Learning About Safety, Prevention and Quality of Life Through PBL: Implications for Teacher Education

Laurinda LEITE  
Research Centre on Education, Institute of Education, University of Minho, Portugal  
lleite@ie.uminho.pt

Luis DOURADO  
Research Centre on Education, Institute of Education, University of Minho, Portugal  
lidourado@ie.uminho.pt

Sofia MORGADO  
Research Centre on Education, Institute of Education, University of Minho, Portugal  
sofiamorgado@ie.uminho.pt

Manuela VALE  
Secondary School of Castêlo da Maia, Maia, Portugal  
manuelasilvavale@gmail.com

Carla MADUREIRA  
Secondary School of Castêlo da Maia, Maia, Portugal  
carcon133@hotmail.com

ABSTRACT
In Problem-Based Learning (PBL) students learn ‘new’ knowledge by solving problems. Studies focusing on the efficacy of PBL for the learning science content knowledge are rare and their results are not fully consistent. This study aims at: comparing the effectiveness of a transdisciplinary PBL and traditional teaching with regard to students’ learning of science knowledge within the scope of the theme Safety, Prevention and Quality of Life; finding out students’ opinions on transdisciplinary PBL approach. The sample is made of two 9th grade classes of a school located in the north of Portugal. The experimental class (24 students) approached the theme through PBL in an integrated way that is, Natural Sciences and Physical Sciences teachers pooled together the concepts that they were supposed to teach and organized PBL oriented teaching as if those concepts belonged to a single school subject. The control class (25 students) studied the same theme through traditional teaching, with the concepts of each school subject addressed separately by each one of the teachers. Data relative to content learning were collected by means of a pre- and a post-test and data relative to PBL students’ opinions on the new teaching approach were collected through an opinion questionnaire. Results indicate that transdisciplinary PBL led to a bit better results than traditional teaching and that students valued PBL.

CONTEXT OF THE RESEARCH
Problem-Based Learning (PBL) is a student-centred teaching approach that is consistent with the key principles of active learning as it is defined by Savery (2006) and Tan (2004). In a PBL learning environment, students are at the centre of the teaching and learning process (Barrows 1986; Barrows, 1996; Boud & Feletti, 1997; Lambros 2002; Hmelo-Silver, 2004) and they play an active role in it as they have to take the appropriate actions to learn (deeply) knowledge (that is new to them) by solving problems (Dahlgren, Castensson & Dahlgren, 1998). In a PBL approach, problems are the starting point for learning (Barrows, 1986; Barrows, 1996; Dahlgren, Castensson & Dahlgren, 1998; Lambros, 2002; Hmelo-Silver, 2004). They determine what students learn, as this depends on the problem-solving process demands concerning knowledge and skills. Problems are qualitative or quantitative statements that offer an obstacle to problem-solvers who have to find strategies to overcome the obstacle and to reach a solution (Pozo, Postigo & Gómez-Crespo, 1995; Neto, 1998; Jonassen, 2004). To succeed in doing so, students need to use conceptual and procedural knowledge within the scope of the field(s) of the problem, as well as appropriate problem-solving strategies (Hmelo-Silver, 2004). Usually, problem-solvers do not possess all the necessary knowledge and skills and therefore they need to develop them (through study, inquiry, etc.) before being able to reach a good solution (if there is one for the problem that is at stake) or concluding that the problem has no solution.

In a PBL learning environment, teachers do not teach in the usual sense (Dahlgren, Castensson & Dahlgren, 1998; Chin & Chia, 2004). They are not there to tell science or to even to explain science concepts to students (Leite & Esteves, 2012). Thus, there is a risk that they feel that they are not playing their role as teachers (Li & Du, 2015). If it is the case, it may interfere negatively with the learning environment, as they may reduce
students’ learning freedom and responsibility. This is why teachers may need support (Goodnough & Nolan, 2008; Pepper, 2009; Morgado, 2016) before they are used to and become comfortable with PBL. However, as it was discussed in another paper (Leite & Esteves, 2012), in a PBL context, teachers have a variety of important roles to play and many key things to organize and monitor. Above all, teachers are there to stimulate students’ curiosity through scenarios or problems that interest to students and that make them feel willing to engage into a problem-solving process (Lambros, 2002). In doing so, teachers provide students with learning opportunities that these may feel as being relevant for school as well as for daily life purposes. Nevertheless, within school systems that acknowledge curricula which are not problem-based (as defined by Boud and Felleti, 1997) students’ learning possibilities are often conditioned by the problems that are selected by the teacher. As a matter of fact, when making this selection, the teacher bears in mind a mandatory curriculum that requires certain concepts, laws and theories to be taught and learned at a given school level.

Besides, teachers have other key roles to play, namely to guide students’ work towards learning goals achievement and to ascertain that learning takes place (Dahlgren, Castesson & Dahlgren, 1998; Hmelo-Silver, 2004). In the former case, teachers need to prevent the possibility of having students stuck before some difficulty, as this would cause demotivation and even frustration along with waste of time. The idea is not that the teacher gives direct answers to students’ questions but rather that he/she answers them by asking other questions (Hmelo-Silver, 2004) that make students think about relevant issues or rethink some procedures, or redistribute the group roles, etc. In the latter case, teacher needs to ascertain that learning takes place. To do so, he/she needs to use appropriate tools both during the problem-solving process (e.g., questioning the problem-solving teams about their achievements and the foundations of their actions) and afterwards. In fact, by the end of the process, teacher should promote a new knowledge synthesis (Hmelo-Silver, 2004) or revision (if necessary) and a retrospective analysis of the problem-solving process. On one hand, asking students to make the synthesis themselves can make evident the need for knowledge revision through appropriate remediation strategies, which should be student-centred, consistently with the PBL underlying philosophy. On the other hand, the retrospective analysis can help students to develop an awareness of the problem-solving strategies that showed to be more or less useful, as well as the team members’ actions and behaviours that were more or less productive and consistent with the group’s mission.

Arguments for teaching science through a PBL approach (see, for example, Hmelo-Silver, 2004; Lambros, 2004; Azer 2008) assume that PBL may enable students to:

- learn science content knowledge, as problems focus on some science issue that is new or partly new for the students and that needs to be mastered before the problem solution is reached;
- learn procedural knowledge, including problem-solving skills and science process skill, as students need to find the most appropriate strategies to solving the problem. Reaching this goal may require the use of several process skills, some of which may be new to the students;
- develop interpersonal skills, as PBL is usually done in small groups or teams whose members need to cooperate so that they can reach their common goal that is to find one or more solutions for the problem, if it has a solution;
- develop communication competences, as they need to read, write, prepare materials, do presentations and discuss, at least, with colleagues and teacher.

These arguments are consistent with, for instance: Dewey’s ideas of learning as a social process; Piaget’s idea that learning depends on the learner’s logic-mathematic reasonings (Piaget, 1979); Vygotsky’s idea that learning takes place in social contexts in which the teacher should scaffold the students (Palincsar, 1998; Tan, 2007); Bruner’s idea that students learn better by doing (Palincsar, 1998); and Ausubel’s idea that the type of learning that matters is meaningful learning which requires knowledge to be integrated into the cognitive structure of the learner (Ausubel, Novak & Hanesian, 1980).

Despite the convincing arguments for PBL, reviews of research focusing on the effects of PBL on science learning (e.g., Albanese, & Mitchell, 1993; Demirel & Dağyar, 2016; Dochy et al, 2003; Leite, Dourado & Morgado, 2016) do not provide unequivocal support for PBL as a teaching approach. In fact, PBL students’ conceptual learning results are often similar to the ones attained through conventional methodologies and seldom overcome them. However, there are two aspects in favour of PBL that deserve being stressed: no PBL-based published research was found leading to lower results than the traditional approaches; PBL fosters the development of relevant learning components other than the conceptual one. However, it should be noted that some research studies have methodological limitations (Albanese & Mitchell, 1993; Hung, Jonassen & Liu, 2008; Leite, Dourado & Morgado, 2016) that reduce the credibility of the results attained.

Research on teachers’ reactions towards PBL suggests that they fear (Goodnough, 2008; Leite et al, 2013; Morgado, 2016) but (after getting used) enjoy (Vernon, 1995; Dahlgren, Castesson & Dahlgren, 1998; Pepper, 2008; Ribeiro, 2010; Leite et al, 2013; Morgado, 2016) the challenge of trying a very different methodology but they feel unsecure about students’ learning (Li & Du, 2015) in a PBL environment. They themselves ask for support from people experienced on PBL in order to get advice on how to deal with the challenge of putting PBL into practice in real classrooms. Besides, research indicates that according to teachers, students’ reactions
towards science teaching through PBL depend on students’ academic level, with the low achievers (according to teachers’ criteria) showing better attitudes than top students (Leite et al, 2013; Morgado, 2016).

As it is well known, PBL started in medical schools (Barrows, 1996; Camp, 1996; Boud & Feletti, 1997; Barret & Moore, 2011; Hmelo-Silver, 2004; Savery, 2006) but it quickly spread to other areas and reached science education, namely in Portugal where the first known paper was written in 2001 (Leite & Afonso, 2001) and the first research was completed in 2001 by Gandra. At the time the research reported in this paper took place, the National Curriculum (DEB, 2001a) as well as the Physical and Natural Science Curriculum Guidelines (DEB, 2001b) did not explicitly mention the use of problems for science curriculum development but they suggested the use of problem-solving in the science classroom (Morgado & Leite, 2011). Nevertheless, they did not make any explicit reference to PBL. However, it seems possible to integrate PBL into science classes without contradicting the spirit of the national curriculum guidelines. This may happen because the guidelines argue for the use of student-centred teaching approaches that give students an active role and that acknowledge their previous knowledge as a starting point for the development of a diversity of competences, ranging from conceptual, to procedural, attitudinal and metacognitive.

Most science teaching in Portuguese schools is still teacher-centred and subject-based. There are a few experiments with PBL focusing on different science topics and school grade levels, organized on a school subject basis (e.g., Gandra, 2001; Carvalho, 2009; Torres, Preto & Vasconcelos, 2013). Despite the reduced sample size, they suggested that students might have benefited from PBL because they achieved better learning results or because they developed competences that their counterparts did not. In addition, a research study carried out by Morgado et al (2016) suggested that PBL organized into a transdisciplinary basis led to better results than the traditional approach when high demanding cognitive questions were at stake but not necessarily in the case of low demanding questions. If this can be confirmed, it would a strong argument in favour of PBL.

In summary, even though PBL seems to be a powerful approach, research results are not clear enough with regard to PBL effect on science learning, partly due to some research design weaknesses. Besides, some studies did not took into account the multidisciplinary nature of real problems, which requires PBL to be transdisciplinary rather than school subject-centred.

RESEARCH QUESTION

Bearing in mind the disciplinary teacher-centred characteristics of most Portuguese science teaching and the multidisciplinary nature of real life problems, this study aims at comparing a transdisciplinary PBL approach with traditional teaching of the theme ‘Safety, Prevention and Quality of Life’, with regard to students’ learning of science content knowledge; finding out students’ opinions on the transdisciplinary PBL approach. According to the official curriculum, this 9th grade theme is supposed to be approached within both Natural Sciences and Physical Sciences school subjects and therefore the two of them were involved in this study.

RESEARCH METHODOLOGY

In Portugal, science education for all children goes up to 9th grade that is to 14/15 years old. Afterwards, students must continue at school but they can choose to study science or not. Thus, this research is centred on the last school grade in which science is taught to all children, which is a relevant stage from a citizen’s education point of view. It took place in a secondary school that volunteered to participate in a research project which encompassed the research reported in this paper.

As mentioned above, the science theme chosen for the purpose of this research was ‘Safety, Prevention and Quality of Life’, which belongs to the syllabuses of two school subjects: Physical Sciences (includes Physics and Chemistry) and Natural Sciences (includes Biology and Geology). Physical Sciences are supposed to cover topics like Basic motion concepts, Collisions, Airbags, Helmets and seat belts, Traffic accidents prevention. Natural sciences are supposed to address issues like Traffic accidents, Effects of alcohol and drugs on the driver’s abilities, Driver’s food behaviour and psychological characteristics.

A quasi-experimental, pre-/post-test design with control group (see McMillan & Schumacher, 2010) was adopted. Two 9th grade classes and their four teachers were involved in the study even though with different degrees of engagement. Thus, from the experimental group (EG) side, a Physical and a Natural Sciences teacher were involved together with their 24 students. From the control group (CG) side, a Physical and a Natural Sciences teacher were also involved together with their 25 students.

The EG followed an active student-centred transdisciplinary PBL approach. Teachers were invited to work together to approach the topics referred to above, with no differentiation between what used to be the class time periods of each one of the two school subjects. Teaching materials were prepared or selected by the EG teachers and the researchers. To start the PBL sequence, a scenario like a press news focusing on ‘Reducing traffic accidents: a matter of safety, prevention and quality of life’, was adapted by the two schoolteachers and the researchers. It worked as a context for students to raise problems that would require concepts within the scope of the whole theme if they were to be solved by the students. Both teachers monitored the students, which were asked to work in small groups, each at a time or together, according to their availability and the anticipated students’ needs of guidance. One of the researchers observed all the EG classes to give support to teachers.
However, at the end, both teachers assisted to students’ presentations and conducted the solution analysis and the process evaluation. Figure 1 gives a synopsis of the process followed in the EG.

![Fig. 1: Synopsis of the PBL approach followed in the EG](image)

The CG followed a disciplinary teacher-centred approach with teachers working separately and with a well-marked differentiation of the two subjects. They followed the assigned textbooks approach, namely with regard to the sequence of the topics and the activities performed in each subject. Both interventions lasted for about a month. However, in the CG part of the time was devoted to solving exercises after addressing the content.

Inquiry through questionnaire was the data collection technique adopted. Then, to avoid contamination, the researchers alone designed a paper and pencil test to be used as pre- and post-test in the two research groups. The test covers the contents addressed and includes open-ended questions so that students could explain their ideas without being influenced by a given set of predetermined possible answers.

Students answered the test individually, two days before initiating the theme (pre-test) and eight days after concluding it (post-test). Both groups have done it in a Physical Sciences class time, supervised by their own Physical Sciences teacher.

Data analysis included content analysis based on a set of predetermined categories, as follows:

- **Correct answer**: scientifically accepted and complete answer, according to what is expected for this grade level, based on what is prescribed in the syllabus;
- **Incomplete answer**: answer that misses one or more elements required to be considered complete but does not include any incorrect idea;
- **Answer including alternative conceptions**: answer that includes ideas which are not consistent with the scientifically accepted ones;
- **Don’t answer**: comprises no answer, incomprehensible answers and answers that simply repeat the question.

Pre-/post-test gains were also computed. They have to do with the difference between the post-test and the pre-test percentages obtained for each category of answer. They indicate a variation that can be either positive or negative and that is good or bad depending on the category that is at stake. A positive gain is desirable for the correct answer category and a negative gain is desirable for the Don’t answer category. For the other categories, the interpretation of the gain in a category depends on the gains in the other categories. Finally, to attain the objective of the study, control group versus experimental group comparisons were made.

Afterwards, a more detailed analysis was performed in order to get more information on the incomplete answers and the ideas that were more and less hard for students to acquire.

In a physical sciences class after the post-test, the EG students were asked to answer to an opinion questionnaire on the PBL approach. The questionnaire, composed of 15 directional Likert type items, had been developed previously by Leite, Dourado & Esteves (2011). The scale used was a five degrees scale ranging from Nothing to A lot. Frequencies per item and scale grade were computed in order to get information on issues that deserved more and less positive reactions from the EG students.

**RESEARCH RESULTS**

**Students’ learning**

Table 1 shows the results relative to students’ science content knowledge learning which were collected through a test used as pre- and post-test in both research groups (EG and EC). In the pre-test, no research group reached a correct answer in any question. In the post-test, correct answers were obtained in one question (question 3) only.
Table 1: Control/experimental gains comparison for questions asking for an explanation (%)

<table>
<thead>
<tr>
<th>Question</th>
<th>Group</th>
<th>Correct Pre</th>
<th>Correct Post</th>
<th>Incomplete Pre</th>
<th>Incomplete Post</th>
<th>Including AC Pre</th>
<th>Including AC Post</th>
<th>Don’t answer Pre</th>
<th>Don’t answer Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Driving under alcohol</td>
<td>CG</td>
<td>0.0</td>
<td>0.0</td>
<td>96.0</td>
<td>92.0</td>
<td>0.0</td>
<td>4.0</td>
<td>0.0</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>EG</td>
<td>0.0</td>
<td>0.0</td>
<td>75.0</td>
<td>91.6</td>
<td>0.0</td>
<td>25.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>2 - Driving under drugs</td>
<td>CG</td>
<td>0.0</td>
<td>0.0</td>
<td>84.0</td>
<td>96.0</td>
<td>0.0</td>
<td>16.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>EG</td>
<td>0.0</td>
<td>0.0</td>
<td>83.3</td>
<td>87.5</td>
<td>0.0</td>
<td>12.5</td>
<td>0.0</td>
<td>4.2</td>
</tr>
<tr>
<td>3 - Slow down motion</td>
<td>CG</td>
<td>0.0</td>
<td>4.0</td>
<td>24.0</td>
<td>44.0</td>
<td>0.0</td>
<td>20.0</td>
<td>0.0</td>
<td>72.0</td>
</tr>
<tr>
<td></td>
<td>EG</td>
<td>0.0</td>
<td>29.2</td>
<td>20.8</td>
<td>16.7</td>
<td>12.5</td>
<td>20.8</td>
<td>66.7</td>
<td>33.3</td>
</tr>
<tr>
<td>4 - Speed and velocity</td>
<td>CG</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>4.0</td>
<td>36.0</td>
<td>44.0</td>
<td>0.0</td>
<td>64.0</td>
</tr>
<tr>
<td></td>
<td>EG</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>70.8</td>
<td>33.3</td>
<td>4.2</td>
<td>66.7</td>
<td>25.0</td>
</tr>
<tr>
<td>5 - Asleep driver after lunch</td>
<td>CG</td>
<td>0.0</td>
<td>0.0</td>
<td>28.0</td>
<td>44.0</td>
<td>0.0</td>
<td>72.0</td>
<td>0.0</td>
<td>64.0</td>
</tr>
<tr>
<td></td>
<td>EG</td>
<td>0.0</td>
<td>0.0</td>
<td>45.8</td>
<td>62.5</td>
<td>50.0</td>
<td>37.5</td>
<td>4.2</td>
<td>0.0</td>
</tr>
<tr>
<td>6 - Instantaneous velocity <em>versus</em> mean speed</td>
<td>CG</td>
<td>0.0</td>
<td>0.0</td>
<td>12.0</td>
<td>24.0</td>
<td>8.0</td>
<td>0.0</td>
<td>20.0</td>
<td>60.0</td>
</tr>
<tr>
<td></td>
<td>EG</td>
<td>0.0</td>
<td>0.0</td>
<td>20.8</td>
<td>58.3</td>
<td>8.3</td>
<td>0.0</td>
<td>70.8</td>
<td>41.7</td>
</tr>
<tr>
<td>7 - Collisions on a road</td>
<td>CG</td>
<td>0.0</td>
<td>0.0</td>
<td>28.0</td>
<td>40.0</td>
<td>8.0</td>
<td>8.0</td>
<td>64.0</td>
<td>52.0</td>
</tr>
<tr>
<td></td>
<td>EG</td>
<td>0.0</td>
<td>0.0</td>
<td>42.2</td>
<td>54.2</td>
<td>4.2</td>
<td>0.0</td>
<td>53.6</td>
<td>45.8</td>
</tr>
</tbody>
</table>

Note: n_{CG} = 25; n_{EG} = 24

Table 2 shows the gains (positive, null or negative) for the seven questions used to assess students’ learning in this research study. An analysis of the gains obtained for the correct answers shows that non-null gains were obtained for question 3, the only got correct answers. Those gains are positive for the two research groups. However, the gains obtained for the EG (29,2%) are much larger than those obtained for the CG (4,0%) which is a result in favour of the EG.

Table 2: Control/experimental gains comparison for questions asking for an explanation (%)

<table>
<thead>
<tr>
<th>Question</th>
<th>Correct</th>
<th>Incomplete</th>
<th>Including AC</th>
<th>Don’t answer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CG</td>
<td>EG</td>
<td>CG</td>
<td>EG</td>
</tr>
<tr>
<td>1 - Driving under alcohol</td>
<td>0.0</td>
<td>0.0</td>
<td>-4.0</td>
<td>16.6</td>
</tr>
<tr>
<td>2 - Driving under drugs</td>
<td>0.0</td>
<td>0.0</td>
<td>12.0</td>
<td>4.2</td>
</tr>
<tr>
<td>3 - Slow down motion</td>
<td>4.0</td>
<td>29.2</td>
<td>20.0</td>
<td>-4.1</td>
</tr>
<tr>
<td>4 - Speed and velocity</td>
<td>0.0</td>
<td>0.0</td>
<td>4.0</td>
<td>70.8</td>
</tr>
<tr>
<td>5 - Asleep driver after lunch</td>
<td>0.0</td>
<td>0.0</td>
<td>16.0</td>
<td>16.7</td>
</tr>
<tr>
<td>6 - Instantaneous velocity <em>versus</em> mean speed</td>
<td>0.0</td>
<td>0.0</td>
<td>12.0</td>
<td>37.5</td>
</tr>
<tr>
<td>7 - Collisions on a road</td>
<td>0.0</td>
<td>0.0</td>
<td>12.0</td>
<td>12.5</td>
</tr>
</tbody>
</table>

Note: n_{EG} = 25; n_{CG} = 24

Then, an analysis of the gains for the incorrect answers shows that: no null gains were obtained; larger positive gains were obtained for the experimental group in three questions (question 1, 4 and 6); similar positive gains were obtained for questions 5 and 7; lower gains were obtained for the EG in question 2 and 3. However, if in the case of question 3 we sum up the gains obtained for the correct and incomplete answers, for each group, 24,0% and 25,1% will be obtained for the CG and the EG, respectively. Even though these two percentages are similar, the 25,1% of the EG are better because they come mainly from complete answers while the 24% of the CG come mainly from incomplete answers. Data given in table 2 also show that positive gains in the complete and incomplete answers are associated with negative gains in the Don’t answer and/or Including Alternative Conceptions (AC) answer. Thus, it can be stated that the EG achieved better results than their counterparts in the CG.

As far as the incomplete answers are concerned, table 3 shows that in question 1 the CG incomplete answers were more incomplete than those of the EG as the percentage of incomplete answers mentioning 2 or 3 effects that alcohol can have on a driver’s organism is much larger in the EG (40,9%) than it is in the CG (26,1%). Being the numbers of students similar in both groups (22 and 23, respectively), this result is also in favour of the EG.
Table 3: Driving under the effect of alcohol - # of effects in Incomplete Answers (%)

<table>
<thead>
<tr>
<th># effects mentioned</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Gains</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG (n=24)</td>
<td>EG (n=18)</td>
<td>CG (n=23)</td>
<td>EG (n=22)</td>
</tr>
<tr>
<td>1</td>
<td>87,5</td>
<td>73,9</td>
<td>59,1</td>
</tr>
<tr>
<td></td>
<td>83,3</td>
<td>51,9</td>
<td>-13,6</td>
</tr>
<tr>
<td>2 or 3</td>
<td>12,5</td>
<td>26,1</td>
<td>13,6</td>
</tr>
<tr>
<td></td>
<td>16,7</td>
<td>40,9</td>
<td>24,2</td>
</tr>
<tr>
<td>4 or 5</td>
<td>0,0</td>
<td>0,0</td>
<td>0,0</td>
</tr>
<tr>
<td></td>
<td>0,0</td>
<td>0,0</td>
<td>0,0</td>
</tr>
</tbody>
</table>

Table 4 shows that the two research groups mentioned the same effects of the alcohol, in the pre- and the post-test, the only exception being the EG that did not mention sleepiness, in the pre-test. ‘Difficulty of risk assessment’ was the effect mentioned by larger percentages in the pre-test probably because it has to do with every day (including mass media) arguments against drink ingestion before driving.

Table 4: Driving under the effect of alcohol - Effects mentioned in Incomplete answers (%)

<table>
<thead>
<tr>
<th>Effects</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CG (n=24)</td>
<td>EG (n=20)</td>
</tr>
<tr>
<td>Reduction on the reaction capacity</td>
<td>25,0</td>
<td>27,8</td>
</tr>
<tr>
<td>Difficulty of risk assessment</td>
<td>50,0</td>
<td>61,1</td>
</tr>
<tr>
<td>Sleepiness</td>
<td>20,8</td>
<td>0,0</td>
</tr>
<tr>
<td>Vision limitations</td>
<td>20,8</td>
<td>27,8</td>
</tr>
<tr>
<td>Motor coordination limitations</td>
<td>0,0</td>
<td>4,8</td>
</tr>
</tbody>
</table>

Percentages relative to ‘Reduction on the reaction capacity’ and to ‘Motor coordination limitations’, increased from the pre- to the post-test, being a bit favourable to the CG in the former case and to the EG in the latter case. These effects have to do with human physiology (Ogden & Moskowitz, 2004; Carson-DeWitt, 2003) and the increase in the percentages from pre- to post-test may mean that learning took place in both groups. Table 5 shows that in question 2 the CG incomplete answers were quite as incomplete as those of the EG, as the percentage of incomplete answers mentioning 2 or 3 effects of drugs on a driver’s organism is quite as large in the EG (28,6%) as it is in the CG (29,2%). It should be emphasised the CG students that had mentioned 4 or 5 effects in the pre-test did not mention the same number of effects in the post-test. Therefore, these results are not clearly in favour on any of the groups.

Table 5: Driving under the effect of drugs - # of effects in Incomplete Answers (%)

<table>
<thead>
<tr>
<th># effects mentioned</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG (n=21)</td>
<td>EG (n=20)</td>
<td>CG (n=24)</td>
</tr>
<tr>
<td>1</td>
<td>85,7</td>
<td>95,0</td>
</tr>
<tr>
<td>2 or 3</td>
<td>9,5</td>
<td>5,0</td>
</tr>
<tr>
<td>4 or 5</td>
<td>4,8</td>
<td>0,0</td>
</tr>
</tbody>
</table>

Data given in table 6 show that the most mentioned effects in Incomplete answers relative to the effects of drugs on the driver compare to those most mentioned for the alcohol question (see table 4). However, the control group added a new effect in the pre-test that is hallucinations, which is also mentioned by authors like Ogden and Moskowitz (2004) and Carson-DeWitt (2003). In the EG, from pre- to post-test, percentages increased for all effects except for ‘Difficulty of risk assessment’. In the control group, the percentages obtained for several effects decreased a little bit. The ‘Reduction on the reaction capacity’ was again the effect whose percentages suffered a larger increase as it happened in the case of alcohol (see table 3). This increase was larger for the EG.

Table 6: Driving under the effect of drugs - Effects mentioned in Incomplete answers (%)

<table>
<thead>
<tr>
<th>Effects</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CG (n=21)</td>
<td>EG (n=20)</td>
</tr>
<tr>
<td>Reduction on the reaction capacity</td>
<td>28,6</td>
<td>10,0</td>
</tr>
<tr>
<td>Difficulty of risk assessment</td>
<td>47,6</td>
<td>85,0</td>
</tr>
<tr>
<td>Sleepiness</td>
<td>9,5</td>
<td>0,0</td>
</tr>
<tr>
<td>Vision limitations</td>
<td>14,3</td>
<td>5,0</td>
</tr>
<tr>
<td>Motor coordination limitations</td>
<td>0,0</td>
<td>5,0</td>
</tr>
<tr>
<td>Hallucinations</td>
<td>28,6</td>
<td>0,0</td>
</tr>
</tbody>
</table>
Question 3 asked students to explain why a child (Rui) traveling without the car seat belt fasten was projected forwards and hit the head when his father slowed the car down due to meeting a red traffic light, in a raining day. Table 7 shows that each incomplete answer for this question includes one of two explanations. The first explanation is a synthetic statement that does not provide fully evidence that their holders really understand what they are saying. This interpretation is supported by answers like the following one: “His seat belt was not fasten and a body that is moving tends to keep on motion” (post-test, CG11). The first part of this answer is a repetition from the question (the seat belt was not fasten) which is not explicitly related to the second part of the answer, which is a general statement (on the inertia law), not explained.

<table>
<thead>
<tr>
<th>Explanation</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CG (n=6)</td>
<td>EG (n=5)</td>
</tr>
<tr>
<td></td>
<td>CG (n=11)</td>
<td>EG (n=4)</td>
</tr>
<tr>
<td>Rui’s body tends to continue in motion</td>
<td>0,0</td>
<td>20,0</td>
</tr>
<tr>
<td></td>
<td>63,6</td>
<td>0,0</td>
</tr>
<tr>
<td>As Rui’s seat belt was not fasten, there was nothing to prevent him from</td>
<td>100,0</td>
<td>80,0</td>
</tr>
<tr>
<td>keeping moving with the car speed at the slow down instant</td>
<td></td>
<td>36,4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100,0</td>
</tr>
</tbody>
</table>

The second one is much more explicit in terms of why Rui was projected. In fact, it implicitly mentions the role of the seat belt (it would prevent Rui from keeping moving with the car speed), as shown by the following answer: “As a force was exerted on the car, it stopped; as no force was exerted on Rui, he kept on moving” (post-test, EG18). In the post-test, all the incomplete EG answers fell into this category, while the same happened with only about one third of the CG incomplete answers.

Question 4 focused on Rui’s conversation with his father; Rui was talking about the car speed and his father talking about the car velocity. Table 8 shows that incomplete answers relative to a possible difference between the meanings of the two words were registered in the post-test only and that they fell into three categories. While the CG incomplete answer fell into the most incomplete group of answers, the EG incomplete answers are distributed by the three categories, being some of them (11.8%) quite complete, which is an indicator of deeper learning. An example of this is the following answer, which combines type of magnitude and trajectory: “Velocity is the distance (straight line) between points A and B (displacement) over a certain time; speed is the path travelled between points A and B over a certain time.” (post-test, EG18). Bearing in mind table 1, the incomplete answers are a result of a reduction in Including Alternative Conceptions and/or Don’t know answers. Therefore, data in table 8 reinforce the idea of a better performance of the EG.

<table>
<thead>
<tr>
<th>Explanations</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CG (n=0)</td>
<td>EG (n=0)</td>
</tr>
<tr>
<td></td>
<td>CG (n=1)</td>
<td>EG (n=17)</td>
</tr>
<tr>
<td>Velocity is a vector magnitude and speed is a scalar magnitude</td>
<td>0,0</td>
<td>0,0</td>
</tr>
<tr>
<td></td>
<td>100,0</td>
<td>52,9</td>
</tr>
<tr>
<td>Velocity is a ratio between the displacement and the time spent to make it;</td>
<td>0,0</td>
<td>0,0</td>
</tr>
<tr>
<td>speed is a ratio between the path covered and the time used to cover it.</td>
<td></td>
<td>0,0</td>
</tr>
<tr>
<td></td>
<td>35,3</td>
<td></td>
</tr>
<tr>
<td>Velocity is a ratio between the displacement and the time spent to make it;</td>
<td>0,0</td>
<td>0,0</td>
</tr>
<tr>
<td>speed is a ratio between the path covered and the time used to cover it.</td>
<td></td>
<td>0,0</td>
</tr>
<tr>
<td>Then, opposite to speed, velocity does not depend on the trajectory.</td>
<td></td>
<td>11,8</td>
</tr>
</tbody>
</table>

When explaining why a truck driver fell asleep after lunch, having slept well the night before (question 5), students mentioned only one of the two issues that would be demanded to them according to the syllabus. Thus, they based their explanation either on ‘Digestion energy requirements’ or on ‘Blood concentration on stomach and intestine’ (table 9), which are effects that are mentioned in the literature (Burr & Wright, 2010; Eldelstone & Holzman, 1981). The former was the most popular in both research groups, in the pre- as well as in the post-test. Surprisingly, a few students of the EG abandoned the explanations based on the idea of ‘Blood concentration on stomach and intestine’. In the whole, these results are consistent with those given in table 1, as they are not in favour of none of the research groups.
Table 9: Driving when feeling asleep after lunch - Explanations in Incomplete answers (%)

<table>
<thead>
<tr>
<th>Explanation</th>
<th>Pre-test</th>
<th></th>
<th>Post-test</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CG (n=7)</td>
<td>EG (n=11)</td>
<td>CG (n=11)</td>
<td>EG (n=15)</td>
</tr>
<tr>
<td>Digestion energy requirements – needs energy and originates a deficit in the rest of the body</td>
<td>85.7</td>
<td>45.5</td>
<td>100.0</td>
<td>86.7</td>
</tr>
<tr>
<td>Blood concentration on stomach and intestine – brain has not enough blood to react</td>
<td>14.3</td>
<td>54.5</td>
<td>0.0</td>
<td>13.3</td>
</tr>
</tbody>
</table>

Question 6 focuses on who was right: a driver, arguing that he made calculations (with time and km) and was moving at 100km/h, and a police officer, accusing the driver of having exceeded the maximum velocity (or instantaneous speed, that is equal to instantaneous velocity magnitude) limit of 120km/h. Table 10 shows that three types of incomplete explanations were obtained, being the first one a statement that does not make explicit the difference between the two concepts that are at stake: instantaneous velocity and mean speed.

Table 10: Instantaneous velocity vs mean speed - Explanations in Incomplete answers (%)

<table>
<thead>
<tr>
<th>Explanation</th>
<th>Pre-test</th>
<th></th>
<th>Post-test</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CG (n=3)</td>
<td>EG (n=5)</td>
<td>CG (n=6)</td>
<td>EG (n=14)</td>
</tr>
<tr>
<td>Mean speed is different from instantaneous velocity</td>
<td>0.0</td>
<td>0.0</td>
<td>16.7</td>
<td>0</td>
</tr>
<tr>
<td>The value shown by the policy radar has to do with instantaneous velocity</td>
<td>33.3</td>
<td>0.0</td>
<td>16.7</td>
<td>0</td>
</tr>
<tr>
<td>The driver’s argumentation is wrong because it is based on the computation of the speed and this is not what the radar shows.</td>
<td>66.7</td>
<td>100.0</td>
<td>66.6</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Even though many incomplete answers were got in the post-test for the EG, they not only resulted from a decrease in the Alternative conceptions and Don’t know answers but also fell into the most complete group of incomplete explanations. This group shows disagreement with the driver’s reasoning, uses the concept of mean speed and implicitly or explicitly suggests that the radar does not shows that magnitude. This can be illustrated by the following answer: “The car driver calculated the mean speed [100km/h] but he may have exceeded the velocity limit [120km/h] even though the mean was that one.” (Post-test, CG25).

Table 11 shows that the number of Incomplete answers increased in both research groups from pre- to post-test, for question 7. This question focuses on the effects of two cars colliding with the road protection rails. In one of the collisions, the rails were damaged but not broken; in the other collision, the rails were broken. The two explanations obtained for incomplete answers suggest that students seem to focus on the observable effects rather than on the interaction between the cars and the protection rails. Nevertheless, it seems that the second explanation given in table 11, shown by lees students in both groups, is a bit more complete than the first one. In fact, the second explanation relates force, speed and collision effects, as illustrated by the following answer: “To break the protecting rails a large force is needed; this means that it was travelling with a larger speed.” (Post-test, EG15). These results suggest that the numbers of students showing the most complete answer did not change from pre- and to post-test.

Table 11: Collision on a road - Explanations in Incomplete answers (%)

<table>
<thead>
<tr>
<th>Explanation</th>
<th>Pre-test</th>
<th></th>
<th>Post-test</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CG (n=7)</td>
<td>EG (n=10)</td>
<td>CG (n=10)</td>
<td>EG (n=13)</td>
</tr>
<tr>
<td>The larger the magnitude of the impact force, the more violent is the collision</td>
<td>85.7</td>
<td>80.0</td>
<td>80.0</td>
<td>92.3</td>
</tr>
<tr>
<td>The larger the speed, the larger the magnitude of the impact force and the strongest is the effects of the collision</td>
<td>14.3</td>
<td>20.0</td>
<td>20.0</td>
<td>7.3</td>
</tr>
</tbody>
</table>

EG students’ opinions on PBL

The EG students’ opinions on PBL were collected through an opinion questionnaire, after the post-test. Table 12 shows the questionnaire 15 items, clustered according to the skills that underlie them, and the frequencies obtained for each grade of the scale.
Table 12: EG students’ opinions on the PBL approach (f)

<table>
<thead>
<tr>
<th>Skills</th>
<th>Items</th>
<th>Nothing</th>
<th>A little bit</th>
<th>Moderately</th>
<th>Quite a lot</th>
<th>A lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning</td>
<td>13. Deepen knowledge/ideas</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>14. Understand content</td>
<td>0</td>
<td>5</td>
<td>4</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>12. Learn about issues that interest me</td>
<td>0</td>
<td>3</td>
<td>7</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Problem-solving</td>
<td>10. Learn how to solve problems</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>8. Learn how to plan tasks</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>Thinking</td>
<td>11. Learn how to synthesize</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>7. Learn to think</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>5. Learn how to interpret information</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Communication</td>
<td>3. Learn how to communicate ideas</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>4. Learn how to present own ideas</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1. Learn how to argue and counter-argue</td>
<td>0</td>
<td>2</td>
<td>9</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Social interaction</td>
<td>6. Learn how to share tasks</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2. Learn how to cooperate with colleagues</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>9. Learn how to respect the others’ opinions</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Welfare</td>
<td>15. Feel comfortable</td>
<td>2</td>
<td>5</td>
<td>8</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

An analysis of the frequencies given in this table shows that at least two thirds (that is 16) of the 24 students choose the Quite a lot or A lot degrees for 10 (out of 15) items. Item 15 was the only item that got non-null frequencies for the Nothing degree and about one-third only for Quite a lot plus A lot, meaning that some students did not feel comfortable with PBL classes. This sensation may be due to students’ initial lack of experience with not only PBL but also with teamwork and with enquiry like tasks, as well as with their high level of anxiety regarding the non-distinction between the two disciplines and the nonexistence of exercises to be solved by (and after) the end of the classes. Thus, it seems that the novelties introduced may have really caused initial discomfort to students. Nevertheless, for what researchers and teachers could observe, most of them overcame those difficulties and anxiety quite fast. An additional evidence of this is that the discomfort felt did not impair them from recognising the positive things they got from the PBL approach. Excluding item 15, items 1 and 12 are the ones that got less Quite a lot and A lot. In the former case, on one hand, it should be noted that argumentation is not an easy competence to develop (Belland, Glazewski & Richardson, 2008) and, in the other hand, it may happen that students were not familiar with the words, especially with counter-argumentation. It may be that argumentation and counter-argumentation competences development may need more assistance from the teacher than the PBL context provided. In the latter case (item 12), it should be emphasized that what students learned was limited by the problems that emerged from the scenario. During the classes, teacher(s) were used to monitor the small groups’ activities in order to check whether they were on the task or whether they were doing other things. It was necessary to settle strict rules for internet access in order to prevent waste of time with issues that were not relevant for the task students had at hands. In fact, undue internet use was an expected issue (see Dogruer, Eyyam & Menevis, 2011) as it was students’ unhappiness with limitations on this. On the other hand, as argued above, the fact that the Portuguese curriculum is not a problem-based one, obliged teachers and researchers to find problems to be solved that were consistent with the curriculum demands, as the use of a new methodology and the undertaking of a research experience could not prevent the compulsory curriculum to be followed.

CONCLUSIONS AND IMPLICATIONS
The global results together with the incomplete answer analysis suggest that students in the EG performed better than their CG counterparts, which is a result consistent with studies that compared PBL with traditional teaching (ex. Gandra, 2001, Carvalho, 2009; Khoshnevisasal et al, 2014; Zahid et al, 2016; Strobel & van Barneveld, 2009; Morgado et al, 2016). However, both groups rarely reached complete answers, which may be partly due to strict correction criteria adopted in this research and partly due to language issues. The latter may be especially true for physics questions that deal with the speed and velocity concepts, as the words that give names to these two physics concepts are usually used undistinguishably in Portuguese everyday language. Besides, even though the EG students may have felt an initial discomfort (as it happened in other studies – see, for example, Gandra, 2001; Selguk, 2010; Alessio, 2004; Larin, Buccieri & Wessel, 2010), they seem to have valued PBL as they recognized that they have developed several types of competences.
Thus, the use of a transdisciplinary approach neither impaired students from learning nor made them feel confused and unhappy. However, the fact that some students (not only but also in the EG) used a sort of slogan-like explanations when trying to explain their reasoning on issues related to daily life situations should deserve
attention. On one hand, pedagogic attention is needed in order to find better ways of promoting deep learning. Hence, results obtained through the present study should be combined with those obtained by Morgado et al. (2016) in order to find ways of making PBL more useful for the learning of students’ complex and familiar issues. On the other hand, research attention is needed in order to find out whether slogan-like answers just happened or whether this is a result consistent with what Silva, Leite and Pereira (2013) found with seven graders, which were asked to solve familiar problems. This concern raises a few questions that are worth considering. Were students happy with their previous common sense knowledge about the effect of drugs and alcohol on the organism so that they did not feel the need to learn more about it? Should the teaching context have been able to deal with such knowledge to show that it is not enough to fully explain the situation? Was inertia law too much emphasized so that students memorized it and, maybe, based on previous experiences, felt that it would be enough to restate the law without explicitly relating it to the problem-situation that was at stake? Of course it may also have happened that the information sources used by the students were reinforcing the slogan-like answers or that they were unable to propel students to go deeper into the issue. Answering to these questions would be useful for organizing learning situations more able to foster students’ deep learning through PBL.

Finally, bearing in mind that EG students managed well with transdisciplinary PBL, it should be investigated how disciplinary and transdisciplinary PBL convey students the ability to deal with real problems which are transdisciplinary in nature. Transdisciplinary PBL is more demanding for teachers and school organization. From the authors’ experience, teachers need to get not only training but also support from researchers or colleagues used to PBL as well as from the school director. PBL requires flexible classroom organization and school resources use which need to be acknowledged by the whole school. Effort to get such support may be worthwhile as PBL seems to be one of the best teaching approaches for XXI century students, which need to be prepared for solving real problems. As it was argued elsewhere (Leite et al, 2017; p.159), PBL can “show students that science […] is all around them and that the knowledge it encompasses may help them not only to better understand, fully appreciate and respect more the natural world but also to take more advantage from what the natural world can offer without putting it at risk.”

ACKNOWLEDGEMENT

Data were collected within the scope of the Research Project “Science Education for Citizenship Through Problem-Based Learning” (PTDC/CPE-CED/108197/2008), funded by FCT within the scope of the Thematic Operational Programme Competitivity Factors (COMPETE) of the European Union Community Support Framework III co-funded by the European Regional Development Fund (ERDF/FEDER). This paper was funded by CIEd – Research Centre on Education, projects UID/CED/1661/2013 and UID/CED/1661/2016, Institute of Education, University of Minho, through national funds of FCT/MCTES-PT. Authors are grateful to the school, the teachers and the students that participated in this research.

REFERENCES


Morgado, S. et al (2016). Ensino orientado para a aprendizagem baseada na resolução de problemas e ensino...


Turkish Online Journal of Educational Technology

Special Issue for INTE 2017
November 2017

Prof. Dr. Aytekin İşman
Editor-in-Chief

Prof. Dr. Jerry WILLIS - ST John Fisher University in Rochester, USA
Prof. Dr. J. Ana Donaldson - AECT President
Editors

Assist.Prof.Dr. Fahme DABAJ - Eastern Mediterranean University, TRNC
Associate Editor

Assoc.Prof.Dr. Eric Zhi - Feng Liu - National Central University, Taiwan
Assistant Editor
Message from the Editor-in-Chief

Dear Colleagues,

We are very pleased to publish Special Issue for INTE-2017, ITICAM 2017 & IDEC 2017 conferences. This issue covers the papers presented at International Conference on New Horizons in Education, International Trends and Issues in Communication & Media Conference and International Distance Education Conference which were held in Freie Universität Berlin, Germany. These papers are about different research scopes and approaches of new developments and innovation in education, communication, media and technology.

Call for Papers

TOJET invites you article contributions. Submitted articles should be about all aspects of educational technology. The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJET. Manuscripts must be submitted in English. TOJET is guided by its editors, guest editors and advisory boards. If you are interested in contributing to TOJET as an author, guest editor or reviewer, please send your CV to tojet.editor@gmail.com.

November, 2017
Prof. Dr. Aytekin ISMAN
Sakarya University
Editorial Board

Editors
Prof. Dr. Aytekin İşman - Sakarya University, Turkey
Prof. Dr. Jerry Willis - ST John Fisher University in Rochester, USA
Prof. Dr. J. Ana Donaldson - AECT President

Associate Editor
Assist.Prof.Dr. Fahme Dabaj - Eastern Mediterranean University, TRNC

Assistant Editor
Assoc.Prof.Dr. Eric Zhi - Feng Liu - National Central University, Taiwan

Editorial Board
Prof.Dr. Ahmet Zeki Saka - Karadeniz Technical University, Turkey
Prof.Dr. Akif Ergin - Başkent University, Turkey
Prof.Dr. Ali Al Mazari - Alfaisal University, Kingdom of Saudi Arabia
Prof.Dr. Ali Ekrem Özkul - Anadolu University, Turkey
Prof.Dr. Anil P. Gaikwad - Yashwantrao Chavan Maharashtra Open University, India
Prof.Dr. Antoinette J. Muntjewerff - University of Amsterdam
Prof.Dr. Arif Altun - Hacettepe University, Turkey
Prof.Dr. Arvind Singhal - University of Texas, USA
Prof.Dr. Asaf Varol - Firat University, Turkey
Prof.Dr. Aytekin İşman - Sakarya University, Turkey
Prof.Dr. Brent G. Wilson - University of Colorado at Denver, USA
Prof.Dr. Buket Akkoyunlu - Hacettepe University, Turkey
Prof.Dr. Carmencita L. Castolo - Polytechnic University of the Philippines, Philippines
Prof.Dr. Cengiz Hakan Aydin - Anadolu University, Turkey
Prof.Dr. Chang-Shing Lee - National University of Taiwan, Taiwan
Prof.Dr. Charlotte N. (Lani) Gunawardena - University of New Mexico, USA
Prof.Dr. Chi - Jui Lien - National Taipei University of Education, Taiwan
Prof.Dr. Chih - Kai Chang - National University of Taiwan, Taiwan
Prof.Dr. Chin-Min Hsiung - National Pingtung University, Taiwan
Prof.Dr. Colin Latchem - Open Learning Consultant, Australia
Prof.Dr. Colleen Sexton - Governor State University, USA
Prof.Dr. Demetrios G. Sampson - University of Piraeus, Greece
Prof.Dr. Dimitar G. Velev - University of National and World Economy, Bulgaria
Prof.Dr. Don M. Flournoy - Ohio University, USA
Prof.Dr. Dongsik Kim - Hanyang University, South Korea
Prof.Dr. Enver Tahir Riza - Dokuz Eylül University, Turkey
Prof.Dr. Eralp Altun - Ege University, Turkey
Prof.Dr. Feng-chiao Chung - National Pingtung University, Taiwan
Prof.Dr. Ferhan Odabaşı - Anadolu University, Turkey
Prof.Dr. Finland Cheng - National Pingtung University, Taiwan
Prof.Dr. Fong Soon Fook - Universiti Sains Malaysia, Malaysia
Prof.Dr. Francine Shuchat Shaw - New York University, USA
Prof.Dr. Gianni Viero Vercelli - University of Genova, Italy
Prof.Dr. Gwo - Dong Chen - National Central University Chung-Li, Taiwan
Prof.Dr. Hafize Keser - Ankara University, Turkey
Prof.Dr. Halil Ibrahim Yalın - Gazi University, Turkey
Prof.Dr. Heli Ruokamo - University of Lapland, Finland
Prof.Dr. Henry H.H. Chen - National Pingtung University, Taiwan
Prof.Dr. Ing. Giovanni Adorni - University of Genova, Italy
Prof.Dr. J. Ana Donaldson - AECT President
Prof.Dr. J. Michael Spector - University of North Texas, USA
Prof.Dr. Jie-Chi Yang - National Central University, Taiwan
Prof.Dr. Kinshuk - Athabasca University, Canada
Prof.Dr. Kiyoshi Nakabayashi - Chiba Institute of Technology, Japan

Copyright © The Turkish Online Journal of Educational Technology
Dr. Li Ying - China Open University, China
Dr. Norlidah Alias - University of Malaya, Malaysia
Dr. Pınar Nuhoğlu - Hacettepe University, Turkey
Dr. Rosnaini Mahmud - Universiti Putra Malaysia, Malaysia
Dr. Sachin Sharma - Faridabad Institute of Technology, Faridabad
Dr. Seetharam Chittoor Jhansi - Pushpa Navnit Shah Centre for Lifelong Learning, India
Dr. Tam Shu Sim - University of Malaya, Malaysia
Dr. Tiong Goh - Victoria University of Wellington, New Zealand
Dr. Vikrant Mishra - Shivalik College of Education, India
Dr. Zahra Naimie - University of Malaya, Malaysia
Dr. Zari Sadat Seyyedrezaie - Islamic Azad University, Iran
Factor of Values Influencing Mind Virtue of Muslim Malay Youth: Study in Klang Valley, Malaysia
JAWIAH Dakir, SITI MASLIAH Mohd Nuri, FARIZA Md Sham, Khairul Anwar MASTOR, SITI RUGAYAH Hj Tibek, A‘DAWIYAH Ismail, AL ADIB Samuri, JALIL M. H., NOOR AZIAH Mohd. Awall

Factors Analysis of Technology Leadership in Thailand Royal Awarded School
Dawruwan THAWINKARN

Fluorescence of Edible Oils in Teaching the Course Forensic Science
Michaela MIKULIČOVÁ, Vojtěch KŘESÁLEK

From Learning to Practice: A Draft of Access to Optimize the Structure of University Studies Taking Into Account Specifics in Arts Oriented Schools
R. ČOČKOVÁ, O. JURÁŠKOVÁ

General Principles of Shaping Teaching Content For Informatics As A Teaching Subject
Jiří DOSTÁL, Jiří KROPÁČ

Global Competencies of Undergraduate Students in Dentistry, Nursing and Engineering Programs
Unchalee SANRATTANA, Suwadee AERARUNCHOT, Pavee SIRIRUK, Somsamorn RUEANGWORABOON

Google Slide As a Tool to Promote Active Learning Strategies
Dawood Al HAMDANI

Graphical Solution of Linear Programming Problems in MS Excel
Anna NEBESOVÁ, Jana SEKNIČKOVÁ

Happiness of Students’ Suan Sunandha Rajabhat University
Pimporn THONGMUANG

How the Cipp Model Assesses the Entrepreneurial Education Program: From the Micro Entrepreneurs’ Perspective
Tengku Maaidah Tengku A RAZAK, Muhammad Sabri HARON, Nor Aishah BUANG

How to Teach Mathematics: Some Suggestions from Herbartian Tradition
Verena ZUDINI

Impacts of Differentiation of Self on Interpersonal Relationship in Early Adulthood: Mediating Roles of Adult Attachment and Empathy
Dalsaem BAE, Min-hee KIM

Implementation Managing Strategic for Innovation in High Vocational Education Systems (Hves): From Malcolm Baldrige National Quality Award (Mbnqa) for Improving Competitiveness of Graduates
Budhi HARYOTO, MARDJI, DARDIRI, Eddy SUTADJI

Implementing Numbered Heads Together Strategy to Year 5 Students: An Alternative Approach to Teaching Writing
Sri Kartika A.Rahman, Harinah Mohd Shara, Suraya Tarasat, Noradina Jaidi

Implication of Model of Acceptance and Behavior Usage of Mobile Learning in Higher Education of Indonesia
Syamsul Arifin, Aulia Siti Aisjah, Punaji Setyosari

Importance of Architecture for the Success of Primary Education
Arzu CAHANTIMUR, Rengin BECEREN OZTURK

Importance of the Role of Education on Basic Problems of Measuring and Determining Costs in the Company
Zuzana CHODASOVÁ, Mária ĎURİŠOVÁ, Alžbeta KUCHARČIKOVÁ, Zuzana TEKULOVÁ

Improved Learning Through Interactive Video Mini-Lectures in Ecology

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the Footsteps of de La Salle, On Becoming a Lasallian: Evaluation of the Conduct of the Intro to La Salle and Contextualization and Living out the Lasallian Guiding Principles Sessions for All Incoming First Year and Second Year Students of Dela Salle Health Sciences Institute</td>
<td>132</td>
</tr>
<tr>
<td>Increasing the Success Rate in Mathematics at the College of Polytechnics Jihlava (Czech Republic) as a Result of the Implementation of Support Measures</td>
<td>142</td>
</tr>
<tr>
<td>Industry and Vocational Education</td>
<td>151</td>
</tr>
<tr>
<td>Influence of Experiential Education in Pre-Graduate Training of Teachers on the Classroom Climate – The Conflicts</td>
<td>155</td>
</tr>
<tr>
<td>Information Literacy Level of Coastal and Small Island Community in Indonesia on Accepting the Education of Technology with Animation Base</td>
<td>163</td>
</tr>
<tr>
<td>Initiative Taking Levels of School Principals*</td>
<td>171</td>
</tr>
<tr>
<td>Innovation of Education in Risk and Crisis Management</td>
<td>177</td>
</tr>
<tr>
<td>Innovative Technologies in Educational Process of Teaching Computer Graphics</td>
<td>183</td>
</tr>
<tr>
<td>Integrated Moral Values in Standard-Based Assessment: Opportunities and Challenges of Computer-Based Test in Indonesian National Assessment</td>
<td>187</td>
</tr>
<tr>
<td>Integrating Assessment For Learning Strategies Into Online Learning Environments: A Case Study Of Teaching Secondary Ict</td>
<td>200</td>
</tr>
<tr>
<td>Integrating Software Development Courses in the Construction Curriculum</td>
<td>215</td>
</tr>
<tr>
<td>Integration of Landscape Analysis and Assessment Methods, into Vocational Education Processes of Design and Planning Disciplines, by using R &amp; D Projects</td>
<td>226</td>
</tr>
<tr>
<td>Integration of Social Innovation Creation in Higher Education: Case Study of Latvia</td>
<td>235</td>
</tr>
<tr>
<td>Interaction and Communication in Education at the University: Temporal Aspect of Educational Communication and Activities and Forms of Communication</td>
<td>241</td>
</tr>
<tr>
<td>INTERACTIVE EFFECTS OF ENGLISH PROFICIENCY AND MATERIAL PRESENTATION MODE ON ENGLISH LISTENING COMPREHENSION AND COGNITIVE LOAD IN MOBILE LEARNING ENVIRONMENT</td>
<td>247</td>
</tr>
<tr>
<td>Intercultural Peculiarities of Modern American Movie Translation</td>
<td>253</td>
</tr>
</tbody>
</table>
Internationalization of Higher Education Institutions: The Case Study of the Polytechnic Institute of Bragança
Cláudia Miranda VELOSO, Paula Odete FERNANDES
260

Investigating Ethical Information Sharing in Facebook Within Educational Context Through Adopted Papa Framework
Seren BAŞARAN
268

Investigating Formative Assessment Strategy to Chemistry Habits of Mind (Chom) of Buffer Solution Concept in Learning Chemistry
NAHADI, Sjaeful Anwar, Dewi Kharisma WINAN
276

Investigation of Healthy Living Behaviors of University Students Participating and Non Participating Sports
Selma CIVAR YAVUZ, Nazmi BAYKÖSE, Ömer ÖZER, Ahmet ŞAHİN, Meryem ÇOBAN
286

Investigation of Preservice Elementary Teachers’ Opinions on Science Fiction Films
Ümit İZGI
293

Investigation of Relationship between Factors Hindering the Participation of University Students in Recreational Activities and their Leisure Motivations Levels
Fatih UZUN, Osman PEPE, Mehmet Beňzat TURAN
298

Investigation of Teacher Opinions on Measurement Tools Used to Evaluate Listening/Monitoring Skills
Zeynel HAYRAN
304

Investigation of The Factors Influencing Teaching Profession Choices of Pedagogical Formation Trainees
Volkan PAN, Serkan SAY
311

Investigation of the Relationship Between University Students’ Personal Characteristics and Success Tendencies
Mehmet Beňzat TURAN, Barış KARAOĞLU, Kenan KOÇ
318

Investigation of the Subjective Well-Being of Psychological Counselling Candidates and The Perceived Social Support Levels
Seda TÜRKÖZ
326

Investigation on The Effect of the College Curriculum Of Physical School College of Physical Education on Communication Skills
Alper TANRIKULU, Kuddusi KILIÇ, Mehmet Beňzat TURAN, Kerimhan KAYNAK
337

Kaızen and Intuıtıon in Stress Management
Okan ŞENELDIR, Sinan AYDIN, Mustafa KUDU, İsmail KILIÇARSLAN, Mustafa OF, Celal MUTLU
345

Knowledge and Skills Transfer for Sustainabile Rural Tourism in the Baltic Sea Countries
Gunta GRINBERGA-ZALITE, Zane VITOLINA, Baiba RIVZA
350

Knowledge Management Model to Develop Creative Thinking for Higher Education With Project Based Learning
Kwanjai DEEJRING
355

Korean High School Student’s Perception of Trust in Teachers
Ryumi Choi, Daehyun Kim
360

La Fete De La Francophonie and Intercultural Communication of French University Students in Indonesia
Sri Harini Ekowati
366
Leading Software Development Methodologies in Central Europe
Veronika VESELÁ

Learning About Safety, Prevention and Quality of Life Through PBL: Implications for Teacher Education
Laurinda LEITE, Luís DOURADO, Sofia MORGADO, Manuela VALE, Carla MADUREIRA

Learning Adequacy of Nigerian Tertiary Educational System for Sustainable Built Environmental Course
R.OJELABI, A.AFOLABI, P.TUNJI-OLAYENI, I.OMUH

Learning Difficulties in the Study of Structural Analysis in Tertiary Institutions
Ignatius O. OMUH, Lekan M. AMUSAN, Rapheal A. OJELABI, Adedeji O. AFOLABI, Patience F. TUNJI-OLAYENI

Learning for Placement. Fostering Innovation in the Construction Sector Through Public-Private Partnership in the Emilia-Romagna Region
Marcello BALZANI, Fabiana RACO, Theo ZAFFAGNINI

Learning Geometry Through Mathematical Modelling: An Example With Geogebra
Maria Giovanna FRASSIA, Annarosa SERPE

Learning Programming From Scratch
Monika MLADENOVIĆ, Divna KRPAN, Saša MLADENOVI

Learning Strategies Enhancing on Statistical Education
Somruay APICHATIBUTARAPONG

Learning the Phonetic of Ffl by Turkish Learners: Need for Specific Teaching Materials
Fatma KAZANOĞLU, Havva ÖZÇELEBİ

Lifelong Learning Tendencies of Primary Education Teachers
Nuray KURTDEDE FİDAN, Nuray YILDIRIM

Limitations of Peace Education in Divided Societies: The Case of Cyprus
Dülek LATIF

Listening Comprehension in French Language Teaching – The Situation at Secondary Schools in the Czech Republic
Michaela MADLOVÁ

Looking for New Models of Society: The Example of the Fencing Team
Sara NOSARI

Managing Universities: From Collegiality to Shared Governance
Erman M. DEMİR

Masters in Hydraulics: Sense of Humanism in Classrooms Based on Freedom Research?
Maritza Liliana Arganis JUAREZ, Juan Jose Baños MARTINEZ, Ramón DOMÍNGUEZ, Eliseo Carrizosa ELIZONDO

Measurement of the Human Capital Efficiency – An Interesting Topic For Diploma and Doctoral Theses
Alžbeta KUCHARČIKOVÁ, Zuzana CHODASOVÁ, Mária ĎURIŠOVÁ

Measures in Forming a Harmonious Family Based on the Practice of Noble Values Among the Participants of Bicara Sakinah (Talk on Harmony) at Pasat Islam (Islamic Centre), Kuala Lumpur
A’dawiyah ISMAIL, Siti Syarah M. TAWIL, Jawiah DAKIR

Measuring Robustness of Thai Athletes Using Trait Robustness Of Self-Confidence Inventory (TROSCI)
Sarstrawit WONGBUTLEEWATTHANA

Mental Health and Marital Violence
Sofia CAMPOS, Conceição MARTINS, Marisa PINTO, Manuela FERREIRA, Cláudia CHAVES, Rosa MARTINS

Metamorfosa Kupu-Kupu Song: Integration of Language and Science Subjects for Developing Early Childhood Education Teachers Competences in Teaching Scientific Concepts
Tuti Tarwiayah Adi

Middle School Students Views’ on Socio-Scientific Issues: Global Warming Example
Murat GENÇ, Tülin GENÇ

Mobile Learning Perception Scale: A Short Version for the Italian Context
Samuele ZAMINGA, Gloria GUIDETTI, Rosa BADAGLIACCA, Ilaria SOTTIMANO, Sara VIOTTI, Daniela CONVERSO

Model of Project-Based Learning on Cloud Computing Technology in Collaboration to Enhance Ict Literacy
Thiti JANTAKUN, Thada JANTAKOON

Model Situations for Usage of Creative Techniques While Listening to Modern Popular Music at School
Veronika ŠVONCOVÁ

Modelling Smartphone Security Behaviour of University Students
Mohamad Noorman MASREK, Ismail SAMADI, Qamarul NAZRIN, Atikah AZRY

Moral Reasoning of Adolescents
Blandína ŠRAMOVÁ

Morphological and Contextual Clues in Guessing Word Meaning from Context in a Foreign Language
Berrin MANGA ÇETİNAVCI, Meral ÖZTÜRK

Motivation of Gifted Pupils Towards Negative School Performance
Ilona KOČVAROVÁ, Eva MACHÚ, Adéla VÁLKOVÁ

Motivational Factors in Homework: Parent’s Strategies
Barbora PETRÚ PUHROVÁ, Jana MAJERČÍKOVA

Multi-Dimensional Expansion of Algo-Rythmics
Erika OSZTIÁ, Zoltán KÁTAI, Géza-Károly VEKOV

Multiple Drug Use in Elderly and Responsibilities of Nurses
Didem SARIMEHMET, Sevilay HİNTİSTAN, Nurhan GÜMRÜKÇÜOĞLU

Museum-Based Education as A Part of School Education
Kinga Anna GAJDA

National Cultural Identity in Teaching English to Kazakhstani Learners
Gulnara KASSYMOVA

Need Assessment on Teaching and Learning About Water Resource Management and Water Disaster of Basic Education
Chunwadee CHUNRASAKSAKUN, Unchalee SANRATTANA

Needs Assessment on Knowledge Regarding The Use of ICT Network of the Community Members For Self-Development
Intira ROBROO
Negative Effects of Barriers to Seeking Psychological Help and Their Association With Depression, Anxiety, Stress, and Self-Efficacy Among College Students
Nursel TOPKAYA, Ertuğrul ŞAHİN, Yaşar BARUT

New Approach to Entrepreneurship Education in Primary Schools: The BGENTL
Teresa PAIVA, Pedro TADEU

Non-Profit Management Education in Kazakhstan
Bakhytnur OTARBAYEVA

Old Meets New: Collaborative Digital Storytelling for Effective 12 Reading Instruction
Meliha R. ŞİMŞEK

On In-struction-Ability Of Tacit Knowledge As Ordinary, Practical Member's Method
Minho SHON, Hyunyoung CHO

On the Level of Academic Achievement of the Vocational School Students: The Effect of Motivation
Sinan AYDIN, Yaşar GENEL, Kazım KAHRAMAN, Yusuf TOLA, Mustafa OP, Celal MUTLU

On The Way Towards Career Awareness: Interview With Graduates
Zehranur KAYA, Meltem Ozten ANAY, Guzin KARASU, Gökşen ABALI, Mehmet Cem GİRGIN

Opinions Of Education Administrators Regarding The Impact Of Their Leadership Features On The Mobbing And Organisational Commitment Of Teachers
Togay ULUÖZ, Emete YAĞCI, Ali AKTEPEBAŞI, Figen Yaman LESİNGER

Opportunities of Interactive Teaching in the Implementation of Project Method
I.V. Kovalev, Y.Y. Loginov

Outside the Box: Change – Various forms of Connecting Practitioners in the Process of Intensive Kindergarten Development
Edita SLUNJSKI

Parental Attitudes as Predictors of Subjective Well-being of Psychological Counseling and Guidance Department Students*
Hatice KUMCAGIZ

Peer Learning in HE: Students’ Perceptions of the Benefits and Challenges in Becoming Peer Leaders in a Peer Assisted Learning Programme
Annyza TUMAR

Peculiarities of the Information Structure of Written Discourse and its Use in Flt Classroom
Golovchun A.A., Zolotukhina YE.

Peripheral Studies of Muslim Identity in Islamic World: Malay Muslim Case Study
Muhammad Hilmi JALIL, Jawiah DAKIR, Noor Aziah MOHD AWAL, Fariza MD SHAM, A’dawiyah ISMAIL, Wan Zulkifli WAN HASSAN, Siti Maheran ISMAIL@IBRAHIM, Mohd Irfan MOHD TERIN

Physical Activities and Special Education. A Case-Study With Autism Spectrum Disorders Students
Laura Sara AGRATI, Francesco FISCHETTI

Policy Analysis on the Use of an E-learning Platform at a Higher Education Institution
Ain Nurhazifah JASMEI, Cassandra Siaw Yang CHIN, Joanna Suk Shin LIM, Pei Fun LEE, Norain Awang Damit @ HARUN, Azaharaini MD JAMIL, Masairol MASRI, Mastiah SHAHRILL

Positive Discipline and Behavior Approach For Addressing Negative Behaviors in Education: Model of Ari Schools
Seva DEMİRÖZ


Jana VERNARCOVÁ

Preferred Value Structure By Adolescent Girls And Boys
Anežka HAMRANOVÁ, Blandína ŠRAMOVA

Preschool Teacher Candidates’ Metaphoric Perceptions About The Concept of Music
Aylin MENTİŞ KÖKSOY

Presumptions for “International Trade” Studies – Comparison the Czech and Slovak Education System Effectiveness
Milos MARYSKA, Petr DOUCEK

Primary School Students’ Metaphors About the Concept of Mathematics
Nihan SAHINKAYA, Çiğdem KILIÇ

Project Teaching at University - A Tool for Presenting Proposals for Prevention and Solving the Problem of the General Public
Martina JUŘÍKOVÁ, Josef KOUCOUREK, Eva GARTNEROVÁ

Promoting Academic Integrity in Secondary Education
Bagus Hary PRAKOSO

Promoting Students Metalanguage Awareness Through Genre Pedagogy
Murti Ayu WIJAYANTI, Wawan GUNAWAN, Emi EMILIA

Prospective Teachers’ Metaphors on Scientific Literacy and The Nature of Science
Ijlal OCAK

Protection and Promotion of Mental Health
Jarmila KRISTOVA, Zuzana BACHRÁTA, Emília MIKLOVIČOVÁ

Reasoning and Moral Judgement in Higher Education Students: Reality and Challenge
Madalena CUNHA, João DURTE, Ernestina SILVA, Daniel SILVA, João PINA

Reconciling the Terrible Twins: Investigating the Relationship of Literacy and Numeracy in Primary Classrooms
Maura SELLARS

Refining Inconstancy Of Prayer Among University Students By Using Digital Visual Schedule
Amin Mohd DAMANHURI, Muhammad FAZRULILAH, Siti Hamaira RAMLI, Muhamad Fairus KAMARUZAMAN

Reflections on People’ s Needs in Bangkok Community Based on Lifelong Learning Concept
Sumolnit KERDNOONWONG

Religious Education in North Cyprus
Ali DAYIOĞLU

Repositioning Technical Education a Panacea to Solving Globalization Challenges in Construction
Sector Lekan AMUSAN, Dele OWOLABI, Patience TUNJI-OLAYENI, Raphael OJELABI, Ignatious OMUH, Ayodeji OGUNDE, Opeyemi JOSHUA

Role of Tablet Technology Towards Children with Autism Learning Development: A Study on the Acceptance of Special Education Teachers
Muhamad Fairus KAMARUZAMAN, Harrinni Md NOOR, Mustaffa Halabi Haji AZAHARI

Roma in the Czech and Slovak Republic in the Spectrum of National Diversity
Jaroslav BALVÍN

Satisfaction Level of Faculty of Education Students with the Service Quality of Teaching

Page 743

Page 749

Page 755

Page 763

Page 768

Page 775

Page 784

Page 789

Page 798

Page 812

Page 825

Page 829

Page 838

Page 843

Page 849

Page 856

Page 865

Page 877
H.Ömer BEYDOĞAN

Scale Development and Validation for Career Aptitude Test for Designers in South Korea
Imjoo GIL, Daedong HAHN

Scale of Social Values in Turkish Folklore
Azmiye Yınal, Nuran Soytekín, Habib Derzínevesí

School Image Based on Its Value Messages
Eva POLIAKOVÁ, Anežka HAMRANOVÁ, Blandína ŠRAMOVÁ

Schools as Institutes of Acculturation: A Question of Belonging
Maura SELLARS

School-Work Alternating In Italy: A Critical Study
Francesca SARTORI, Carlo BUZZI

Self-Correcting Mechanism in Education: A Mechanism to Improve Reading a Language Taken Online
Nabil Al-AWAWDEH

Self-Efficacy Study of Computer Science Engineering Students
Ildikó HOLIK

Semantic Translation of Selected Pun Words From the Holy Quran into English
Mohammed H. Al Aqad, Kulwindr Kaur, Ahmad Arifin Bin Sapaí, Kais Amir Kadhím, Nor Hazrul Mohd Salleh

Semi-Unplugged Tools for Building Algorithms With Sprego
Piroska BIRÓ, Mária CSERNOCH

Shooting Short Film as an Application of Values Education
Mustafa SOZEN

Skill Versus Content: Using Twitter in the Literature Classroom
Zainor Izat ZAINAL, Ann Rosnida Mohd DENí

Social Competence, Hope for the Success and Participation in Popular Culture of Polish Students of Education and Special Education
Kamil KURACKI

Social Innovation in Small Schools in Thailand
Thanakorn SRIWIPHAT, Dawruwan THAWINKARN

South Korean University Students’ Views of Mobile-Assisted Language Learning
Andrea Rakushin LEE

Sound Creation and Artistic Language Hybridization Through the Use of the Collaborative Creation System: Soundcool
Noemy BERBEL-GÓMEZ, Adolf MURILLO-RIBES, Jorge SASTRE-MARTÍNEZ, María Elena RIAÑO-GALÁN

Status and Improvement of Human Rights Education for Police in Korea
Chong, SANGWOO, Kang, EUNYEONG, Han, HWAERYEON

Students’ Game Playing Preferences And Personality Traits
Simon SO

Study About the Perception of Basic Digital Competences of Students of a Chilean University
Lagunes Dominguez AGUSTIN, Judikis Preller Juan CARLOS, Torres Gastelú Carlos ARTURO, Flores García María ALICIA
Study Collocations Through Language Corporuses
Leila Yu. MIRZOYEVA, Khafiza A. ORDABEKOVA

Study on Continuous Training for University Teachers: Analysis of Training Programmes
Josué ARTILES-RODRÍGUEZ, Josefa RODRÍGUEZ-PULIDO, Arminda ALAMO-BOLAÑOS, Victoria AGUIAR-PERERA

System Architecture of Business Intelligence to Aun-Qa Framework for Higher Education Institution
Thada JANTAKOON, Panita WANNAPIROON

System of Continuous Professional Development for Language Teachers in Kazakhstan: Issues and Perspectives
Oxana SYURMEN, Maira ZHOLSHAYEVA

Systemic Approach in “Mother-Child Home” Projection in Education
Leyla SURI