challenge to further development of ESD research and its wider use in education. In fact, it was a gradual internal structural change that began to appear along with the idea, which was included in the DU Development Strategy (2009–2016) about the establishment of UNESCO Chair at Daugavpils University. The Chair was established in 2013, and it took time to understand that it was the most important outcome within the Decade of Education for Sustainable Development, which introduced internal structural changes into Daugavpils University for ESD research development and ESD measure implementation in a broader perspective. After the establishment of the Chair, platform preparation was started in order to recognise the responsibility for ESD as the strategic objective of the entire university.

Looking back on the formation of this situation, it is evident that there was interest in the education for sustainable development. It has emerged and developed within the historical development of scientific activity at the Faculty of Education and Management (FEM) and its subordinate Institute of Sustainable Education (ISE), and obtained as a personally relevant experience gained by the staff members who have been engaged in ESD research and programme development. The FEM and its subordinate ISE proposed using the gained experience throughout the university by drawing up the application for the establishment of DU UNITWIN UNESCO Chair on Teacher Education and Continuing Education: Interplay of Tradition and Innovation in Education for Sustainable Development.

The Chair was established and became the structural unit of the university. At the same time, this structural transformation was the assessment of the FEM and ISE experience, which was acquired and developed at a time when they were involved in a global project on the reorientation of teacher education to address sustainability and were one of the partners involved in the preparation of the Decade of Education for Sustainable Development (2000–2005) and later also one of the partners involved in the implementation of the Decade objectives. The research conducted by the FEM and ISE was organised on the participatory action research basis. To establish the UNESCO Chair, the ISE shared its own experience, inviting other DU structural units, individual staff members and students to participate in the UNESCO Chair action research. The Latvian National Committee for UNESCO supported this proposal.
At present, structural change processes on institutional involvement in the ESD and education research have shifted the responsibility to the UNESCO Chair, which is historically the continuation of the FEM work undertaken in a broader perspective. Historical continuity has been maintained, as the FEM and Centre of Sustainable Education (former the ISE) are the partners involved in the implementation of UNESCO Chair objectives.

During the first three years of its operation, the development of the Chair became apparent in the area of promoting cooperation at the institutional level both nationally and internationally, which became recognizable as a network of networks. The approach of a network of networks is based on the Chair proposals, which are formulated by developing specific issues, enabling all stakeholders to participate in the networks set up by the UNESCO Chairs or in the networks, in which the UNESCO Chair is involved as a member. Opportunities to participate in academic or research interest networks at various levels increase with the increase in the activities provided by the Chair. At present, the Chair invites to participate in the BBCC (the Baltic and Black Sea Circle Consortium in Education Research), BSRESP (Baltic Sea Region in Education for Sustainable Development), the European Environmental Education Alliance, GUPES (Global Universities Partnership on Environment and Sustainability), WEEC (World Environmental Education Congress), Homo Europeanus Network, and many others.

In the closing event of the UN Decade of ESD taking place in Japan, DU UNITWIN UNESCO Chair has agreed to cooperate in the UNESCO Chair network, which addresses the ESD issues. Through the UNESCO Chair, DU continues to participate in the Global Action Programme (GAP, 2015–2020), which envisages through activities to address sustainability issues, and it is initiated in a broader perspective as institutional, regional and wider international cooperation towards achieving ESD objectives.

Participation in the GAP as well as the establishment of the Chair with responsibility for ESD in broader perspective first requires a strategic perspective that can be created under the condition that there is understanding of the current sustainability and ESD phenomena and the ability to apply it in the participatory action research, which by its nature is a complex process. Reflection on experience is also necessary to consider these phenomena in a deeper perspective of historical causes as well as scientific development perspective, which makes it possible to predict the possible direction towards the ESD and sustainable development. To fulfil the GAP objectives, it was necessary to undertake participatory action research, which was prepared and started in the 2015/2016 academic year.

In cooperation with the Baltic Sea Region countries with the aim of implementing GAP objectives, since September 2015 DU UNESCO Chair has participated in the project “Local Research and Education Hubs – Key for Sustainability Education”, which laid the foundation stone for the centre “Local Research and Education Centre – Sustainable Education Solutions” at Daugavpils University. DU Graduate Research and Education Centre for Sustainable Education was opened in May 2016 and was approved as a structural unit of UNESCO Chair. DU graduate network has been set up, and it started as a participatory action research, the prospective strategic goal of which is:

*establishment of open evolutionary relationships between university and its graduates for partnership, which through the synergistic quality achieved in relationships will contribute to the development of open evolutionary con-
continuing education programmes in order to influence the reorientation of continuing education towards sustainability and promote public awareness, cooperation evolution and adaptation relationship harmonisation for achieving sustainability and education for sustainable development.

Taking into account the fact that from 1993 to 2013, the issue of sustainability and education for sustainable development was within action research participants’ line of sight, an ambitious review of this issue is no longer useful. In the context of action research experience, most of the previously studied sources have become obsolete, but part of the theoretical sources was used in participatory research and became extension of its experience. Therefore, the experience used in the previous action research is planned to be based on the synthesis and, if necessary, we will resort to the analysis in cases, which are essential in the context of research experience, and in cases when theoretical sources have become the cause of issues provoking discussion. These issues attracted the action research participants by conflicts or inconsistency between real situations and conclusions of theories that resulted in mistrust.

One of these problems in education research is known for the fact that action research in education is most often denied in terms of importance and assessed in terms of strength and majority of other sciences, when it is stated that neither pedagogy nor education is a science. Nevertheless, it should be recognised that changes even occur in the recognition of action research theory, although action research has evolved since the beginning of the 20th century and even the end of the 19th century. At DU, the analysis of this issue has been one of the issues related to the use and development of action research theory (Salite, 1993, 1998, 2000, 2008, 2009, 2015; Pipere & Salite, 2006; Salite, Mičule et al. 2007; Grišāne, 2007; Belousa, Oļehnoviča et al., 2007; Salite, Gedžūne, & Gedžūne, 2009; Salite, Ignatjeva, & Salitis, 2009; Salite, Gedžūne, & Gedžūne, 2010; Switala, 2010, 2011, 2012 a, b, c; Gedžūne, G. et al., 2011; Kapieniks & Salite, 2012; Badjanova, Iliško, & Drelinga, 2013; Kravale, Iliško, & Oļehnoviča, 2013; Pipere, Veisson, & Salite, 2015; Gedžūne, G., 2015; Gedžūne, I., 2015; Briede, 2015; Switala, 2015; Zariņa, Drelinga, Iliško, & Krastiņa, 2016), with the focus on the recognition of action research complex nonlinear nature and attempts to get rid of the complicated approach, which often dominates in the current action research within scientific research.

In the experience of the FEM and ISE action research participants, there is the belief that the present research type has benefits if it entails a long-term participation of its stakeholders. There is also the assumption that action research is organically open to cyclic nature, which does not work in the traditional education research approach that uses a “piecemeal approach” or other type of approach (Bechtel & Callebaut, 1993; Nersessian, 2012).

This article aims at reflecting the beginning of action research by creating an open transdisciplinary research framework and a strategic vision for developing continuing education programs in the participatory action research that will help reorient continuing education to sustainable development. According to the aim of the article, we attempted to evaluate the action research experience by synthesising the actual experiences, theoretical ideas and approaches identified in the research that were intertwined with the ones tested in practice. Therefore, the present article provides an overview of scientific development, integration and well-known Anthropocene phenomenon that through the inter-
action and development of these phenomena affect sustainable / unsustainable quality at different levels. Development of unsustainability phenomenon reinforces the need for new approaches (e.g., resilience approach) (Zolli & Healy, 2012), which makes it necessary to respond to the consequences and look for new solutions that are created as a myriad of concepts. Thus, several new concepts appear, such as systemic resilience and systemic risks, and research theme of resilience synergistic quality (Millington & Millington, Marini, 2015) emerges in the participatory action research. However, there is also an opportunity to move to a pre-emptive approach, at the beginning mitigating the effects of the aftermath approach and gradually reducing the dominance of this approach in scientific research in the broadest sense, when the scientific research in a single science is based on the pre-emptive approach (Salite, 1993).

In the context of sustainable development, the issue of the transition from the aftermath approach to the pre-emptive one is at the same time the issue of several phenomena that take over the unsustainability features that have already been affecting the scientific development as well as understanding integration and unsustainability of the Anthropocene.

Science Development, Integration and Anthropocene Phenomena for Establishing Open Transdisciplinary Research Framework in the Context of Education for Sustainable Development

It is not possible to approach “sustainability from the transdisciplinary perspective” mentioned in the title of the article, if we do not investigate the nature of complex phenomena and do not explore essential relationships that may appear to be sustainable or unsustainable and, as a result, influence the transition of education, society and science towards sustainable or unsustainable development. Thus, the issue of quality arises, which subsequently becomes recognisable as education, science and society development quality, for the understanding and explanation of which it is important to shed light on the issues of attitudes and relationships that help comprehend the nature of complex processes.

Evaluating our experience gained in reorienting teacher education towards sustainability, it is possible to identify a number of problems, which are of the value in the context of participatory action research. In the phenomenon of science development, one should admit the idea that in the science development process it is important to address the issue of application of knowledge structure and classification approach that is related to the internal or external contexts affecting science development. Classification is not something dead or mechanical; it is important for research activity. If we consider the issue of science classification, it has recently been emphasised that it reflects the classification system of branches of science, like chemical elements, and the classification may also reflect a certain theoretical procedure (Margolis & Laurence, 1999; Szostak, 2007).

Classification is used to identify the strengths and weaknesses of various sciences and the potential for integration among various sciences. In broader terms, when addressing the issue of classification of sciences, the diversity can be identified and according to Ziman (2000), researchers in communication recognise each other by the way they look at the issue.
In the experience of teacher education reorientation developed since 2000, an invaluable influence was exerted by Kedrov (1983), whose interpretation of scientific development process served as a model for many research participants enabling them to consider the development of science in the form, which was not in conflict with the existing development trends of science. It should be noted that his proposal has not lost its strategic potential, and has not yet come in conflict with the ongoing development trends of science. What is more, the current events taking place in the context of science transdisciplinary approach and research development coincides with the vision of scientific development perspective proposed by Kedrov in the early 1980s.

The application of Kedrov’s model in teacher education reorientation towards sustainability has been valuable as it suggests considering phenomena at a greater distance, at which it is possible to distinguish significant constituents of the process, its evolution and openness necessary for the development of science. In the action research process, the gained experience enabled the research participants to find answers to questions that were sometimes not examined from the perspective of the resilience theory. As an example, we can mention theories of prototype and wicked problems that we frequently face, when we distinguish something that could be conditionally called the issues related to the theory of units of analysis. Looking at the popularity of the above-mentioned theories at a greater distance, we can find that they were popular from the 1970s to the early 1990s (Margolis & Laurence, 1999; Kalko, 2012; Brown & Harris, 2010; Cabrera & Cabrera, 2015; Wilber & Watkins, 2015; Adam, 2016).

Examining the current application of these theories, at least in the perspective of our experience, we have found out that the popularity of these theories has diminished because their openness, dynamism of the phenomena used in the evolutionary explanation and the very theories, evolving nature and complexity have not been revealed in the perspective of a complex approach. It has mainly been explained and understood from the perspective of a complicated approach. Action research experience enabled some participants to reveal a number of problems often untouched in educational research, the causes of which were identified as non-recognition and unreasonable use of a complicated and complex approach. In theory, the issue of application of the two approaches in education and educational research has been recognised and is nothing new (Savio, 2010; Wells, 2012; Salite, 2015) but a problem that affects the development of scientific research and educational research.

Recalling the influence of Kedrov’s (1983) visual model in the theoretical perspective, it should be admitted that the power of its historical perspective and generalisation affects researchers in the way as it enables them to see the essential elements of the development of science. Explaining his model, the scholar maintains that in the development and classification of science, there are infinitely many opportunities to turn away from the essential issues and lose the nature of continuity and transformation by focusing on details and not observing the structure of the development process, which needs historical context, current trends and future prospects (Fig. 1).
In his model, the author intends to understand the progress of science in order to maintain its evolutionary scene. In the evolution of science, the author distinguishes three scientific cognition transition stages in the development of science towards the future science. Details disappear when an attempt is made to view the scientific cognitive development historically, as trends in the change of science structure become apparent. Figure 1 demonstrates the three stages: (1) the ancient science – cognition is still undifferentiated, undivided; parts are not distinguished. It is a single science, which includes seeds of the future sciences; (2) an intermediate stage, stage of science differentiation, the Renaissance; (3) integration of sciences and appearance of many stages.

The author made a forecast of the future development of science if knowledge differentiation would disappear and structure of science recover, dominated by the general issues over the individual ones. Kedrov knew that some scientists in those days saw the way in which a narrow specialisation would develop determining the differentiation of sciences and individual dominance over the joint one. He saw the integration of natural and social sciences; however, he left open the question of whether they would connect through technical sciences.

The use of this theoretical point of view in the action research devoted to teacher education reorientation (1) made it possible to discern a deeper relationship among the development, integration and differentiation of science, as well as reveal changes in the
relationship between analysis and synthesis, and (2) served as an open holistic framework, despite the fact that the author at that time did not use a holistic approach. On the basis of this theoretical study, DU conducted the applied research on the use of integrated approaches in primary school as well as introduced a number of courses within which the integration theme was related to the use of different types of integration. Following Kedrov’s approach, it became apparent that integration was a process interweaving the development of science. Within its internal structural changes, the development of science should be evaluated and adapted taking into account the application of appropriate integration type framework at each stage in order to organise research and teaching activities. In scientific research, unsustainability finds its way through the relationships that appear through the choice of integration type in research, which is not in full compliance with the situation related to the current development of science. At a time when the science is aware of the complex nature of man, society and social phenomena, it is necessary to consider the integration from the perspective of a complex approach as well as recognise that it should be linked to the development of the theory of wicked problems that requires the complex and transdisciplinary approaches to the study of the integration. The question then arises: Are the specific sciences and some researchers allowed not to observe in their research the compliance of approach choice to the need of science to develop recommendations for solving wicked problems? Perhaps, they can do so, but how should we look at it in situations when the science has vividly reoriented to the aftermath approach, which implies seeking solutions that are mainly aimed at resilience, eliminating prior recommendations or “innovation consequences”?

On the basis of the synthesis of the model of scientific development proposed by Kedrov (1983) and our experience, we can found out that it has changed our direct and indirect ability to see that many problems in educational research and educational practice have affected too slow integration of social sciences, natural sciences and humanities. Investigating this issue, we can realise that often in the scientific research and especially in the education practice, the use of a complicated approach dominates. Complex approach began to develop in the boom years of environmental and ecological education (1990s), but the pressure of traditional sciences and the gap between the development of science and the society limited the immersing of science into (1) the issue of responsible choice of the integration approaches and (2) the ontological and epistemological (development) basic relationships, studying and learning contemporary complex phenomena (Adam, 2016; Salite, 2015).

In 2006, in Paris, the UNESCO organised a global colloquium on research and higher education “Universities as Centres of Research and Knowledge Creation: Endangered Species?” It initiated a fruitful discussion on dynamic relations between the society and the science, the need for contextual science, creation of the conditions for healthy production of social knowledge, as well as the necessity of urgent networking and cooperation development (Nowotny, Scott and Gibbons, 2001). It is likely that DU trust in action research and faith in science progress towards its unity have been strengthened. Directly and indirectly the action research in teacher education has diverted the attention of participants, in our view, to the three major themes, which gradually have become topical in recent years and are further investigated in the action research that has been launched as an open transdisciplinary participatory research within the university. These are the issues about the need to see and deal with the fact that (1) the complex approach,
during the development and formation of complex sciences, should be linked to the use of complex approach in the transdisciplinary scientific research and ESD research; (2) research and learning approach still needs to be in agreement with choice of the units of analysis (Babbie, 2016); (3) under the condition of united science, it is important to have understanding of a research object of united science. In this respect, Rozov’s (2012) approach is suitable for the action research since, in his point of view, an object of scientific research is the way we deal with the world, interacting with it through our diverse life actions.

Thus, looking at our previous action experience from a distance, taking into account a holistic perspective, we have identified three previously mentioned questions, and by combing them with the three, in our opinion, important phenomena (science development, integration and Anthropocene) and perspective, which forms as a result of the interaction of these phenomena, we have found the relation between our action research experience and the theoretical ideas “intergrown” in the experience, around which the framework of a new participatory action research has been established.

**Characteristics of Research Design Framework**

*Participatory action research:* started within the GAP phase (2015–2020), focusing on the implementation of GAP objectives, proposed to the entire institution (university) and its graduates for gradual establishment of open evolutionary partnerships with the aim of influencing the reorientation of continuing education towards sustainability.

*Research design:* created to achieve the long-term and short-term goals of the participatory action research (see 137–138 and 136 pages). Open dynamic framework within which stakeholder partnerships are organised by exploring sustainability phenomenon and achieving synergistic quality of cooperation. The establishment of open evolutionary continuing education programmes for the development of public awareness and cooperation in search of sustainable development areas.

*Stakeholder approach:* the research promotes cooperation among parties of various action experiences who get engaged in examining and addressing complex problems related to sustainability phenomena: (1) teachers, academic staff members and researchers who represent areas of different disciplines and scientific research; (2) graduates who obtained diplomas of different levels from different programmes and at different times as well as gained experience in various professional fields, who work within the university region, across the country and abroad.

*Transdisciplinary approach:* through the cooperation it is possible to open a holistic potential for transdisciplinary research. The choice and application of transdisciplinary approach envisaged as the strategic and methodological use of action research with the aim of finding out in the action research:

(1) a deeper theoretical explanation of the nature of the mentioned approach as in the theoretical literature on a transdisciplinary approach there are different explanations in the scientific perspective. It is expected that it will not be possible to address this process without investigating the recognition ability of interdisciplinary and transdisciplinary approaches because the understanding and application of both approaches is an issue in which diversity is manifested, and there are cases when interdisciplinary and transdisciplinary approaches are described in a similar manner;
(2) the nature of transdisciplinary approach when partnership development between
the university and graduates can reach the state (heterogeneous partnership unit),
the synergistic quality of which proves the quality of this partnership as an indivisible
unit. Such an ideal perspective opens up the opportunity within the framework of
the research to foresee and use a holistic perspective, in which researchers can look
for the achieved highest attitudes and relationships and open space for the achieve-
ment of ideal, expectation-related relations;
(3) the application of transdisciplinary collective thinking method, where over time
the use of the method as a separate dialogue opening method turns into the nature
of participatory action research and it assumes a new nature, which becomes the
integral supportive element of this research process, when the research acts as an
indivisible unit that certifies certain quality, in which the partnership forms among
different actors.

Therefore, a transdisciplinary approach, search for its more general meaning, has
been used in the action research in the context of scientific development and integration
diversity, and from the perspective of ontological development of its various types with
a tendency to promote the use of pre-emptive approach to the synthesis of science and
social practice. The outcome of the action research in terms of transdisciplinary approach
recognition will involve participants’ professional identity, disciplinary specialisation
and realities in the synthesis of complex nature of experiences.

At the first stages of research, in order to establish a deeper awareness, the coopera-
tion is first directed to the exploration of complicated operation of sustainability phenom-
enon that has initiated the process and will become the core of cyclical process of the
action research around which it will be possible to develop the synthesis of participants’
experience and understanding of the complex nature of sustainability, and it will also
be used for deeper evaluation and analysis of participants’ disciplinary affiliation and
professional activities that can help change the existing situation.

Transdisciplinary dialogue maintenance: maintenance of natural synergistic partner-
ship potential through (1) belonging to the university, (2) the participation in the examin-
ation of sustainability phenomena and involvement in continuing education course
establishment, as well as (3) engagement in the search of transdisciplinary solutions of
sustainability phenomenon for implementation of social innovations.

Use of complex nature of action research: if sustainability is studied as a wicked
problem, there is no other way than to understand and explain the action research (1) as
a unique complex phenomenon and interaction of complex processes; (2) as a strategic
approach to research and learning integration at different levels; (3) as an action research
method that can contribute to research participants’ transition from “the piecemeal
approach” to an approach of systemic collective thinking, which is in good agreement
with the participatory action research cases and the goals of the undertaken research.

Participatory Action Research Stakeholders, Activities and Description of Results
of Three Activities at the Initial Stage of the Research

The first activity. At the initial stage of the action research, the first activity took
place in June 2016 within the framework of the project “Local Research and Education
Hubs – Key for Sustainability Education” supported by the Council of the Baltic Sea
States as the first workshop of Daugavpils University “Graduate Research and Education
Centre for Sustainable Education”, which was set up to identify sustainability phenomenon, understand its deeper meaning and promote one’s own awareness. Participants engaging in dialogue were looking for answers to the questions “What is sustainability and how is it manifested?”, “What is unsustainability?”

Participants of the first activity workshop set up at the initial stage of action research: (1) onsite participants – 4 heads of institutions, 4 teachers, 4 students, 4 representatives of municipalities, 1 businessman, 5 lecturers at Daugavpils University (n=22); (2) distance participants who got engaged in the discussions through the e-media (n=33).

General education teachers, DU graduates working in public administration bodies and other areas of public interest discussed problems in education and jointly sought the ways of sustainable education resilience and development maintenance in the current circumstances. During discussions, unsustainability features in the society were distinguished, the quality of educational process was considered, access to education and social environment in educational institutions were addressed, the role of cooperation in the EDS was emphasised, as well as challenges faced by the teaching staff and society in relation to unsustainability overcoming process were discussed. Organisation of activities in the first workshop was focused on the participants’ belonging to the university, which for the participants who responded to the first call turned out into a personally important context and willingness to use the opportunity to engage in the establishment and work of “DU Graduate Research and Education Centre for Sustainable Education”. In the workshop discussion, the collective thinking method was used, in which the transdisciplinary framework was created in response to the unifying DU graduate status.

The results (experiences and ideas identified): a conclusion that there are problems which are unsolvable: the transition to a market economy that promotes competition, the pursuit of profit. Unsustainability problems have also been detected that are classified as a pretext, to which solutions, working together, could also be sought, for example: “… there is no continuation of the analysis of the obtained result”, “… irrational use of resources”, “… inconsistency in methods and learning content”. Sustainability is based on: “… awareness of one’s own mission and work”, “… family and country stability”, “…long-term, short-term plans verifiable through activities”.

The second activity. At the initial stage of the action research, the second activity took place on 16–17 August 2016 as discussions within DU workshop “Graduate Research and Education Centre for Sustainable Education”.

Participants of the second activity at the initial stage of action research: (1) onsite participants – 1 psychologist, 2 heads of institutions, 1 businessman, 2 teachers, 7 lecturers from Daugavpils University (n=13), of the total number of participants, 4 participated for the first time; (2) distance participants who got engaged in the discussion through the e-media (n=13).

During discussions participants raised questions related to the ESD complex nature, for example: “How can our cooperation minimise the effect of unsolvable problems on sustainable development?”, “How is exactly the same problem treated by representatives of different generations, different ages, and different professions?” Participants shared their experience, and their opinion was ranked by importance.

Organisation of activities in the second workshop was focused on the participants’ belonging to the university. In the workshop discussion, the collective thinking method
was also used, in which the transdisciplinary framework was created in response to the unifying DU graduate status.

The results (experiences and ideas identified): DU graduates of different generations and from different fields assessed the sustainability phenomenon from their own experience, actualised their personally important reference systems and from their perspective qualitatively analysed data obtained from motivational letters, in which applicants explained their desire to engage in the networking of DU UNESCO/UNITWIN Chair “DU Graduate Research and Education Centre for Sustainable Education”. Participation in the creation of social innovations and responsibility for their implementation emerged as an opportunity and a common basis for research development of DU Graduate Centre.

Participants concluded, that over the last 25 years the Latvian society rapidly marched into the market economy, which brought about unsustainability. On the one hand, it was and is the struggle for power in the form of unpredictability, freedom and centralisation: “... increased bureaucracy”, “... standardisation that limits creativity”, “... entrepreneurs cannot afford to invest in innovations that will pay off in several years”. Material assets and profit of employers on the one hand and “...overall low remuneration” of employees on the other hand. This leads to social problems: “... a lack of jobs in rural areas”, “... the departure of youth from rural to urban areas”, “... migration”, “... the closure of educational institutions and neglecting closed schools”, “... aging population”. Competition, lack of information and ill-considered planning leads to: “... either overproduction of specialists or shortage of labour”, “... scientists engage in fundamental rather than applied research because applied research in Latvia does not promote academic career development”.

On the other hand, there was a desire to maintain the comfort zone that is reflected in the form of manoeuvring, irresponsibility “... people’s anti-ecological attitude and environmental pollution”, of self-defence and pretext “... lack of time daily and haste”, of campaign-type education that somewhat mitigates “... fear of the unknown”. To minimise unsustainability, the participants proposed “...taking personal responsibility for work and learning outcomes”, “... learning by doing together”, “... contributing to value-based education development”, “... ensuring close connection of education with future, practical life”, “... promoting education for sustainable development”.

The most important conclusions of the second activity have emphasised the complex nature of sustainability phenomenon determined by the fact that (1) it is not possible to solve sustainability problems at once, they are continuously solved through a participatory process, and (2) those who engage in a variety of life processes should take responsibility for the choice of solutions. Actors’ choice also makes the process sustainable or reduces its sustainability. Discussion became a personally important platform, which opened and deepened exchange of views on the concept of DU Graduate Research and Education Centre for Sustainable Education.

The third activity. At the initial stage of the action research, the third activity took place on 4–5 October 2016.

Participants of the third activity at the initial stage of action research: (1) onsite participants – lecturers and students at Daugavpils University, teachers and senior managers of institutions (n=45). Participants of the second activity at the initial stage of action research: 30% of the participants took part in any of the previously organised activities; (2) distance participants who engaged in the discussion through the e-media (n=8).
Within the third activity, a focus group discussion was held, in which 3 representatives of municipalities, 1 businesswoman, 1 fund manager, 1 artist, 1 mother of many children participated as invited persons. In the age group up to 30 years – 1 participant, of 30–45 – 3 participants, over the age of 45 – 2 participants. Focus group discussion was focused on the life experience of the invited persons, searching for answers to the question “How did public figures solve unsustainability problems at different stages of their life?”, from the discussion participants’ point of view forming the basis for reflection in order to identify something that could be learnt by each of them.

Organisation of activities in the third workshop was focused on the participants’ belonging to the university and belonging to the networking of “DU Graduate Research and Education Centre for Sustainable Education”, which had already become recognisable as an interest-oriented open network. In the networking discussion, the collective thinking method was also used, in which the transdisciplinary framework was created in response to the unifying DU graduate status as well as belonging to the Centre networking.

The results (experiences and ideas identified): Focus group participants represented their life stories in the longitudinal context, emphasising reflection on what they thought, what they did and felt over the past 25 years, 12 years, 5 years and now. Which problems did they encounter and how did they deal with them? What did sustainability mean to them? During the third activity in small groups, participants analysed the information they heard and compared it with their experiences. The most important results of the third activity were associated with self-cognition and the importance of acquaintance with other participants that would promote the ability to adequately assess themselves and others, build a strong team, in which on the one hand each participant was responsible for the tasks most suitable to him/her, on the other hand, the team evaluated each participant’s opportunities and entrusted the most appropriate responsibilities to him/her.

Discussion and Conclusion

Considering our experience gained in reorienting teacher education towards sustainability, a broader perspective has been recognised, which has been revealed in the action research process as (1) the complex interaction of the three phenomena, namely, interdependence of science development, integration and Anthropocene phenomena. It can be viewed as a unit of complex interacting phenomena, which demonstrate the complex process of progress towards the goal of sustainable development or unsustainable development. The current Anthropocene era indicates that the attitude towards the scientific development and integration phenomena and the relationship between their formation as well as the changes are the basis and also the cause of gradual Anthropocene development. The detachment of science from the real processes of society and from anthropocentrism impact on the global system is an issue that should be addressed in the transdisciplinary perspective, in which the interest of disciplines and various human activities are associated with complex issues that need to be taken into account addressing specific issues.

In the action research, which was initiated at DU Graduate Research and Education Centre for Sustainable Education, a survey was conducted that was more complex in terms of the diversity of its participants (heterogeneous). At the same time, the relationship
of participants is more natural, because it is based on experience acquired at the university, which is a unifying structure that is characterised not only by experiences and contexts of epistemological nature, but also by historic contexts, contexts related to the development of the institutional and individual experience, which within the framework of the institution leave lasting traces with changing participants over time. These are experiences that make institutions and related people exist, which confirms the development of qualitative changes of this undivided unit. However, this undivided unit can be expanded and its quality can be seen in the context of wider cooperation unit, when graduates apply their practical working experience, complex social life and topical scientific problems to develop a new partnership layer (new relationships), at which through partnership there is a possibility of gradual learning to deal with contemporary problems and, thus, to create a new vision for the development of continuing education programmes.

The action research approach with openness towards systemic collective thinking is the environment that may contribute to the development of continuing education and reorientation towards sustainable development. At the initial stage of the action research, a number of questions have been addressed by the participants through the synthesis and analysis of their experiences with a focus on sustainability and Anthropocene phenomena. The content of ideas and the strategic vision for future activities have been developed: exploration of the complex nature of sustainability, the search for sustainability wicked problems through the action.

The idea of political ecology has been identified and supported, which enables one to search for local content, experience synthesis, which could become a unifying framework for continuing education programme content that is feasible in the context of complex transdisciplinary approaches. This would promote partnerships, build various stakeholders’ trust and confidence that experience found through the activities (evolutionary and adaptive research process) would allow finding the necessary wisdom for the local resilience to make people by doing change first of all their own attitude and experience, later also other persons’ engagement that is out of scope of personal interests and needs. It is envisaged that through attitudes and relationship establishment contributing to the common expectation, it will be possible to achieve actor’s synergistic quality changes that will reduce Anthropocene “power” and increase the synergistic partnership quality.

A number of research questions have been crystallised, which identify the areas of future research, for example: “self” changes (different identities, false “self”, mimicry) in the context of sustainability / unsustainability; the need to integrate in the research contemplative methods for the ESD needs.

Cooperation has been started (currently at its initial stage) to identify the content of political ecology, which may be valuable at the local level as well as for the promotion of partnerships among universities / graduates / regions towards social innovations for sustainable resilience living.

Having conducted the activities of the initial stage of the action research, it can be stated that action research is a challenge that promises participants a new perspective and opportunity to explore the sustainability phenomenon in a broader cooperation and partnership unit, which will require a holistic (transdisciplinary) perspective relating to the development of complex phenomena and their interaction in the modern world.
References


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