

Pupil's Assessment of Teaching and of Him/Herself as Learner – Relevant Items in the Teacher's Creation of Effective Learning Environment

Milena Valenčič Zuljan
Faculty of Education, University of Ljubljana

Abstract

The beginning of the 21st century is marked by numerous social and economic changes, new knowledge about learning and findings of various meta-analyses on efficient teaching, reforms, innovations, heterogeneous classes and intercultural schools as well as high expectations of teachers and schools. Hence, teachers are coping with new challenges.

It is important that a teacher can create an effective learning environment and adapt teaching to pupils. The article presents the results of the research carried out on a sample of 577 pupils of the ninth grade of primary schools in Slovenia focusing on teaching mathematics and Slovenian language. We wanted to reveal how pupils estimated teaching and themselves in the role of learners and if they statistically significantly differed in subject marks and gender. The research results showed that learning differentiation and individualization were not adequately performed from two points of view: directly by low evaluation by pupils' estimation of teaching and indirectly by significant differences in all factors between genders and, to a smaller extent by different achievements of pupils.

Key words: *differentiation and individualization; encouragement of pupil's thinking; gender; pupil's activity in teaching; subject grades.*

Introduction

European countries have so far encountered diverse challenges in the social, cultural, economic and technological areas. Though the reactions of countries and

international organizations to economic and social changes are distinctive, all have noted the important role of education (Buchberger et al., 2001). The entry into the 21st century implies, besides numerous social and economic changes, new knowledge about learning (Hinton & Fischer, 2010) and findings of various meta-analyses on efficient teaching (Marzano, 2000; Walberg, 2003; Hattie, 2009), numerous reforms and innovations (Fullan, 2007; Resnick et al., 2010), international comparisons (PISA ...) and heterogeneous classes, multiculturalism in schools and rapid development of ICT. Broad access to ICT changes socialization of people and meetings as well as possibilities of informal learning (Dumont & Istance, 2010) in addition to new possibilities for pupils' activities throughout teaching (Mayer, 2010).

Dumont and Istance (2010) contemplate how schools meet the above requirements of the 21st century. The key question is what teaching should look like when present-day net-generations of pupils will be ready for self-lifelong learning and quality personal life in addition to constructive collaboration. Several studies on learning and meta-studies on teaching efficiency emphasize the formation of efficient and innovative learning environments (Dumont & Istance, 2010), which we will highlight from five aspects.

In the Effective Learning Environments, It Is Important to Know Each Individual and Perform Differentiation and Individualization

The focus on an individual could provide optimum conditions for the learning and progress of each pupil. It is important that teachers sympathetically observe differences among pupils relating to foreknowledge, abilities, interests, motivation, learning styles, beliefs in self-efficacy, expectations of themselves and education, besides the linguistic, cultural and social background of each pupil. Effective teaching certainly depends on a teacher's knowledge and consideration of pupils' foreknowledge. Teachers should not pay attention to the "quantitative dimension" about what a pupil knows and what (s)he does not know but they should concentrate on the "quality of pupil's foreknowledge", his/her views and experiences (Valenčič Zuljan, 2002). The quality of the teaching process depends on teacher awareness of foreknowledge of each pupil and his/her family including learning sources that are available within the family environment and not only in school (Schneider, Keesler, & Morlock, 2010). Focusing on an individual means neither less demanding lessons and creation of friendly teacher-pupil relations that would impede educational formation of an individual nor funny teaching. The main objective of individualization and differentiation is efficient learning and teaching.

Effective Teaching Environments Are Aimed at Promoting Optimal Mental and Emotional Activity in Each Pupil

Thus, a teacher should be qualified to carry out several teaching activities, varying from systematic indirect teaching to open project, metacognitive teaching and other methods that enable independence and innovativeness. A didactic principle of activity (Strmčnik, 2001) requires utmost stimulation of a pupil's mental activity, which is accentuated by the cognitive-constructivist teaching model. Based on pupil's

explanations and views, a teacher creates situations of socio-cognitive conflict in which (s)he faces pupils' ideas and thoughts with failures and conflicts (e.g. science and technology) on the one hand, and with diversity of opinions of classmates, public, experts ... (e.g. social sciences and humanistic fields) on the other (Valenčič Zuljan, 2002). The objective of teaching should not only be the formation of situations of cognitive conflict where pupils are left on their own; moreover, an important phase of support or scaffolding should follow (Wang & Palinscar, 1989). The creation of an efficient teaching environment that stimulates pupil's activity, therefore, depends on the permanent expert reflection of how to balance teacher's external regulation with pupil's self-regulation and how to contribute to the formation of the so-called "suitable cognitive burden" that stimulates efficient learning (Schmidt, Loyens, van Gog, & Paas, 2007, as cited in De Corte, 2010).

Effective Learning Environments Create Collaborative Learning and a Collaborative Climate

Properly organized collaborative teaching intensifies cognitive activity of each pupil, hence pupils develop social and communication skills (Peklaj et al., 2009; Slavin, 2010); nevertheless, the integration of students and community development are important as well. De Corte (2010) notes that construction of individual's knowledge demands interactions, negotiations and collaboration. The inclusiveness of teacher is important, thus, (s)he should recognize differences between individuals and groups as well as accept the weakest pupils and vulnerable groups. Effective learning environments require meaningful upgrading of an individual, teacher-centred approach and group work as forms of learning, sprinkling of pupil's independent work with group work, team collaboration among teachers and other experts along with the creation of partnership between the school and the broader environment.

Effective Learning Environments Promote Innovativeness and Openness and Include Authentic Problems and Different Ways of Research

The use of knowledge in diverse circumstances, the opportunity for experiencing new and unknown problems is one of the key characteristics of competences for the 21st century. Hence, critical intelligence, research attitude and solving authentic problems should be promoted in teaching, including horizontal connection among curriculum subjects on the one hand and the school and the broader environment on the other.

Effective Learning Environments Promote Learning of Learning and Conceive the Independence of Pupils

A special emphasis is put on planned development of metacognitive abilities of pupils that enables control, evaluation and optimization of knowledge acquisition and usage (De Corte, 2010). This represents the basis of independent and active learning for all pupils.

Definition of Problem and Methodology

We wanted to know what kind of teaching pupils received and to what extent were some characteristics, as described in the introduction to learning environments according to pupil's assessment, present in teaching. We also wanted to reveal how pupils estimated themselves in the role of learners.

Research Questions

- How do pupils estimate teaching; do pupils statistically significantly differ in their estimation of teaching with respect to gender and subject grades?
- How do pupils estimate themselves in the role of learners; do pupils statistically significantly differ in their estimation of themselves in the role of learners with respect to gender and subject grades?

Basic Research Method

We used descriptive and causal-non-experimental educational research methods.

Sample

In the study, which was part of a wider national project, 577 pupils from the ninth grade of primary schools from Slovenia participated in the research. Half of them responded for the subject Mathematics and the other half for the subject Slovenian Language. There were 298 girls and 254 boys in the sample. In the first phase of the two-stage sampling, the schools were selected relating to the teaching of Mathematics and Slovenian Language in the ninth grade in the homogeneous and heterogeneous groups, respectively (criterion of differentiation) and in the second phase, schools were selected at random.

Collection and Analysis of Data

Data were collected by means of a questionnaire with two estimation scales: a) pupil's assessment of teaching and b) pupil's assessment of him/herself in the role of a learner. Pupils evaluated items on a 5-point scale: 1 – certainly not true; 2 - usually not true; 3 – neither true nor untrue; 4 – quite true; 5 – very true.

Table 1

Initial solution of factor analysis (principal component analysis – PCA) for the scale "pupil's assessment of him/herself in the role of a learner"

Factors	Value λ	explained variance %	cumulative variance %
F1a	10.299	18.068	18.068
F2a	4.507	7.907	25.975
F3a	2.474	4.341	30.316
F4a	2.165	3.798	34.114
F5a	2.030	3.562	37.676
F6a	1.758	3.084	40.759
F7a	1.676	2.941	43.700
F8a	1.352	2.372	46.072

For the 55 variables that were related to the *pupil's assessment of him/herself in the role of a learner*, we considered Gutman-Kaiser criterion ($\lambda > 1$) and obtained 15 common factors which explained 60% of variance. In agreement with specific values of factors, Scree diagram and the possibility of their content definition, we chose 8 factors for interpretation. This was the basis for the definition of chosen estimation scale as adequately valid (the first factor explains 18% of common variance) and reliable (according to $r_{tt} \geq \sqrt{h^2}$ for $r_{tt} = 0.68$). Furthermore, the factors represented variables. The factors were named as follows: F1a – assessment of pupil's learning efforts; F2a – degree of self-awareness; F3a – relations among pupils; F4a – teacher-pupil relation; F5a – attitude towards subject; F6a – assessment of usefulness of knowledge; F7a – learning of learning and F8a – attitude towards education. The factor structure matrix is shown by factors in Tables 3 to 8.

Table 2

Initial solution of factor analysis (principal component analysis – PCA) for the scale "pupil's assessment of teaching"

Factors	Value λ	explained variance %	cumulative variance %
F1b	6.340	33.367	33.367
F2b	1.676	8.821	42.188
F3b	1.153	6.070	48.258
F4b	1.034	5.442	53.699

For the 19 variables that were related to the pupil's assessment of teaching we considered Gutman-Kaiser criterion ($\lambda > 1$) and obtained 4 common factors which explained 54 % of variance. The first factor explained 33 % of variance. This was the basis for the definition of chosen estimation scale as adequately valid and reliable (according to $r_{tt} \geq \sqrt{h^2}$ for $r_{tt} = 0.68$). These factors represented variables. The factors were named as follows: F1b – teacher's stimulation of pupil's activity; F2b – individualization of teaching; F3b – connection of subject with life and other subjects, F4b – stimulation of thinking.

The following statistical procedures were used:

- factor analysis (principal component analysis – PCA);
- analysis of variance: whenever the homogeneity of variances was not justified, we used the results of Welch's F test;
- t-test for independent samples; whenever the homogeneity of variances was not justified we used approximate t-test.

Results and Interpretation

Pupil's Assessment of Teaching

The factor (F1b) "Teacher's stimulation of pupil's activity and participation in teaching" consists of 13 items that have proved to be efficient teaching factors in previous studies (consideration of pupils' foreknowledge, hints, feedback during lessons on subject matter, homework, modelling, regular appraisal of pupils'

Table 3

The final solution of factor analysis after Varimax rotation and a survey of structural shares (%) of pupils relating to their assessment of significance of statements according to four factors from the scale "pupil's assessment of teaching"

Factor structure (a>0.30)	a>0.30	f% pupil's assessment (from 1 to 5) and mean M of estimations					
		1	2	3	4	5	M
Teacher's stimulation of pupil's activity and participation in teaching (F1b)							
1. The teacher stimulates each pupil to achieve good results	0.778	9.8	35.9	13.3	15.5	25.4	3.11
2. The teacher includes all pupils in answering the questions.	0.757	16.6	21.3	24.4	17.2	20.5	3.03
3. The teacher awards all pupils who solve the task correctly.	0.730	6.8	30.9	26.4	15.7	20.1	3.12
4. In knowledge assessment, the teacher explains my mistakes and instructs me how to improve my knowledge.	0.628	30.7	16.2	25.1	16.6	11.4	2.62
5. The teacher stimulates cooperation among pupils.	0.624	31.3	12.7	31.6	15.5	8.9	2.58
6. The teacher always clearly explains what we should know.	0.623	30.9	11.0	22.6	17.5	18.0	2.81
7. The teacher maintains our attention throughout the lesson.	0.622	9.3	34.3	26.0	16.8	13.5	2.91
8. If we do not understand the subject matter, we can ask the teacher.	0.571	53.7	0.8	4.6	11.3	29.7	2.62
9. I understand the teacher's explanation of the subject matter.	0.568	1.0	2.9	15.7	46.0	34.3	4.10
10. We always check our homework.	0.554	31.9	9.2	20.6	15.8	22.5	2.88
11. Before new subject matter is taught, the teacher examines our foreknowledge.	0.520	16.5	40.1	15.3	17.5	10.6	2.66
12. The teacher adapts the explanation of the subject matter to each pupil's abilities.	0.417	4.6	19.1	27.6	28.4	20.2	3.40
13. The teacher encourages asking questions if we want to know more about the subject matter.	0.308	3.4	8.6	23.9	33.5	30.7	3.80
M							<u>3.0</u>
Differentiation and individualization (F2b)							
1. Pupil who solves the tasks earlier gets more tasks that are complex.	0.839	11.0	25.0	33.8	19.8	10.4	2.94
2. Pupil who solves tasks earlier gets more tasks that are equally complex.	0.820	8.5	26.5	35.8	20.8	8.3	2.94
3. When repeating the subject matter, pupils solve tasks of different difficulty regarding the subject grade.	0.554	16.7	19.2	26.0	21.4	16.7	3.02
M							<u>2.96</u>
Interdisciplinary approach and actualisation of subject matter (F3b)							
1. The teacher connects mother tongue/ mathematics with other curriculum subjects.	0.756	31.9	25.4	28.3	8.5	5.8	2.31
2. The teacher connects the subject matter with examples from life.	0.628	4.9	13.4	34.4	30.2	17.1	3.41
M							2.86
Stimulation of pupil's thinking (F4b)							
1. During the lesson, we solve difficult tasks where we have to think.	0.817	1.6	4.4	26.4	39.3	28.4	3.88

understanding, stimulation of interpersonal cooperation among pupils ...). The sum of estimations 1 and 2, and 4 and 5 for some items shows that estimations 4 and 5 are present only in three items. Those items are: I understand the teachers' explanation (80.3% : 3.9% estimations 1 and 2); the teacher encourages asking questions if we find the subject matter interesting (64.2% : 12.0% estimations 1 and 2); the teacher adapts the explanation of the subject matter to pupils' abilities (48.6% : 23.7%. estimations 1 and 2). In nine items, estimations 1 and 2 prevail. In four items, the negative trend is slighter: the inclusion of each pupil to tell his/her answer (37.9% and 37.7%); stimulation of each pupil to achieve good results (45.7% : 40.9%); regular checking of homework (41.1% : 38.3%). The following 7 items show a higher difference: award for pupils who solve the tasks well (37.7% : 35.8%); during examination of knowledge the teacher explains the mistakes (46.9% : 28%); stimulation of pupils for interpersonal cooperation (44% : 24.4%); the teacher clearly explains what we should know (41.9% : 35.5%); if we do not understand the subject matter, we can ask the teacher (54.5% : 41%); the teacher maintains our attention throughout the lesson (43.6% : 30.3%).

The factor (F2b): "Differentiation and individualization" consists of 3 items ($M=2.96$). The above table shows that the first estimation is 3 in all of the items. The comparison of sums of estimations 1 and 2, and 4 and 5 shows that in all items the estimations 4 and 5 prevail in solving additional more complex tasks (36% : 30.2%), additional equally complex tasks (35% : 29.1%); as in solving variously complex tasks relating to the subject grade (38.1% : 35.9%).

The factor (F3b) "Interdisciplinary approach and actualisation of the subject matter (F3b)" consists of 2 items ($M=2.86$). Interdisciplinary approach is rare in teaching. 57.3% of pupils chose estimations 1 and 2, and only 14.3% estimations 4 and 5. 47.3% of pupils (sum of estimations 4 and 5) state that the teacher connects the subject matter with examples from life.

The factor (F4b) "Stimulation of pupil's thinking" concerns one item. The opinion that throughout lessons pupils solve difficult tasks in which they should think was expressed by 67.7% of pupils (sum of estimations 4 and 5).

Pupil's Assessment of Teaching Relating to Gender and Subject Grade

Table 4

Results of the t-test of differences in factors extracted in the evaluation scale "assessment of teaching" relating to the gender

Assessment of teaching	Gender	Number	Arithmetic mean	Standard deviation	Test of homogeneity of variances	t - test of differences of arithmetic means
		N	M	SD	F p	t p
F1b	Female	331	0.093	0.926	7.808	2.260
	Male	221	-0.084	1.069	0.005	0.024
F2b	Female	331	-0.076	0.972	0.523	-1.784
	Male	221	0.062	1.030	0.470	0.075
F3b	Female	331	0.094	0.997	0.001	2.038
	Male	221	-0.064	0.999	0.981	0.042
F4b	Female	331	0.115	0.930	3.667	3.508
	Male	221	-0.156	1.042	0.056	0.000

By gender, pupils statistically significantly differ in three out of four factors, namely in estimation of teacher's stimulation of activity and cooperation of pupils (F1b) ($p=0.024$); in interdisciplinary connections and actualization of the subject matter (F3b)($p=0.042$), and in teacher's stimulation of pupil's thinking (F4b)($p=0.000$). The girls estimate all three factors statistically significantly higher.

Table 5

Results of the analysis of variance differences in factors extracted in the scale "pupil's assessment of teaching" regarding the pupil's subject grade

Assessment of teaching	subject grade	Number N	Arithmetic mean	Standard deviation	Test of homogeneity of variances		Test of arithmetic means	
			M	SD	F	P	t	P
F1b	2	59	-0.326	1.172	2.843	0.037	3.387 Welch	0.019
	3	124	0.068	1.083				
	4	201	0.110	0.974				
	5	193	0.197	0.861				
F2b	2	59	0.275	0.957	0.854	0.465	10.876	0.000
	3	124	0.371	0.878				
	4	201	-0.067	0.979				
	5	193	-0.299	0.974				
F3b	2	59	-0.037	0.979	1.243	0.294	0.155	0.927
	3	124	-0.081	0.978				
	4	201	0.010	0.969				
	5	193	-0.018	1.061				
F4b	2	59	-0.474	1.157	1.264	0.286	10.945	0.000
	3	124	-0.375	0.960				
	4	201	0.001	0.930				
	5	193	0.218	0.917				

By achievement gain, pupils statistically significantly differ in one of four factors. The review of arithmetic means of factors (F1b) and (F4b) shows that pupils with a higher subject grade estimate that teachers stimulate them to actively collaborate and are statistically significantly more likely to receive incentives for reflection.

Pupil's Assessment of Him/Herself in the Role of a Learner

Table 6

Final solution of factor analysis after Varimax rotation and review of structural shares (%) of pupils relating to their estimation of significance of statements according to eight factors from the scale "pupil's assessment of him/herself in the role of a learner"

Factor structure ($a>0.30$)	$a>0.30$	f% pupil's assessment (from 1 to 5) and arithmetic means M of estimates					M
		1	2	3	4	5	
Pupil's assessment of self-effort at learning (F1a)							
1. I want to understand the subject matter well.	0.662	2.2	3.8	16.7	36.5	40.8	4.10
2. I am ready to do my best for a good grade.	0.632	1.3	4.6	17.8	37.2	39.1	4.08
3. I do my homework carefully.	0.622	26.2	18.3	28.2	15.3	12.0	2.69
4. I am going to do my best to have good marks this year.	0.613	0.6	1.4	9.8	30.2	58.0	4.44

5. If I cannot solve the task, I persevere until I come to a solution.	0.581	35.1	18.4	29.7	11.6	5.2	2.33
6. I often give the answer, solution at teaching.	0.524	1.8	8.5	23.9	30.7	35.0	3.89
7. I think that homework is very important for good knowledge.	0.478	22.2	33.4	13.8	16.7	13.9	2.67
8. I can study Slovenian language/mathematics successfully.	0.478	3.1	9.0	23.6	32.8	31.4	3.81
9. If I try hard, I can do all schoolwork.	0.456	13.7	36.6	10.3	16.0	23.4	2.99
10. When I set a goal, I usually realize it.	0.411	38.7	15.9	10.5	20.7	14.2	2.56
11. I learn about different ways of writing/calculating in class.	0.358	39.3	4.9	13.3	24.2	18.4	2.81
M							3.3
Pupil's assessment of the degree of (un)certainty(F2a)							
1. Even if I have my opinion, I am too scared to say it.	0.797	17.6	20.5	26.7	22.7	12.4	2.92
2. I am afraid to make a fool of myself when I am in front of the blackboard.	0.744	14.1	16.8	19.9	26.7	22.5	3.27
3. I am concerned that I won't meet expectations of others.	0.680	8.8	16.1	27.3	27.3	20.5	3.34
4. I am afraid of examinations.	0.551	6.5	12.4	26.1	28.5	26.5	3.56
5. Nerves hinder me at questioning, so that I cannot show my knowledge.	0.525	12.3	22.8	29.5	22.2	13.2	3.03
6. If I get a bad mark, I do not see the way out.	0.521	42.6	27.3	24.9	3.3	1.9	1.95
M							3.01
Pupil's assessment of relations among pupils (F3a)							
1. We are friends in our class.	0.709	2.4	9.2	23.8	27.4	37.2	3.88
2. I feel good in the class.	0.647	17.9	20.6	18.5	20.2	22.7	3.09
3. If a classmate is in trouble, we are ready to help him/her.	0.615	1.7	4.2	21.9	34.2	37.9	4.02
4. Classmates help each other in studying	0.614	3.9	10.7	20.7	24.7	40.0	3.86
5. Classmates consider my suggestions and ideas.	0.568	3.3	11.1	30.9	34.6	20.0	3.57
6. We do not mock anybody in our class.	0.521	8.0	15.8	25.4	26.2	24.7	3.44
7. I feel good in school.	0.513	7.8	16.4	25.5	30.5	19.9	3.38
M							3.61
Pupil's assessment of teacher-pupil relation (F4a)							
1. The teacher shows interest in each pupil's opinion and experiences.	0.707	2.1	5.2	23.8	41.0	27.9	3.87
2. The teacher can establish order in the classroom.	0.704	11.7	43.9	7.7	12.8	23.9	2.93
3. The teacher respects each pupil.	0.657	3.3	4.1	13.0	30.6	49.0	4.18
4. If I fail an examination, I think that it is all the teacher's fault.	-0.559	22.9	23.9	20.6	16.4	16.1	2.79
M							3.44
Pupil's assessment of attitude towards the subject (F5a)							
1. I think I do not have problems in secondary school.	0.737	2.6	8.7	27.0	31.3	30.4	3.78
2. I think I am capable.	0.692	9.6	16.7	27.7	24.8	21.2	3.31
3. Slovenian language/mathematics is interesting for me.	0.465	25.5	13.8	20.9	14.3	25.5	3.01
4. I spend a lot of time studying.	-0.448	6.0	14.4	32.3	29.4	17.9	3.39
5. I am relaxed during lessons.	0.391	2.2	4.9	16.2	28.7	48.0	4.15

M							3.52
Pupil's assessment of usefulness and application of knowledge of Slovenian language/mathematics (F6a)							
1. Knowledge is useful for everyday life.	0.707	2.1	5.1	17.8	35.3	39.7	4.05
2. Knowledge that I gain in school will be helpful in my life.	0.690	9.9	14.3	25.0	27.7	23.0	3.40
3. I develop creativity in Slovenian language/mathematics.	0.524	8.6	19.5	35.7	24.0	12.2	3.12
4. I think I will be successful in my profession.	-0.336	1.7	2.8	11.9	37.5	46.1	4.23
M							3.7
Pupil's assessment of learning (F7a)							
1. Before learning a certain subject matter, I make a plan how to solve tasks and I plan learning time.	0.649	8.4	13.2	21.1	23.9	33.4	3.61
2. When I get the results of my examination paper, I check my mistakes and I try to learn better.	0.598	8.4	15.8	28.2	27.2	20.3	3.35
3. Before the assessment of knowledge, I check my knowledge myself.	0.590	3.1	10.5	24.0	36.2	26.1	3.72
M							3.56
Pupil's assessment of attitude towards education (F8a)							
1. Parents think that education is important for success in life.	0.727	0.4	1.6	7.0	20.6	70.5	4.59
2. Parents think that it is important to have a good mark in Slovenian language.	0.653	34.6	11.3	15.3	21.3	17.4	2.76
3. Education is important for my success in life.	0.528	2.2	2.2	13.0	28.7	53.9	4.30
M							3.88

The first factor (F1a) "Pupil's assessment of self-effort at learning" consists of 11 items that refer to pupil's effort, persistence, focus on understanding, etc. Items in which arithmetic means are above 4 relate to pupil's efforts to gain good subject grades in the present school year and understand the subject matter well. Two items that are related with pupil's participation in teaching and knowledge about how to study the subject successfully have arithmetic means between 3 and 4. Items, which pupils most often estimate with 1 and/or 2, refer to homework, persistence in solving tasks (35.1%, estimation 1) and achieving the goals (38.7%, estimation 1).

The second factor (F2a) "Pupil's assessment of degree of (un) certainty" consists of 6 items that are recorded in the negative form. The comparison between pupils who estimate items with 1 and 2, and 4 and 5 shows that in 3 of 6 items, estimations 4 and 5 are strongly represented. These items refer to fear of examinations (55%), solving tasks in front of the blackboard (49.2%), and the concern to fulfil the expectations of others (47.8%). Also, 69.9% pupils report that they do not see themselves in the hopeless situation due to bad marks. Two items, which refer to pupil's fear of expressing his/her own opinion and showing his/her knowledge during oral examination, are percentages of estimations 1 and 2, while 3 and 4 are equally represented in the range between 35.1% and 35.4%.

The third factor (F3a) "Pupil's assessment of relations among pupils" consists of 7 items. The comparison of share of pupils who estimate the items within the factor with 1 and 2, and 4 and 5 shows that in all items that refer to pupil's feelings and acceptance, estimations 4 and 5 are heavily represented, which is welcome. "If a classmate is in trouble, we are ready to help him/her" (72.1%); "Classmates are friends" (64.6%); "Classmates help each other at study" (64.7%); "Classmates consider my suggestions

and ideas” (54.6%); “We do not mock anybody in our class”(50.9%); “I feel good in school” (50.4%). The share of pupils who estimate some items with 1 and 2 is high too, which is worrying.

Items in the fourth factor (F4a) “Pupil’s assessment of the teacher-pupil relation” show that most pupils think that the teacher has a positive attitude towards pupils (M=3.44). 79.6% of pupils think that the teacher respects each pupil (4 and 5), whereas 68.9% think that their teacher is interested in the opinion and experiences of each pupil (sum of 4 and 5). Greater dispersion of ratings appears in establishing discipline in the classroom and in the item of attributing failure.

Items in the fifth factor (F5a) “Pupil’s assessment of attitude towards the subject” show that most pupils have a positive attitude towards the subject (M=3.52). The item “Slovenian language/mathematics is an interesting subject” is very true for 25.5% of pupils and certainly not true for the same share of pupils.

The sixth factor (F6a) “Pupil’s assessment of usefulness and applicability of knowledge” consists of 4 items. Pupils regard the knowledge of mother tongue and mathematics useful and realistic (M=3.70).

The seventh factor (F7a) “Pupil’s assessment of learning” consists of 3 items, which refer to ways of learning. Pupils highly estimate them (M=3.56).

The eight factor “Pupil’s estimation of attitude towards education” consists of 3 items. Pupils estimate that education is important for their success in life (82.6%, estimations 4 and 5), and so do their parents (91.1 %, estimations 4 and 5).

Pupil’s Assessment of Him/Herself in the Role of a Learner with Respect to Gender and Subject Grade

Table 7

T-test differences in extracted factors relating to gender

Factors	Gender	N	Arithmetic	Standard	Test of homogeneity	Test of differences
			mean	deviation	of variances	of arithmetic means
			M	SD	F	t
					p	p
F1a	Female	331	0.176	0.891	7.639	4.783approx.
	Male	221	-0.248	1.101	0.006	0.000***
F2a	Female	331	0.215	1.021	4.309	5.711approx.
	Male	221	-0.256	0.899	0.038	0.000***
F3a	Female	331	0.068	1.019	0.010	2.210
	Male	221	-0.123	0.980	0.918	0.027*
F4a	Female	331	0.040	0.886	4.960	0.242approx.
	Male	221	0.019	1.072	0.026	0.809
F5a	Female	331	0.083	0.999	0.641	2.805
	Male	221	-0.160	0.995	0.424	0.005**
F6a	Female	331	0.178	0.919	7.892	4.979approx.
	Male	221	-0.258	1.065	0.005	0.000***
F7a	Female	331	0.027	1.034	0.673	0.463
	Male	221	-0.012	0.934	0.412	0.644
F8a	Female	331	-0.073	0.951	0.816	-2.621
	Male	221	0.151	1.038	0.367	0.009*

By gender, pupils statistically significantly differ in 6 out of 8 factors, namely in (F1a) efforts in learning ($p=0.000$), (F2a) degree of (un)certainity ($p=0.000$), (F3a) relations among pupils ($p=0.027$), (F5a) attitude towards the subject ($p=0.005$), (F6a) estimation of usefulness and applicability of knowledge ($p=0.000$), and in (F8a) parent attitude towards education ($p=0.009$). The review of arithmetic means displays that boys, in comparison with girls, estimate parent attitude towards schooling statistically significantly higher whereas in all other items girls' estimations are statistically higher.

Table 8

Results of analysis of variance differences in factors extracted according to the pupil's subject grade

subject grade	n	Arithmetic	Standard	Test of homogeneity		Test of arithmetic		
		mean	deviation	of variances		mean differences		
		M	SD	F	P	F	P	
F1a	2	59	-.278	0.815	6.708	0.000	9.816 Welch	0.000
	3	124	-.226	1.144				
	4	201	-.017	1.075				
	5	193	.251	0.804				
F2a	2	59	.154	1.151	3.505	0.015	4.458 Welch	0.005
	3	124	.152	1.071				
	4	201	.046	0.944				
	5	193	-.210	0.940				
F3a	2	59	-.232	1.163	2.969	0.031	2.083 Welch	0.104
	3	124	-.099	0.984				
	4	201	.100	0.881				
	5	193	.029	1.069				
F4a	2	59	-.119	1.141	1.248	0.291	0.623	0.600
	3	124	-.002	0.967				
	4	201	-.036	0.987				
	5	193	.063	1.001				
F5a	2	59	-.646	0.904	0.572	0.633	26.288	0.000
	3	124	-.347	0.905				
	4	201	.022	0.949				
	5	193	.397	0.972				
F6a	2	59	.001	1.088	0.304	0.822	1.327	0.265
	3	124	.154	1.021				
	4	201	-.028	0.980				
	5	193	-.067	0.982				
F7a	2	59	.040	0.917	1.214	0.304	2.074	0.103
	3	124	.166	0.941				
	4	201	-.009	0.988				
	5	193	-.115	1.048				
F8a	2	59	-.099	1.134	2.503	0.058	2.344	0.072
	3	124	.127	0.847				
	4	201	.068	0.978				
	5	193	-.131	1.036				

Pupils statistically significantly differ with respect to achievement gain in three factors: efforts in learning (F1a) ($p=0.000$), degree of (un)certainly (F2a) ($p=0.005$) and attitude towards the subject (F5a) ($p=0.000$).

The review of arithmetic means in the first factor (F1a) shows that pupils with better grades have a statistically significantly higher estimation of their own efforts: intensity and persistence in learning. The review of arithmetic means in the second factor (F2a) shows that pupils with a lower subject grade express a statistically significantly higher degree of uncertainty. The factor (F5a) displays that pupils with a higher subject grade express statistically significantly higher positive attitude towards the subject.

Discussion

Teaching for understanding (Good & Brophy, 2000) has become the main objective of modern teaching. In our study, we measured the aspects of teaching for understanding with 19 items grouped into 4 factors: "Stimulation of activities and pupils' participation in teaching", "Differentiation and individualization", "Interdisciplinary approach" and "Promotion of pupil's thinking".

The thinking activity of pupils represents an important factor of quality teaching (Marzano, 2000; Walberg, 2003; Hattie, 2009). In our study, the total average estimation for 13 items that compose the factor "Teacher's stimulation of activities and participation in teaching" was $M=3$. The research results show that many pupils estimate that they understand the teacher's explanation, that the teacher adapts it to their abilities and encourages pupils to ask questions if they find the subject matter interesting. These items are very important for the quality of teaching and pupil's knowledge despite low frequency. A high share of pupils estimates that the teacher does not assess their foreknowledge before the lesson about a new subject matter (56.6%); that the teacher does not explain what they should know (41.9%); that he/she does not explain errors at knowledge examination (46.9%), that the teacher does not stimulate pupils to ask questions if they do not understand the subject matter (54.5%), that the teacher does not motivate pupils for achievement goals (45.7%); that teachers do not maintain pupil's attention throughout the lesson (43.6%), and that the teacher does not check homework regularly (41.1%). The skill of interpersonal collaboration is one of the significant competences of the 21st century pupils. It is concerning that 44% of pupils estimate that teachers do not stimulate them for interpersonal cooperation. Similar results were obtained by Peklaj et al. (2009), and Valenčič Zuljan et al. (2012), in their study on a sample of secondary school students who did not even have group teaching. In our study, we found out that the estimation of teacher's stimulation of activities and participation in teaching statistically significantly differs in relation to the pupil's subject grade and gender.

The didactic aspect of learning differentiation and individualization should be considered to achieve the optimum of pupil's activity in teaching and learning. The study shows a relatively low total average estimation of items within the factor "Differentiation and individualization". A statistically significant difference is found in estimations of implementation of learning differentiation and individualization in

relation with achievement gain. Pupils with a higher subject grade estimate that they have more opportunities for solving extra tasks in teaching. Hemke (1988 as cited in Terhart, 2001) noted that efficient teachers knew how to adapt teaching to pupil's characteristics. They found out that efficient teachers frequently formed small groups as forms of inner differentiation, that they often adjusted the level of complexity and adapted it to the different abilities of pupils. One of the important features of these teachers was their focus on encouraging pupils, particularly the vulnerable ones in addition to high expectations.

The ability to use knowledge in diverse contexts is one of the key competences of the 21st century (Dumont & Istance, 2010). An interdisciplinary approach and actualization can be a significant contribution. The study shows relatively low estimation of the factor "Interdisciplinary approach and application of the subject matter" ($M=2.86$). This is the factor with the lowest estimation. Boys' estimation of the frequency of interdisciplinary approach and application of the subject matter is statistically significantly lower than the girls'. In the study by Valenčič Zuljan et al. (2012), and Peklaj et al. (2009), authors found that the interdisciplinary approach and the connection of the subject matter with samples from everyday life were under-represented in class.

The factor "Stimulation of pupil's thinking" reached the highest estimation among the four factors in the scale "*Estimation of teaching*", ($M=3.88$). In this factor, statistically significant differences appear in relation to pupil's gender and subject grade.

We investigated how pupils estimated themselves in the role of a learner; their seriousness and efforts in learning and teaching, the level of certainty, relations between pupils, teacher-pupil relations, their attitude towards the subject, usefulness and application of knowledge, their way of learning and the attitude of pupils and their parents towards education. All of the above factors have an important influence on pupil's learning and knowledge. In our study, those aspects were measured with 55 items on the scale "pupil's assessment of him/herself in the role of a learner", that were grouped into 8 factors.

We noticed that within the factor "Pupil's assessment of self-effort in learning" pupils estimate more highly general items like efforts to get good grades this year, good understanding of the subject matter, whereas items that express pupil's active engagement and persistence are less valued (e.g. 35.1% pupils do not insist on solving tasks, 38.7% do not insist on achieving the set goals). Statistically significant differences relating to pupil's gender and subject grade are evident in this factor, too.

The experience of teaching is significantly connected to the "pupil's assessment of (un)certainty". The study showed that 55% of pupils are afraid of examinations, 49.2% of pupils are afraid of solving tasks in front of the blackboard, 47.8% are concerned if they could meet the expectations, 35.1% dare not express their opinion and 35.4% are too anxious to show their knowledge in oral examinations. We found a statistically significant correlation between the pupil's estimation of his/her certainty and gender and subject grade.

School is an important micro-system of teenagers, after family and peers (Bronfenbrenner, 1979). Teacher-pupil interactions are a very important part of

the school micro-system. Items in the factor “Pupil’s assessment of teacher-pupil relations” show that pupils think that the teacher has a positive attitude towards pupils (79.6% of pupils estimate that the teacher respects all pupils, 68.9% estimate that the teacher is interested in each pupil’s opinion and experiences). Pupil’s assessment of teacher-pupil relations shows no statistically significant differences with respect to gender and subject grade. Teaching and learning are successful when they occur in a cooperative and safe climate. It is important that factors, which are related to the relationship aspects, are well estimated. The analysis of estimations within the items of the factor “Pupil’s assessment of relations among pupils” shows that most pupils feel good in the classroom, and are welcome by classmates. The share of pupils that do not feel good in the classroom (38.5%) or in the school (24.2%) is also high. 8% of pupils estimate that mockery occurs in their classroom. Boys estimate relations among pupils statistically significantly lower in comparison with girls. It is important that pupils with different subject grades do not differ statistically significantly in estimation of relations among pupils. Items in the factor “Pupil’s assessment of relation towards the subject” express a positive attitude towards the subject ($M=3.52$) in most pupils. Pupils with better subject grade and girls show statistically significant positive attitudes towards the subject. Items in the factor “Pupil’s assessment of usefulness and applicability of knowledge” show that pupils estimated the knowledge of mother tongue and mathematics as adequately useful and applicable ($M=3.70$). Boys have statistically significantly worse attitudes towards the subject in comparison with girls. Items in the factor “Pupil’s assessment of learning” that refer to ways of learning are highly estimated ($M=3.56$). Does it mean that pupils are not critical of their ways of learning? In this factor, no statistically significant differences were noticed relating to gender and the subject grade. The study shows that pupils estimate that in their opinion and in their parent’s views, education is important for their life success (factor “Pupil’s assessment of attitude towards education”). Boys have statistically significantly better attitudes towards education than girls do.

Conclusion

Which challenges will teachers meet in designing effective learning environments based on the results of our research? The achievement of the 21st century requires competences according to which teachers should be trained to identify sensitive characteristics of pupils and differences among them and to fulfil the didactic principle of differentiation and individualization. Hence, the teacher can stimulate mental and emotional activity in each pupil, which is a precondition for quality knowledge of pupils. The research results pointed to two aspects of the shortage of implementation of differentiation and individualization: directly by the fact that this factor got low estimations, and indirectly with statistically significant differences between gender in all factors and to a lesser extent, to differences among pupils with different achievement gains. Therefore, the question arises if teaching is adapted to high-achieving pupils in comparison to weaker pupils, and to girls with regard to boys – can boys get more out of teaching? Nevertheless, teachers should be aware of

the mentioned differences and should professionally ponder how to stimulate boys to get a positive feeling towards the curriculum, subject, etc. Therefore, teachers should be acquainted with professional learning, interpersonal cooperation and permanent inquiries on how to design a stimulating learning environment that encourages each pupil to learn and to develop his/her personality (Valenčič Zuljan, 2007; Valenčič Zuljan & Vogrinc, 2007; 2011; 2012; Valenčič Zuljan, Zuljan, & Pavlin, 2011; Valenčič Zuljan & Marentič Požarnik, 2014; Valenčič Zuljan & Kiswarday, 2015).

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Milena Valenčič Zuljan,

Faculty of Education, University of Ljubljana,
Kardeljeva ploščad 16, 1000 Ljubljana, Slovenia
milena.valencic-zuljan@guest.arnes.si

Učenikova procjena nastave i sebe u ulozi onoga koji uči – važne stavke kod učiteljeva oblikovanja poticajne okoline za učenje

Sažetak

Početak 21. stoljeća obilježile su brojne društvene i ekonomske promjene, nove spoznaje o učenju, kao i zaključci raznolikih metaanaliza o efikasnom podučavanju, reformama, inovacijama, heterogenim razredima i interkulturalnoj školi, kao i velika očekivanja od učitelja i škole. Zbog svega navedenog učitelji se suočavaju s novim izazovima. Važno je da učitelj zna oblikovati poticajnu okolinu za učenje i nastavu prilagoditi učenicima. Priloženi članak prikazuje rezultate istraživanja koje je bilo i provedeno na uzorku od 577 učenika 9. razreda osnovnih škola u Sloveniji, a koje se odnosi na nastavu matematike i slovenskog jezika. Zanimalo nas je kako učenici prosuđuju nastavu i sebe u ulozi onoga koji uči te razlikuju li se statistički značajno u prosudbama s obzirom na ocjene i spol. Rezultati istraživanja su između ostalog upozorili na problem nedostatnog izvođenja diferencijacije i individualizacije učenja te upozorili na dva gledišta: neposredno, s tim da je taj faktor bio nisko vrednovan, i posredno kada su se gotovo kod svih faktora pokazale statistički značajne razlike između spolova, a u nešto manjoj mjeri i razlike između različito uspješnih učenika.

Ključne riječi: diferencijacija i individualizacija; ocjena zadanog predmeta; poticanje učenikova razmišljanja; spol; učenikova aktivnost na nastavi.