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## INTERACTION BETWEEN EMOTIONS AND PUPILS' ACTIVE CLASS PARTICIPATION

**Summary:** In this research, which was implemented on a sample of 159 primary school pupils, age 9 to 13, the authors propose two hypotheses. The first being that positive emotions increase when pupils are actively involved in class work, and the second that the disposition of teacher's work style is not an important precondition for an active class participation. Regressive analysis established that the key predictors of pupils' active class participation are: a) grade point average ( $\beta = .20$ ; significant at the level of .01) and b) pupils' positive emotions ( $\beta = .18$ ; significant at the level of .05). It was also found that positive emotions have a liner correlation with the increase of active participation of pupils in class. That, however, is of significance for the *happiness* emotion, while it is not of significance for the *contentment* emotion. Negative emotions are not significant predictors of active pupils' participation and did not alter significantly during classes. To prove these correlations, the authors use a multivariate analysis of variance and covariance – MANCOVA. Apart from the stated findings, this research also offers several topics for new researches.

**Key words:** positive emotions, negative emotions, class participation, GPA – grade point average, interactive learning.

Traditional school based on reproduction of facts is not as powerful and inciting for a learning environment as the school which bases its lectures on students' activity (Collis & Winips, 2002). Learning independence and self-reliance is a strong motivator for students, particularly when such a responsibility is transferred onto them gradually (Vermunt, 2003). Positive action by students is contingent upon their emotions, as well as upon their

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positive disposition during the activities (Cavanagh, Urry, and Shin, 2011). Generally speaking, we can argue that emotions are a strong instigator of activities, but they can also pose a serious hurdle. For example, people with intensified anxiety are more prone to make attention errors (Rutherford, MacLeod, and Campbell, 2004). People are inclined to „emotional selectiveness“ and chose emotions that will yield more pleasure and less discomfort (ibidem, 2004). Following this trail, we decided to explore the correlation between pupils' positive and negative emotions according to their activities at classes.

### **Pupils' active participation in lecture**

When a teacher manages to convey activity and authority from their own person onto the persons of students, the emotional climate in the classroom improves and the participatory attitude ensues, as shown in two researches. After they modified the learning rules in 100 classes, and introduced learning games, dividing authority between the teacher and the pupils, as well as a non-competitive evaluation, the researchers were able to observe significant improvements in the learning outcomes in a friendly emotional climate within the classrooms (see: Covington, 2000). Activity tendencies are more sustainable. Once activated, activity tendencies lead towards autonomous kinds of behaviour (Macrae and Bodenhausen, 2000). When supported by positive emotions, these tendencies become a benchmark in pupils' behaviour. In a three-year activity research, the pupils continuously showed positive emotions when their teachers announced interactive work. Likewise, during interactive classes, positive emotions rose, as well as the positive atmosphere in the classroom (Suzic 2004). In simple words, pupils like action and appreciate teachers who make it possible for them to be active, independent and cooperative in the classroom.

In a longitudinal study on children propensity to have sympathies, the teachers and the parents reported that the intensity of children's negative emotions declined with the increase of their propensity to the sympathy disposition (Eisenberg et al, 1998; Murphy et al, 1999). These sympathies were developed spontaneously in children, through play and being together. They also developed in an organized environment too, whenever the school provided opportunity for it. The best way to accomplish it is the interactive mode of educational work. Over time, co-education and cooperation mitigate fear and lead towards positive emotions. Unlike peer inclusion, social exclusion from peer activities leads to children's unconscious escape into in positive emotions (DeWal et al,

2011). In our research, we observed the interaction, co-education and emotional climate during regular class lectures, probing four basic emotions of the pupils, three times during a class, i.e. happiness, sadness, fear and pleasure. We subsequently compared those emotions against the activities during the classes.

### **The role of the teacher**

The traditional lecture stereotype is that of a teacher acting as the owner of knowledge which pupils learn and repeat, which is subsequently subjected to evaluation by the teacher. This we know as the *Magister dixit*<sup>2</sup> model. This model is based upon the authoritative figure of the knowledgeable teacher, teacher seen by the pupils as a walking encyclopaedia. Such an authoritative role of the teacher was more of an impediment than of a catalyst. Another research showed that in authoritative lecture models, pupils had less trust in their abilities than in those in which the teacher upheld their autonomy (Caprara et al., 2008). The teacher is the key person to create an emotional climate in classroom, and the working atmosphere in mastering the syllabus depends upon him. A research showed that the perception of the learning environment is of crucial importance for pupils (Könings et al., 2008). Eduard Deci's self-determination theory has it that, in principle, people are inclined to make their own decisions (Deci and Ryan, 2000). When they are in a position to choose the method of work on their own, and to choose individual or group activities, pupils are more motivated than in those situations in which the teacher tells them what to do, and what the objectives and work methods are.

If the teacher's work style is such that it supports pupils' autonomy, it stimulates their intrinsic motivation (Radel, Sarrazin, Legrain, and Wild, 2010). And not only that; when pupils are enabled to work independently, the teacher can even incite them to perform senseless content activities (Suzić, 2008a). Motivation during an experiment on interactive geography teaching was so strong that in all four schools, the pupils asked to work during the pauses rather than taking a break, even though they had been doing only geography in all five classes in the experimental design (Suzić, 2002). Teacher's supportive attitude towards autonomy is a strong motivator for pupils, as shown in other researches (Jang, Reeve, and Deci, 2010; Pelletier, Séguin-Lévesque, & Legault, 2002; Radel et al., 2010; Roth et al., 2007). In our research, we observed class activities from the angle of

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<sup>2</sup> The teacher said.

pupils' emotions, as compared against self-evaluation of the teacher's work efficiency, and the evaluation of that efficiency by the pupils.

In our research, the pupils evaluated the role of the teacher via the SRNA instrument, whereby 15 items were attributed to teacher's work style features. As already known, the Fritz and Heider's attribution theory (Heider, 1958) stems from the premise that laymen, those who have no formal psychology education, attribute features and properties to people when evaluating their personality or work methods. We opted for the attribution because teachers, educators and psychologists are more interested in features that children attribute to teachers, since children do behave in accordance with those attributes, rather than in accordance with the real properties of the teacher. For example, a teacher can be serious, while most children will see him as strict.

## **Research**

### *Hypotheses*

There is a significant interaction between the time pupils spend actively during a class and their positive emotions; this interaction is not significant for negative emotions. In simple words, the more active the pupils during a class, the higher the level of their positive emotions over the time. The second hypothesis is that pupils link their evaluation of the teacher's work style with the activities in classes, but it is not a significant predictor of class activities.

### *Participants*

The sample included 159 pupils of primary schools from the territory of the town of Banja Luka, 9 to 13 years of age, 71 of whom were male and 88 female, with  $\chi^2 = 1.82$ , this statistics is not significant, implying that the sample was sex equated.

### *Procedure*

To test the hypothesis on interaction between emotions and pupil activity, it was necessary to scan the activities and emotions of the pupils in classes, and then compare these two variables internally. We opted for two approaches: measure both variables by observation and self-reporting. There was immediately a problem in cross-referencing of the data: observation is continuous, whilst self-reporting is momentary. It is not such a tremendous problem since it can be easily overcome by methodology, but we knew that the comparison would be more sound if we had a continuity in self-reporting too – which was impossible. We

therefore opted for the emotion probing option, whereby children mark on an *Emotion thermometer* their current feelings three times during the class, at the beginning, in the middle and at the end. Thus, we offset the self-reporting continuity without disturbing the lecture process, since those one-minute breaks acted as refreshments. Other than that, there were also two cameras in the classrooms. One continuously filming the pupils' activities, and the other filming the teacher. The evaluation of the classes recorded by the cameras were performed by four experts individually, and the average of their assessments was entered into the SPSS as the comparison basis. On top of that, the pupils filled in an A-form questionnaire on teacher's efficiency, and the teachers filled in a B-form of the same scale in which they provided a self-assessment of the efficiency of their own work. That enabled us to have a complex insight into the emotions and activities of pupils during lectures, as well as data on several variables of interest for this correlation. Methodologically, the most convenient procedure for cross-matching variables scanned in such a fashion was the multivariate analysis of variance and covariance – MANCOVA. This measurement is the most convenient one when observing two or more variables in their interaction over a time period (Bryman and Cramer, 2001, p. 152). In such a setup, it is not feasible, nor is it methodologically justified, to select one variable as being dependant, and the other one as independent, because emotions and activities of the pupils had an internal causal relation. A pupil can be active on account of feeling certain emotions, and can have desirable emotions on account of being active. It would be wrong to use the classical Wundt's approach and say upfront which of the two is the dependant, and which the independent variable, and claim that it is the only correct way to approach it. It is a common error of modern-day psychologists and educators, because the reality is not black and white, it is composed of far more colours.

The pupils evaluated the teachers' characteristics by attribution on the SRNA instrument, by circling digits on the response list, while numbers 1 to 5 represented the levels of assessment on the Likert-type scale. The teachers filled in a SAN instrument by circling one of the five digits on a Likert-type assessment scale provided on the side of each of the statements.

#### *Instruments*

Four instruments were used in this research: 1) *Efx* (Suzić, 1995), *Emotion Thermometer* (Suzić, 2008b), *SRNA – Teachers' style of work*, *SAN – Teachers' activities self-assessment*. The last two instruments were

designed for the needs of this research. I shall briefly describe each of the four instruments.

*Efx – Lecture class efficiency* is an instrument that measures the efficiency of a lecture class on a five-level scale. For pupils, it is a scale which ranges from the lowest level, when they are inactive or excluded from work in class, up to independent and interactive work, and for the teachers, from exclusion up to the highest level of management and lecture organization. This instrument was calibrated on a large sample, and several small samples. Several procedures were used for the calibration. We measured the pupils' activity and the activity of the teacher. The obtained correlation  $r = .98$  justifies this design of the teacher and pupil scales. The objectiveness of the instrument was tested by calculating the correlation between parallel uses of the same instrument on the same classes by different observers. The Pearson's correlation coefficient  $r = .99$ , with a  $t$ -value ( $t = 7.06$ ) is marked at the level of  $.01$ . Reliability was calculated using the Spearman-Brown formula. The obtained  $r = .72$  with a  $t$ -value ( $t = 5.96$ ) is statistically significant at the level of  $.01$ .

*Emotions Thermometer* is a simple instrument which, just like a thermometer, measures the intensity of a certain emotion at a certain time, from zero to one hundred. More specifically, a pupil can circle a number on the scale 0–100 describing the intensity of his fear or another emotion at that moment (Figure1).

Figure 1: Emotion thermometer

<b>Happiness (joy)</b>	0	10	20	30	40	50	60	70	80	90	100
<b>Sadness (sorrow)</b>	0	10	20	30	40	50	60	70	80	90	100
<b>Fear (anxiety)</b>	0	10	20	30	40	50	60	70	80	90	100
<b>Contentment (satisfaction)</b>	0	10	20	30	40	50	60	70	80	90	100

The pupils know what the thermometer is and they easily circle the numbers that represent the levels that their emotions are at at the time. We calculated the Cronbach-alpha test for internal consistency of positive emotions  $\alpha = .84$ , and  $\alpha = .87$  for negative emotions. At the beginning of the class, the pupils circled the numbers on the emotion thermometer, thus showing what they were feeling at the time, and then they repeated the same activity again at the middle of the class, 25 minutes later, and at the end of the class, 45 minutes later. This made it possible for us to determine how each of the pupils was feeling at different times during the class and lecture design.

SRNA – *Teacher's work style* has 15 items and measures how the pupils evaluate the style of work of their teachers. The internal consistency of these 15 items measured by the Cronbach-alpha coefficient is  $\alpha = .74$ . These are attributions, or rather attributive assessments of teachers' work by the pupils. More specifically, the pupils were given an assortment of 15 statements, one of which reads as follows: We can see from the teacher's face that he enjoys explaining the subject to us. All questions are to be answered in a Likert-type scale, ranging from 1 = *never* to 5 = *always*.

SAN – *Teachers' activity self-assessment* has 15 items and measures how teachers assess their work efficiency and their style. Cronbach's alpha for internal consistency of this instrument is a respectable  $\alpha = .74$ . These are teachers' self-assessments in which they answer each question by circling one of the five items on a Likert-type scale, from 1 = *never* to 5 = *always*. One of the questions was: *It is pleasant to recollect lectures, while I contemplate classes.*

## Results

Since our thesis is that pupils' emotions interact with their activities in class, we applied a multivariate analysis of variance for three and more dependent and internally linked arithmetic means (Bryman and Cramer, 2001, p. 152). We repeated this procedure for activities recorded on the cameras. As a test of variance within pupils and teachers' activities, we entered three measurements on the activity: at the beginning, in the middle and at the end of the class. As a test of variable relations, we set positive and negative emotions, and as covariances, we entered three variables: pupils' sex, age and success. We used the full factorial model (Full factorial; Type III) recommended by Tabachnick and Fidell (1996). Of the four multivariate tests of the variance, we retained the Pillai's criterion (see: Bryman and Cramer, 2001, p. 153), and left out the Hotelling's trace criterion, Wilks' lambda and Roy's gcr criterion, because the Pillai's criterion is the most convenient for testing relations of variances among the covered variables (ibidem). The results of the multivariate interaction test among the variables are shown in Table 1.

It transpired that activities altered significantly during the class ( $F = 8.86$ ; with a significance level of .001 – on the basis of observer's assessment and  $F = 12.88$ ; with a level of significance of .001 – as assessed on the basis of camera recordings: Table 1). When we analysed the impact of emotions along with the activities, it appeared that positive emotions changed significantly depending on the pupils' activity ( $F = 1.59$ ; level of significance

of .02 – observer's assessment and  $F = 1.49$ ; level of significance of .04 – assessed on the basis of the camera recording; Table 1).

Table 1: Variance multicovariance analysis of the correlation between pupils' emotions and activities in class

Source	Observation		Camera	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
(Within-subject effects) <sup>b</sup>				
Activity	<b>8.86</b>	<b>.001</b>	<b>12.88</b>	<b>.001</b>
Positive emotions	<b>1.59</b>	<b>.02</b>	<b>1.49</b>	<b>.04</b>
Negative emotions	1.34	.12	1.28	.16
(Between-subject effects)				
Sex	1.58	.22	.01	.94
School success	.04	.84	3.17	.08
Age	<b>19.32</b>	<b>.001</b>	<b>15.26</b>	<b>.001</b>

Note: <sup>a</sup> The observation was carried out with the presence of an observer at class and application of Efx;

<sup>b</sup> Pillai's criterion was applied.

The variance data within pupils and teachers' activities is Table 1 (bolded) indicate changes in pupils and teachers' activities, whereby positive emotions that the pupils exhibited during the class are in a significant interaction with the activities. Since the importance of this correlation was calculated on the basis of camera recording ( $F = 1.49$ ; significance level of .04), it is somewhat lower than that of observer's assessment. All that was subjected to a contrasting test (Figure 2). The contrasting serves to quadruple and amplify the impact of data which are further from the mean values, thus making the significance test more accurate (Bryman and Cramer, 2001, p. 148)

Table 2: Interaction of the time spent in class activities and pupils' emotions (MANCOVA) – contrasting test

Source	Contrast	Observer		Camera	
		<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Activity	Linear	28.96	.001	52.45	.001
	Square	.06	.80	.38	.54
Activity × Positive emotions	Linear	2.00	.02	2.02	.02
	Square	1.42	.15	1.33	.20
Activity × Negative emotions	Linear	1.30	.23	1.60	.09
	Square	1.36	.19	1.18	.32
Activity × Age	Linear	2.15	.15	25.72	.001
	Square	.09	.77	2.22	.15
Activity × Sex	Linear	1.51	.23	1.83	.19



Activity × GPA	Square	1.11	.30	2.06	.16
	Linear	4.14	.05	3.86	.06
	Square	.81	.37	.10	.75

Note. GPA = grade point average

The design of a repeated measuring is the most convenient when we operate with several variables which we can compare for the same interviewees and when some of the variables have been observed more than once, in repeated measurings (ibidem, 2001, p. 203). Such a design examines the interactions of the dependant and several independent variables. Table 2 shows that there is a significant linear interactive effect between the pupils' activities and their positive emotions ( $F = 1.52$ ; significant at level .02), which was also shown in the contrasting ( $F = 2.00$ ; significance level .02; Table 2), which means that there is a significant difference in pupils' emotions during the activities, at the beginning, in the middle and at the end of the class. The difference is linear, but not square, for the reason that the relation between the variables did not withstand the square contrasting test ( $F = 1.42$ ; significance level of .15). Here, we need to check whether the positive emotions during class activities have increased or declined. That can be best found by insight into the descriptive data on the mean scale emotion values (Table 3).

Table 3: Mean scale values for four emotions at the beginning, in the middle and at the end of class

Variable	Beginning of class (1)	Middle of class (2)	End of class (3)	Difference of t-value		
	M (SD)	M (SD)	M (SD)	1-2	2-3	1-3
	Happiness	74.59 (27.80)	79.12 (28.00)	82.01 (29.01)	2.37*	1.26
Sadness	10.44 (16.96)	10.50 (19.42)	12.01 (24.54)	.05	.85	.82
Fear	15.28 (24.75)	13.52 (25.83)	11.83 (24.35)	.38	.34	.07
Contentment	73.21 (29.13)	75.35 (30.29)	77.30 (30.14)	1.07	.76	1.66
Activity <sup>a</sup>	.57 (.06)	.77 (.12)	.92 (.07)	17.16***	15.30***	39.58***
Activity <sup>b</sup>	.65 (.13)	.71 (.15)	.73 (.08)	5.02***	1.33	6.16***

Note: <sup>a</sup> Observation was implemented via observer's presence at class and by application of Efx;

<sup>b</sup> Observation was implemented via two camera records;

\*  $p$  significant at the level of .05; \*\*  $p$  level of significance at .01; \*\*\*  $p$  level of significance at .001.

If we take into consideration the arithmetic means in Table 3, we can easily note that all emotions increase during class, except for fear, which declines, and that only happiness has a statistically important increase ( $M = 2.37$ ; with a level of significance of .05 in the first part of the class;  $M = 2.91$ ; significance level .01 for the whole class; Table 3). A similar increase of significance can also be seen in the pupils and teachers' activity variable, both from the observer's assessment point of view and from the camera records and after-class assessment ( $t = 39.58$ ; significance level .001 – observer's assessment;  $t = 6.16$ ; significance level .001 – record assessment; Table 3). Data in tables 1, 2 and 3 clearly indicate the justification of the hypothesis that pupils' class activities are followed by positive emotions. It also corroborates the position that emotions are precursors of activities (Cavanagh, Urry, and Shin, 2011, p. 241). This finding becomes even more important if we bear in mind that the research has shown that positive emotions are linked with the feeling of happiness in life (ibidem, 2011).

Along with the hypothesis that positive emotions go hand in hand with pupils' activation, it is also interesting to contemplate the question of relations between pupils' activities, positive and negative emotions and the pupils' assessment of the teachers' efficiency and the teachers' self-assessment (Table 4). As predictors in a multiple regression, it is recommendable to take the variables which are in significant correlation with those that we are predicting, that is, with the dependent ones (Bryman and Cramer, 2001). By that criterion, in Table 4 we find three predictors: pupils' positive emotions ( $r = .18$ ; significance level of .05), pupils' assessment of teachers' work style ( $r = .16$ ; significance level .05) and pupil school success ( $r = .19$ ; significance level .01). As we have already observed, these are correlations that are close in scope, and we need to know which ones are those that predict the pupils' class activities the most. That can best be tested by a multiple regression (Hedges and Olkin, 1985), and graphically presented by the AMOS statistics (Cunningham and Wang, 2005).

Table 4: Pearson's correlation moment product for relations between activities, emotions and self-assessment of pupils and teachers' activities

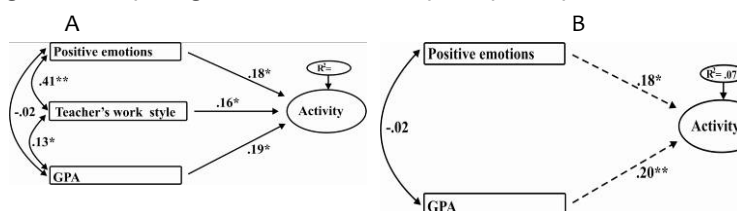
Variables	1	2	3	4	5	6
1. Pupils and teachers' activity						
2. Pupils' positive emotions	.18*					
3. Pupils' negative emotions	-.04	-.21**				
4. Teacher's work	.16*	.41**	-			

	style			.24**		
5.	Teacher's activity self-assessment	.01	.08	.01	–	.21**
6.	GPA	.19**	–.02	–	.13*	–
	Mean	.75	76.93	12.19	3.56	3.94
	Standard deviation	.07	21.87	16.45	.60	.52
						1.17

Note: \* p significant at level .05; \*\* p significant at level .01.

Multiple regression (Figure 2) showed that the key predictors of active class interaction are GPA ( $\beta = .20$ ; significance level .01; Figure 1B) and pupils' positive emotions ( $\beta = .18$ ; level of significance .05; Figure 1B). These two predictors explain 7% of the variance, and that is not a large percentage, but it is significant at the level of .05. The rest of the variance

Figure 2: Multiple regression of active class participation predictors



Note: The dotted lines show beta coefficients; \* p significance level of 0.05; \*\* p significance level of 0.01;

GPA = grade point average

can be explained by other sources of pupils' motivation; interaction for example (Suzić, 2002). This finding is somewhat in collision with the findings of Ramy Radel (2010), while its other segments corroborate their findings. More specifically, multiple regression excludes the teachers' work style variable as a class activity predictor, which collides with the Remi Radel's findings, but positive emotions as reconfirmed as a class activity predictor, which is in line with the said research. This confirms the thesis that neither control nor autonomy will suffice for a high level of internal motivation, as well as the findings of the Jang, Reeve and Deci's research (2010) that good motivation requires both control and support of pupils' autonomy. It is obvious that the pupils in our sample do not correlate their experience in class and the decision to actively participate in it with their assessment of the teacher's style of work, even though this correlation does exist ( $r = .16$ ; significance level of .05; Table 4), albeit at a rather low level. It is interesting to conclude that the teachers' self-assessment of their style of work is in a negative correlation with the pupils' assessment of their style of work ( $r = -.21$ ; significance level of .01; Table 4). Here, we need a new research to furnish us with answers to

several interesting questions. One of those questions is: What is more accurate, teachers' self-assessment or pupils' attributions to their style of work. The second question would be: Are those teachers who evaluate their work above the average more versatile in the application of teaching methods and are they inclined towards upholding pupils' autonomy. The third question: Are those teachers who evaluate their work below the average prone to fall under the burn-out syndrome. As we are able to see, our research opens a number of questions for further research.

### **Discussion**

By exploring the correlation between pupils' activities and emotions in class, as well as the matching between teachers' self-assessment and pupils' assessment of teachers' work, we have come to several valuable findings. Positive emotions increase if the teacher activates pupils adequately, but this increase is not the same for all positive emotions. In our research, the pupils showed statistically significant positive elevations at the *happiness* emotion, but at the *contentment* emotion, the elevation, albeit existing, is far from being statistically significant. The *fear* emotion declined during the class, but insignificantly statistics-wise, while the *sadness* emotion varied. Viewed generally, positive emotions increased if the pupils were active, if they worked interactively and participated cooperatively in the syllabus mastering process.

Another important finding of this research is that the attribution to teacher's style of work was not a significant predictor of class activities, while positive emotions and success in school proved to be significant predictors, as shown in a regressive analysis. This collides, to some extent, with the findings of some researches, but can be explained by the fact that during the research, there were two cameras installed in the classroom, and the teachers may be prone to investing an additional effort in such an environment. Pupils assign their attributions to teachers in accordance with their knowledge of the teacher that spans over a longer time, while in the class, they react in accordance with the activities they are currently participating in. Here lies a weakness of this research that we recognize, and that is that the introduction of cameras in the classroom disturbs the usual routine and creates particular „experimental“ circumstances, different from those that the pupils and the teachers are used to.

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