World Transactions on Engineering and Technology Education
Vol.14, No.1, 2016
© 2016 WIETE

Profiling an inquiry-based teacher in a technology-intensive open learning environment

Stanislav Avsec

University of Ljubljana
Ljubljana, Slovenia

ABSTRACT: The aim of this study was to investigate how teacher learning and leadership styles, creativity and attitudes toward technology impact on middle school students' engagement and efficacy in inquiry-based learning (IBL). The role of the teacher in such a setting differs from traditional teaching approaches, and requires pedagogies and context mapping that foster students' construction of their knowledge through inquiry, exploring, explaining, modelling, expanding and finding their own path to effective solution. For the purpose of this study, a 3-year pedagogical experiment in an IBL technology-intensive open learning course was used. From 2013 to 2015, fifteen middle schools around Slovenia were involved and six inquiry-based teachers were profiled. Effective data from 232 participants were collected and subjected to a two-way ANOVA and multiple regression analysis. The results indicated that an activist teacher with a *laissez-faire* leadership style, cluster thinking and of high creativity as an accommodator significantly affects students' engagement in IBL and impacts on the development of students' technological literacy.

INTRODUCTION

Contemporary technology and engineering education demands more student-led instruction and peer-scaffolded learning to create an environment that challenges students to create, discuss, and critique explanations and conjectures. Inquiry-based learning (IBL) promotes increased levels of metacognition among students, which has been linked to improvements in both content knowledge and problem-solving ability. IBL as an inductive approach has been proved to be an effective teaching strategy in which the teacher's guidance is necessary [1]. The role of the teacher in IBL differs markedly from those in traditional teaching/learning strategies or pedagogies. Moreover, an inquiry-based teacher serves as a facilitator, working with student groups, if they need help, and addressing class-wide problems when necessary [2]. She/he also supports students in connecting former knowledge and experiences with the problems learners have, designing procedures and/or plans to find an answer to the problem, investigating phenomena through conjecture, constructing meaning through use of logic, evidence and reflection [1].

Several researchers reported the importance of inquiry-based teacher knowledge models and knowledge domains' interactions, where the teacher's self-efficacy, leadership styles and attitude towards technology were found to be an important domain [3-5]. In spite of several studies, a clear visualisation of the inquiry-based teacher's behaviour for effective IBL is still lacking. Between 2013 and 2015, the Chain Reaction project [1] was organised and IBL of science and technology subject matter was conducted in fifteen middle schools around Slovenia. Students were tasked with four topics, one of which was an engineering subject matter of water turbine optimisation. Inquiry-based teachers engaged in an IBL process were carefully selected to improve students' achievements in IBL. A teacher's subject matter knowledge (SMK), pedagogical content knowledge (PCK), self-efficacy (SEF) and attitude toward technology (ATT) guide a teacher's behaviour in the classroom [3], and have an impact on student scaffolding learning in technology-intensive open learning systems [5].

Teacher Profiling

SMK was found to be a crucial teacher knowledge domain [3]. SMK affects all SEF, PCK and ATT. Weak evidence was found that PCK affects SEF, which markedly affects a teacher's ATT [3]. Teachers' diversities have been shown in their approaches to learning, learning styles and in their intellectual ability [6]. Teaching style consists of a teacher's personal behaviours and the media used during interaction with learners [4] and it is mostly related to how the teacher behaves in respect to the instructional methods used. Teachers' ATT markedly affect students' ATT [3] [7] and students' ATT is positively correlated with their technological literacy (TL) [7].

Irrespective of a student's learning style, the teacher has a significant impact on the student's learning experience [4]. To date, no clear evidence was provided to what extent learning teacher styles match or mismatch with students learning styles. Nevertheless, it was argued that the teacher's behaviour can enhance student learning [3][4] and the teacher's leadership style can affect student outcomes [4]. Considering the fact of student-led instruction and/or peer scaffolding, manager leadership styles are more appropriate to enhance organisational effectiveness [8][9]. Teacher leadership is the process by which teachers influence teaching/learning process stakeholders to improve teaching and learning practices with the aim of increased student learning and achievement [10]. Teacher leadership does not present authority or power. Moreover, it is about mobilising the still largely untapped attributes of teachers to strengthen student performance at ground level and working toward real collaboration, a locally tailored kind of shared leadership, in the daily life of the school [11]. Some evidence about the impact of teacher leadership style on students' learning was found; namely, that there are some indices that leaders contribute to student learning indirectly, through their influence on other people or features of their organisation [11]. Teacher leadership contributes to organisational learning (e.g. collaborative climate, taking initiatives and risks, improving practices, professional development), which, in turn, influences the student outcomes of participation and engagement [12]. IBL as an organisational context can be affected by transformational, transactional and *laissez-faire* teacher leadership style [9]. Impacts of leadership styles on effectiveness of IBL in open learning setting have not been tested yet, and no conclusive evidence was found to support a positive correlation between student achievement and teacher leadership.

Teachers' creativity seems to be an important influencer of the students' creative ability and learning achievements [13]. Creative ability is a crucial factor in students' capacity to solve problems, develop research skills and to improve their critical thinking and decision making ability [14]. There is still a lack of clear evidence about how a teacher's creativity affects IBL, and in turn, students' learning gain. IBL itself is student-centred approach, where a teacher acts more as a guide or a manager rather than as a traditional instructor. Kolb described four management categories related to the teacher learning styles, where the most creative divergent teachers possess human resource management characteristics, the most convergent teacher holds engineering characteristics, while theorists have a positive attitude to finance and research [8]. Global and cluster thinkers of accommodating style prefer more marketing tasks and try to involve marketing management in their teaching/learning process [8]. To facilitate students' engagement in IBL, the layout of the classroom has to be changed from the traditional design to a new user-centred design [15], which also enhances interactions for collaborative and cooperative learning and creative ability development [14].

Against this background, the questions explored in this study are:

- What are the most important teacher's profiling categories?
- Do profiled teachers impact on students' IBL desirable outcomes - TL in its dimensions?
- What is the level of students' and teachers' perceived ATT and how does ATT interact with TL as an outcome?

METHODS

Course Format

The course format of IBL of water turbine optimisation has been described elsewhere [1]. The course was designed and teacher didactical preparation was prepared in accordance with IBL requirements. Selected teachers used the same preparation and they conducted a course following the same learning objectives, context, content, organisation structure using the extended 7E model of IBL designed by Avsec et al (2014) [5]. Editing course settings was not allowed.

Samples

Selection of inquiry-based teachers to participate in the study was based on six criteria. First, for each IBL season there must be two teachers per topic. Second, each teacher was required to have a technology education diploma and no previous exposure to any form of inquiry-based teaching as a Master degree student with zero years of job experience. Third, all IBL teachers were of the same sex. Fourth, all IBL teachers must have had the same grade point average from technology subject matter knowledge and pedagogical content knowledge subject matter. Fifth, every teacher dyad was of the same or markedly close learning style considering learning orientation, processing information, perceiving information and thinking style. Sixth, teachers' dyads must have the same attitude toward technology, leadership style and of level of creativity. In total, six teachers were involved in the study.

The student sample for this study consisted of middle school students from 15 Slovenian schools, aged 14 to 15 years. Pedagogical experiment was conducted from year 2013 to 2015, where five schools were engaged every year. A paper and pencil survey was distributed accordingly. Of the 244 enrolled students, 232 completed the surveys entirely (4.9% missing values, n = 12). The number of respondents in this study fulfilled the requirements of a multiple regression model with six independent variables, in which at least 146 participants are needed to make confident assumptions about any observed relationships [16]. The participant's sexes were almost evenly distributed 53% (n = 123) females and 47% (n = 109) males.

Instrumentation

Teachers' learning styles were successfully assessed with DLSI [6], while teachers' leadership styles were assessed with a newly developed 21-item test divided into 3 subscales; namely, transformational leadership - 12 items, transactional leadership - 6 items, and *laissez-faire* leadership - 3 items. For the assessment, a 6-point phrase completion scale was used as recommended [17][18]. The intervals of the scale together form a continuous type, from 0 (*never*) to 5 (*always*). It does not present the mean, but ensures the comparability of continuous responses and produces better assumptions of parametric statistics [17]. Creativity testing was done using the Adjective Check List test [19] with 30 items. In scoring a protocol, 1 point is given each time, one of the 18 positive items is checked, and 1 point is subtracted each time, one of the 12 negative items is checked. The theoretical range of scores presents -12 to 0 - low creativity, 0 to 9 - average creativity, and 10 to 18 - high creativity. Teacher attitude towards technology was surveyed with a reconstructed 25-item survey [20]. Instrument development was involved for six constructs: 1) technological career aspirations (TCA) - 4 items; 2) interest in technology (IT) - 6 items; 3) tediousness towards technology (TTT) - 4 items; 4) technology across the sex (TS) - 3 items; 5) consequences of technology (CT) - 4 items; and 6) technology/engineering study is difficult (TD) - 4 items.

For measuring course effectiveness pre- and post-technological literacy tests have been used, which is described elsewhere [1]. Item distribution was classified into three subscales: a) technological knowledge (TK); b) capacity of problem-solving and research (CA); and c) critical thinking and decision-making ability (CTDM). An optimisation of water turbine learning has been tested with 15-item test, 5 items in each subscale. The correct (best) answer (or combination) was scored as 1 point, while distracters were 0 points. A total score on test was 15.

As a measure of course effectiveness, the *average normalised TL gain* was calculated. The TL gain expressed with *g* in Equation (1), is defined as the average actual gain *G* divided by the maximum possible gain [21], i.e.:

$$\langle g \rangle = \langle G \rangle / \% \langle G \rangle_{max} = (\% \langle post \rangle - \% \langle pre \rangle)/(100 - \% \langle pre \rangle), \quad (1)$$

where *G* is the actual gain and % ⟨post⟩ and %⟨pre⟩ are the final (post) and initial (pre) class averages, and the angle.

In order to survey students' attitude toward technology, a reconstructed 25-item test of *Pupils Attitudes Toward Technology* [22] was used. The survey also included 10 questions on demographics. Demographic questions covered sex, age, family background and home education background. The Instrument developed in the Slovene version included six constructs, the same as for the aforementioned teachers. For the assessment, a 5-point phrase completion scale was used as recommended [17][18]. The new scale successfully substitutes and eliminates all limitations of the existing Likert scale. This research treated scale questions as being equal-interval, which enabled the investigation of the nominal properties (whether the responses are different), the ordinal properties (which response has the greater magnitude) and the interval property (the distance between two responses). The intervals of the scale together form a continuous type, from 1 (*very unlikely*) to 5 (*very likely*). It does not present the mean, but ensures the comparability of continuous responses [17].

The Cronbach's coefficient alpha values based on the samples of this study indicated that the developed instruments were reliable (Table 1), with all Cronbach's alpha values being > 0.60.

Table 1: Reliability information Cronbach's α on TL and *Technology and me* survey subscales.

TL test			Technology and me test subscale					
Year 2013	Year 2014	Year 2015	TCA	IT	TTT	TS	CT	TD
0.72	0.67	0.65	0.93	0.80	0.85	0.88	0.76	0.91

Procedure and Data Analysis

All teacher selection surveys were distributed to the teachers, collected and analysed. The selected teachers' base was upgraded every year, according to the selection rules. Teachers were acquainted with the IBL content and trained in an 8-hour introductory course. Students participated in the study during real-world classroom sessions throughout a 3-day open learning of water turbine optimisation course [1]. Individual or group administration and testing with one version takes 15-20 minutes. A pre-test and *Technology and me* survey were applied before the turbine optimisation open learning course on Day 1, while the post-test was used after Day 3, when the optimisation learning course had been accomplished entirely. The high response rate was obtained by the direct presence of the teacher, instructor and test administration. Data analysis was conducted using SPSS software. Descriptive analyses were conducted to present the student basic information, and the mean score of dependent variables. A two-way ANOVA analysis was conducted to find and confirm significant relationships within and between groups with an effect size calculated with eta squared. Multiple regression analyses were performed to investigate whether predictor variables significantly predict TL gain. Multivariate analysis to find and confirm significant relationships between groups with an effect size were conducted.

RESULTS

The findings are reported as descriptive analyses of different surveys' data, a two-way ANOVA analysis and multiple regression analyses. The first objective sought to describe selected teachers' profiles in order to find a justification for their attitude and self-efficacy differences, which could affect inquiry-based teaching (IBT) process. Selected teachers were all women, aged 23-24, with no experience in IBL or IBT. Inquiry-based teacher profiling considered all requirements and their profiles are shown in Table 2.

Table 2: Teachers' average ratings on profiling categories (n = 6).

Profiling categories	Year 2013		Year 2014		Year 2015	
	Prevailing profile	Average rating [/]	Prevailing profile	Average rating [/]	Prevailing profile	Average rating [/]
Learning styles	Activist	3.67	Pragmatist	4.33	Theorist	4.67
Thinking style	Cluster	3.67	Sequential	4.0	Sequential	4.33
Physical	Read/write	4.33	Visual	4.0	Visual	4.33
Sociological	Learning alone	5.0	Peer-oriented	3.33	Authority presents	3.33
Emotionality	Self-motivated	4.0	Other-motivated	4.0	Other-motivated	4.67
	Nonconformity	3.5	Nonconformity	1.5	Nonconformity	0.0
	Needs structure	2.67	Needs structure	4	Needs structure	4.33
Leadership style	Laissez-faire	4.33	Transformational	4.16	Transactional	4.25
Creativity	High	14	Average	4	Low	0

For every year's teacher group, profiles have been provided to supply grounded theory for the study. Teachers' average ratings of attitudes towards technology are shown in Figure 1.

The second objective sought to describe students' achievements in IBL course and to work out the effectiveness of the course. Inquiry-based teachers conducted their IBL of water turbine optimisation as a 3-day open learning course and students' achievements are shown in Table 3. Table 3 depicts the average students' scores on TL gain and its dimensions as the subscales where is *M*-mean and *SD*-standard deviation.

Table 3: Students' TL gain and its dimensions descriptive statistics across group of teachers.

TL dimension	Teacher group	*M (%)*	*SD (%)*	*n*
TL gain	Year 2013	22.12	15.51	91
	Year 2014	16.62	14.65	72
	Year 2015	12.03	18.65	69
	Total	17.41	16.72	232
TL_{TK} gain	Year 2013	31.83	33.02	91
	Year 2014	18.61	37.76	72
	Year 2015	15.10	50.48	69
	Total	22.75	40.84	232
TL_{CA} gain	Year 2013	21.85	28.65	91
	Year 2014	17.66	29.11	72
	Year 2015	13.96	30.27	69
	Total	18.20	29.35	232
TL_{CTDM} gain	Year 2013	10.33	27.25	91
	Year 2014	5.93	25.42	72
	Year 2015	1.62	27.32	69
	Total	6.37	26.82	232

Further descriptive analysis indicated that the test for homogeneity of variance was non-significant, meaning that the sample exhibited characteristics of normality required for analysis under the assumptions of the general linear model. The Levene's test for equality of variances achieved no statistical significance at either pre-test F (1,229) = 2.68 (p = 0.08 > 0.05) or post-test F (1,229) = 2.32 (p = 0.11 > 0.05). The Levene's test confirmed that the study sample did not violate the assumption of normality, which confirmed that the sample is normally distributed (p > 0.05). A two-way ANOVA was performed to test within subject contrasts how IBL enhances learning. Statistically significant impacts of IBL were found, F (2,229) = 9.61 (p < 0.01) with a moderate effect size $\eta^2 = 0.08$. The test of between-subjects effects revelled significant differences between the 3 groups of teachers IBL efficacy, F (1,229) = 2.71 (p = 0.04 < 0.05), $\eta^2 = 0.04$. However, this test combines the pre-test and post-test data for all groups. To find more evidence about particular teacher effects, TL gains (Equation (1)) were calculated to test differences between teacher groups and significant differences (p < 0.01) were found, F (2,229) = 7.67, effect size $\eta^2 = 0.07$. *A Tukey Post Hoc Test* shows that the significant difference (p < 0.05) was between the teacher 2013 group effects and the teacher 2015 group (a large effect size $\eta^2 = 0.15$), and between teacher 2013 group and teacher 2014 group (a moderate effect size $\eta^2 = 0.06$). The teacher effects were moderate both at TL_{CA} and TL_{TK} acquisition ($\eta^2 = 0.07$), while no significant differences (p > 0.05) were found for TL_{CTDM} acquisition. A paired sample t-test revealed significant (p < 0.05) effects of IBL improvement at all teachers group. Across the sexes no significant differences (p > 0.05) were found at TL, TL_{TK} and TL_{CA}, while at TL_{CTDM} a significant (p < 0.05) difference was found in that male students scored higher than female students, with a small effect size $\eta^2 = 0.02$.

The third objective sought to describe students' attitude toward technology, classified into six subscales, in respect of their achievements in acquiring TL. Figure 1 depicts both teachers' and students' attitudes toward technology. The students' perception toward technology seems to be not so positive considering the mid-point 3.

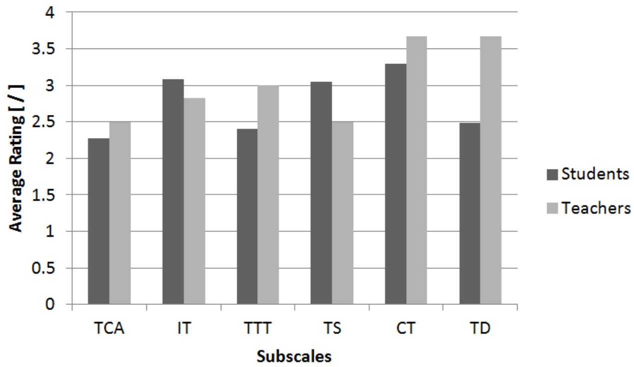

Figure 1. Students' and teachers' average ratings on *Attitudes Toward Technology* survey subscales with a mid-point 3.

Students seem to be aware of the consequences of technology on society and have a positive opinion about the importance of technology and engineering lessons in the regular curriculum. Students were still convinced that boys were more capable than girls at technological tasks or jobs. Surprisingly, students perceived a difficulty in technology and engineering as appropriate. Also, teachers' positive attitude toward interests in technology and engineering was lacking, along with their positive perception of technology/engineering jobs.

Multiple regression analysis was performed to see how much the independent variables could predict student TL gain. The result revealed that the combination of the independent variables significantly predicts student TL gain (F (6,225) = 22.09, p = 0.00 < 0.05). Students' attitudes toward technology contributing to course outcomes (TL gain) were investigated. A multiple regression analysis was carried out with the items of students' expectations as independent variables and TL gain and its dimensions as achievement variables as dependent variables. A linear relation between independent (predictor) and dependent (criterion) variables was assumed, meaning one could expect that increases in one variable would be related to increases or decreases in another one. Only regression coefficients (β - weights) with a significance of $p < 0.05$ were considered. Beta (β) weights describe the relation between a predictor and a criterion variable after the effects of other predictor variables have been removed. They ranged from -1 to 1 (0 means no relation at all; 1 or -1 mean that variations in one variable can be explained completely by variations in another). When interpreting results, one has to keep in mind that multiple regressions do not explain causes and effects but instead describe relations between variables or sets of variables. For all four course outcome variables, a satisfactory amount of variance can be explained by the six independent variables, Figure 2. A large amount of the variance in student TL, TL_{TK}, TL_{TC}, and TL_{CTDM} was accounted for by the predictor variables (65%, 26%, 30% and 20%, respectively). The explained variances were calculated using R^2 from path model where R^2 = 0.02 – a small impact, R^2 = 0.13 - a medium effect size, and R^2 = 0.26 presents a large effect size [23].

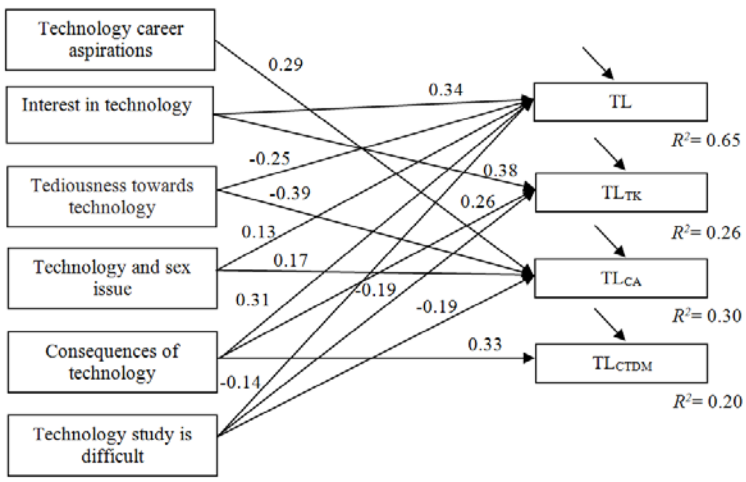

Figure 2: IBL achievements regressed on students' attitudes toward technology. All reported standardised regression weights are significantly different from zero (p < 0.01).

Students' attitude towards careers in technological and engineering jobs significantly (p < 0.05) predicts TL gain and its two dimensions of CA and CTDM. Students who had no interest for future engineering and technological jobs advanced less at TL. Students, who perceived importance of technology as high, advanced more at TL, TL_{TK}, and TL_{CTDM}. Surprisingly, their problem-solving capacity is not developed enough or their perceived self-efficacy is overestimated. A perception of the difficulty of technology caused problems in acquiring TL when they participated in

IBL courses. Surprisingly, students with a positive attitude to the male technological jobs advanced more at the technological knowledge dimension. Technology subject matter was perceived as important in middle schools, but these students markedly improved only their general TL and TL_{TK}, while a significant ($p < 0.05$) development of other TL dimensions still lacks.

CONCLUSIONS

Effective IBL is not a self-regulated process. Moreover, teacher involvement in terms of guidance and leadership is needed. Only well-profiled teachers can have a positive and marked impact on students' multifaceted achievements in an IBL environment. This study provided evidence that cluster thinking and creative activist with *laissez-faire* leadership style in peer scaffolding learning in the open learning environment have a positive impact on students' achievements and significantly differ from other teachers' profiles. It seems that a marketing-oriented IBL teacher more positively affects students' TL acquisition. Between-subjects analysis revealed markedly different impacts of each teacher group on students acquiring TL, TL_{TK}, TL_{CA}. Effect size was regarded as high and moderate, respectively. For acquiring TL_{CTDM} , more conceptual mapping is needed using means of research-based learning to enhance learning and to diversify teachers' profiles. Students' and teachers' ATT needs more attention in order to facilitate learning and teaching of technology/engineering subject matter. Further research is required in order to collect more data from larger technology teachers group, especially, teacher leadership styles impact on students' achievements need more evidence.

REFERENCES

1. Avsec, S. and Kocijancic, S., The effect of the use of an inquiry-based approach in an open learning middle school hydraulic turbine optimisation course. *World Trans. on Engng. and Technol. Educ.*,12, **3**, 329-373 (2014).
2. Marshall, J.C. and Horton, B., The relationship of teacher-facilitated, inquiry-based instruction to student higher-order thinking. *School Science and Mathematics*, 111, **3**, 93-101 (2011).
3. Rohaan, E.J., Taconis, R. and Jochems, W.M.G., Analysing teacher knowledge for technology education in primary schools. *Inter. J. of Technol. and Design Educ.*, 22, **3**, 271-280 (2012).
4. Yildirim, O., Acar, A.C., Bull, S. and Sevinc, L., Relationship between teachers' perceived leadership style, students' learning style, and academic achievement: a study on high school students. *Educational Psychol.*, 28, **1**, 73-81 (2008).
5. Avsec, S., Rihtaršič, D. and Kocijancic, S., Students' satisfaction with an INFIRO robotic direct manipulation learning environment. *World Trans. on Engng. and Technol. Educ.*,12, **1**, 7-13 (2014).
6. Avsec, S. and Szewczyk-Zakrzewska, A., How to provide better knowledge creation and diffusion in mechanical engineering: the DLSI as a vehicle. *World Trans. on Engng. and Technol. Educ.*,13, **3**, 280-285 (2015).
7. de Vries, M.J., *Technological Knowledge and Artifacts: an Analytical View*. In: Dakers, J.R. (Ed), Defining Technological Literacy: towards an Epistemological Framework. New York: Palgrave Macmillan (2006).
8. Kolb, D.A, Management and the learning process. *California Manage. Review*, 18, **3**, 21-31 (1976).
9. Michie, J. and Zumitzavan, V., The impact of *learning* and *leadership* management styles on organizational outcomes: a study of tyre firms in Thailand. *Asia Pacific Business Review*, 18, **4**, 607-630 (2012).
10. York-Barr, J. and Duke, K. What do we know about teacher leadership? Findings from two decades of scholarship. *Review of Educational Research,* 74, **3**, 255-316 (2004).
11. Harris, A., Teacher leadership: more than just a feel-good factor? *Leadership and Policy in Schools*, 4, **3**, 201-219 (2005).
12. Mulford, B. and Silins, H., Leadership for organizational learning and improved student outcomes - what do we know? *Cambridge J. of Educ.*, 33, **2**, 175-195 (2003).
13. Szewczyk-Zakrzewska, A., Creative potential of young engineers - preliminary results of examinations. *World Trans. on Engng. and Technol. Educ.*,12, **3**, 468-472 (2014).
14. Szewczyk-Zakrzewska, A., Can creativity be taught? The case study of chemical engineers. *World Trans. on Engng. and Technol. Educ.*,13, **3**, 382-386 (2015).
15. Pusca, D. and Northwood, D.O., How to engage students in the context of outcome-based teaching and learning. *World Trans. on Engng. and Technol. Educ.*,13, **3**, 268-273 (2015).
16. Stevens, J., *Applied Multivariate Statistics for the Social Sciences.* (5th Edn), New York, NJ: Routledge, Taylor & Francis Group (2009).
17. Dawes, J., Do data characteristics change according to the number of scale points used? An experiment using 5-point, 7-point and 10-point scales. *Inter. J. of Market Research,* 50, **1**, 61-77 (2008).
18. Allen E. and Seaman, C., Likert scales and data analysis. *Quality Progress,* 47, **7**, 64-65 (2007).
19. Gough, H.G. and Heilbrun, A.B., *Adjective Check List Manual.* Palo Alto, CA: Consulting Psychologists Press (1980).
20. Ardies, J., De Maeyer, S. and Gijbels, D., Reconstructing the pupils attitude towards technology - survey. *Design & Technol. Educ.*,18, 1, 8-19 (2013).
21. Hake, R.R., Interactive-engagement vs traditional methods: a six-thousand-student survey of mechanics test data for introductory physics courses. *American J. of Physics*, 66, **1**, 64-74 (1998).
22. Bame, E., Dugger, W., de Vries, M. and McBee, J., Pupils' attitudes toward technology - PATT-USA. *J. of Technol. Studies*, 19, 40–48 (1993).
23. Cohen, J., Cohen, P., West, S.G. and Aiken, L.S., *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences.* (3rd Edn), Mahwah, New Jersey: L. Erlbaum (2003).