Chapter #20

ON THE POSITIVE EFFECT OF RABBIT-ASSISTED INTERVENTIONS IN CLASSROOM ENVIRONMENT ON THE ANXIETY OF PUPILS

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ABSTRACT
In our study the effect of rabbit-assisted interventions on the anxiety of first grade pupils of elementary school was investigated during a 24-week period. The rabbits were involved in the classroom according to the following pattern: 6 weeks without rabbit, 6 weeks with rabbit, 6 weeks without rabbit, 6 weeks with rabbit. After the end of each 3-week period anxiety of pupils were measured by a standardized test. These actions were performed in two different classes; one with pupils in the general population and another one containing mainly pupils with special education needs; we called the latter the integrating class. Our study shows the beneficial effect of a classroom application of rabbit-assisted interventions, as the anxiety of pupils became significantly smaller in the middle and at the end of each 6-week intervention period. Moreover, this positive effect was particularly prominent in the integrating class. Our findings support the assumption that the increasing practice of animal-assisted education is reasonable and that rabbits can be helpful assistants in education, since stress interferes with learning and performance in students.

Keywords: rabbit-assisted activities, anxiety, classroom research, evidence-based research.

1. INTRODUCTION

There has been a lot of research in animal-assisted pedagogy in the literature. These resulted in diverse results in several aspects. One of them was the proven positive impact of animal assisted pedagogy on the anxiety level and the level of depression of pupils. However, most of the studies involved dogs, and only a very few attempted to involve other animals. The involvement of rabbits seems to be particularly scarce (1 out of 25, see Brelsford, Meints, Gee, & Pfeffer, 2017).

Studies on animal-assisted activities have recorded the protective effect of the relations between animals and humans by using several methods. The presence of the animal, its spontaneous behavior, its ability to social interactions are promoting the educative as well as the therapeutic processes (Topál et al., 2009; Fine, 2001; Freund, McCune, Esposito, Gee, & McCardle, 2016). The onset of the initial studies on AAIs (Animal Assisted Interventions) may be estimated for the second half of the 20th century, about the early sixties. Since that time, the involvement of animals appears more frequently in the pedagogical practice and in health care as well as in the social care for the elderly (Meints, Brelsford, Gee, & Fine, 2017). The related terminology is as follows:

AAI includes all of the interventions performed with the involvement of animals in the process of development of abilities or in therapy.

AAA (Animal Assisted Activity) represents an interactive training facilitated by the participation of animals. In the course of this procedure, the presence of the animal exerts a beneficial effect for the general condition and for the activity of both healthy and ill patients. Concerning its purpose, the interaction might be either of recreational or of pedagogical character, for improving the quality of life or for establishing the motivation of the client. Training activities facilitated by animals do not represent direct interventions. In the majority of the cases, the presence of animals plays a role of increasing the comfort of the participants. Under such conditions, the presence of animals may reduce distress caused by isolation, promotes social interactions, facilitates communication skills; moreover, the disposition to empathy might also be supported. In the course of AAA interventions, the development of the spontaneity plays a considerably bigger role than in therapeutic practices.

AAP (Animal Assisted Pedagogy) or by another terminology AAE (Animal Assisted Education) is a procedure in which a trained pedagogue, who is experienced in the animals' behavior and who is conscious of his/her own pedagogical purpose, conducts the educative process with the intention to accomplish his pedagogical concept. The educational aspect here includes the aimed effect for the cognitive skills, too, besides the social and emotional skills.

AAP is an emerging recent trend in Education Science. It is supported by the trend that research, in general, is becoming more and more interdisciplinary in nature. Numerous studies in well-developed countries are devoted to the investigation of classroom applications of human-animal interactions (HAI), in the course of pedagogical practices. According to these, domestic and even non-domestic animals can be involved in the teaching process, both in a direct and an indirect way. Involving animals in classroom has become particularly frequent in the educational and teaching programs for early childhood and for the primary schools (Fine, 2015; Kazdin, 2011; Gee, Fine, & Schuck, 2015).

Animal-assisted interventions (AAI) can be applied in particular school activities, as well as for therapeutic and preventive purposes. In reply to a series of on-line questionnaire collected in the USA in 2015, teachers listed several species which they have applied in their educational programs, namely: fishes, guinea-pigs, hamsters, crabs, reptiles, rabbits and even other unusual species such as ferrets for example (Gee, Griffin, & McCardle, 2017; Gee, & Schulenburg, 2017).

One can observe an increasing trend of the conscious practical usage of HAIs for pedagogical purposes, although, besides the increasing interest in these new facilities, some difficulties still remain: Examples are the lack of standardization of intervention procedures, the lack of guidance in conducting HAIs studies in schools, small sample sizes of the studied groups, inadequate or no control groups. Some of these difficulties are originated partly from the large number of variations of different types of HAIs such as working with animals (veterinarians), animals as pets, animals in entertainment, research with animals, animal law and animal rights, or animal assisted therapy/interventions (Erdman et al. 2018). On the other hand, lack of standardized protocols and lack of an exact methodology for animal-assisted teaching represents a further problem. Besides, animals' presence in classroom could be either real or virtual (by using ICT), they can be involved either without any particular preassigned goal or with a well-defined purpose, etc. Also, the inapplicability of exact, positivistic methods for some related evaluations renders these investigations difficult.

The therapeutic application of dogs and horses is already widely used and well-recognized, mainly in individual therapy in psychology. The use of the AAIs for special pedagogical purposes (for special education of handicapped children) has also been around for a longer time, so it is no longer a peculiar technique in special education (O'Haire, 2013). HAIs are well-established and possess elaborated protocols in the treatment of Attention

Deficit/Hyperactivity Disorder (ADHD), or in the treatment of emotional and behavioral control of juveniles (Pelham & Fabiano, 2008). In Austria it is already a legally recognized option to involve the teacher's own pet in AAIs in classroom (Bundesministerium für Bildung und Frauen, 2014). There, at least empirically, the positive influence and the efficiency of AAIs is acknowledged. However, a well-justified proof of it along with a solid methodology is still to be developed.

2. BACKGROUND OF OUR RESEARCH

Studies of Wilson (1984) has led to the concept of biophilia which concerns the reduction of distress and anxiety, in particular in relation to the decrease of pulse rate and blood pressure. According to his view, human beings have a genetically determined tendency to establish contact with other living creatures. On the base of this presumption, humans instinctively focus on the phenomenon of life or on life-like vital processes, in order to increase the chance of the perspectives for their survival. According to the statement of the author this may be of evolutionary origin. The appearance of animals simultaneously represents a link and a tranquillizing agent for the client (Kruger & Serpell, 2006).

These findings have motivated our choice to investigate anxiety of pupils in relation with AAIs. According to our assumption, the presence of animals and the direct contact with them may act as an aid to establish an optimal state of mind, facilitating the learning processes and reducing anxiety. Therefore, according to our assumption, those children who have direct connection with rabbits during an educative training become more competent concerning their achievement and may show better progress in their learning attitude at the end of such developmental trainings, compared to the control periods.

We have chosen the rabbit for our investigations since there is little related experience with them in the literature (Brelsford et al., 2017), rabbits are easily kept and cheap. Rabbits need no particular training as opposed to dogs, for example. Rabbits represent a much smaller challenge for the teachers than bigger animals. Also, children are keen to get in touch with them, motivated by their former tale experiences, too.

The following factors/difficulties influenced our research design:

1./ The young age of the tested pupils posed a methodological problem, since in Hungary only a few standardized instruments are available for this age group.

2./ It is not easy to maintain such classroom conditions which ensure that the effect of the rabbit itself is measured and not the effect of other factors.

3./ Teachers in Hungary have to maintain a certain pace in their teaching strictly in accordance with the curriculum of the taught subject, and they have little opportunity to deviate from the prescribed schedule. Besides, teachers have to divide their attention between their regular teaching job (timetable, teaching methods, class size, teaching subject etc.) and the design of the ongoing animal-assisted research.

4./ Even in case of an existing positive effect of the AAI on pupils (e.g., on their social skills, mood, anxiety, etc.), it might not readily be seen as an immediate improvement in their marks, which is the basis of evaluation in school.

5./ The general attitude for school research projects in Hungary can be characterized as risk avoiding from the point of view of both the school directors (principals) and the teachers, and the parents.

6./ The ethical requirements of handling animals render such projects even more troublesome. Obeying the numerous rules concerning the selection, keeping, and nursing of animals represents further difficulty for the researchers.

3. METHODOLOGY AND RESULTS

Our hypothesis was that rabbit-assisted interventions decrease the anxiety of first grade pupils. We investigated first grade pupils in elementary schools (age: 6-7, 51 pupils). The pupils came from two elementary schools, and hence two different classes have been involved. The first class, which we will refer to as *majority school*, contained pupils in the general population (no problematic children). The second class which we will refer to as *integrating school* had mostly children of special education needs (vulnerable children with learning difficulties). The two classes were investigated simultaneously.

The effect of a rabbit-assisted intervention on the anxiety of the pupils was investigated during a 24-week period in both classes. One rabbit was involved in each classroom according to the following pattern: In both classes the experimental period started with a 6-week period without rabbit, followed by 6 weeks with a rabbit, then again 6 weeks without rabbit, then finally 6 weeks with a rabbit. In the two animal-assisted periods, the rabbits were continuously present in the classroom, they were nourished and cleaned by the children. In addition, once a week a special course was organized for the pupils: University students of special education held a cognitive training, each topic was focused on rabbits. Pupils then had the opportunity also for a direct contact with the rabbit, to touch and to caress them.

In both the animal-assisted and the control periods, the anxiety state was measured in the middle of the six-week period and at the end of it. We used the Child Behavior Checklist, CBCL (see, Achenbach, 1991), a qualified test. This questionnaire is suitable for screening emotional lability and behavioral disorders of pupils of 7-14 years and was standardized on the data of 1600 Hungarian children (Perczel, Kiss, & Ajtay, 2005). The tests were evaluated by experts in pedagogy. The total score of the test is 60. According to the standardized test, pupils over 35 scores are classified “anxious/stressed children”, between 30 and 35 scores “slightly stressed children”; below 30 “of normal anxiety/stress level”. Only the results of those children were taken into consideration who participated in all ability tests (27 pupils, 19 in the majority school and 8 in the integrating school).

3.1. Results

Figure 1.
Change of pupils’ anxiety level.

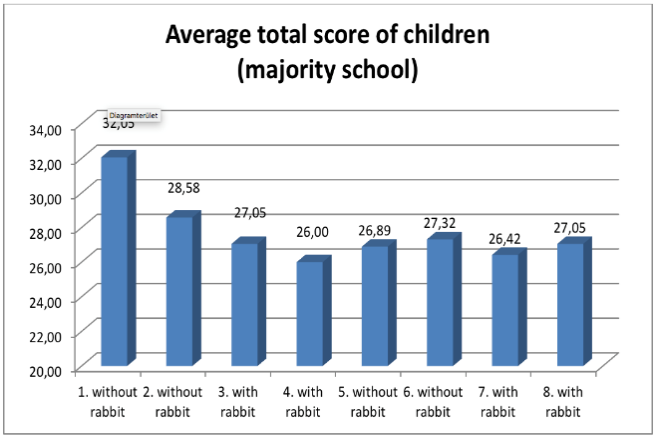
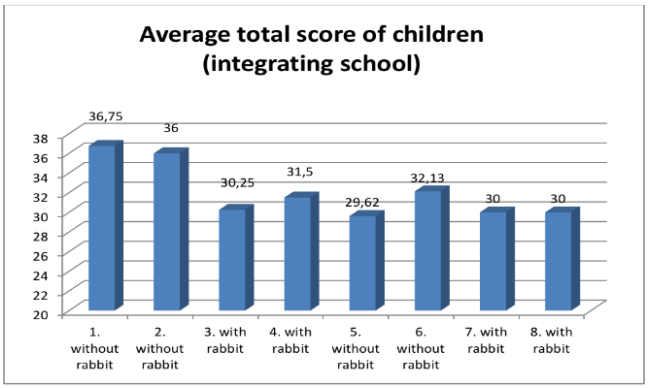


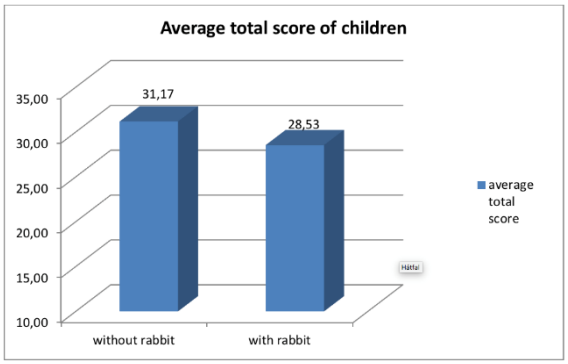
Figure 2.
Change of pupils' anxiety level.



The average score of the stress level in the beginning of the scholar term remained below 35 in the majority school. Then a decrease was detectable in the first six weeks period between the first and second tests, which can be attributed to the professional pedagogical activity of the teachers. In consequence of their efforts, the adaptation to the new environment was successful in this group. After this period the following pattern was observed: a decrease in score was characteristic for all the animal-assisted periods, whereas a more pronounced increase in score was observed in all the non-assisted periods. This tendency was even more pronounced in the integrating school. The effect of the professional pedagogical activity can be observed in this group, too, but with lower intensity then in the other group in the initial period. However, the third test (in the middle of the first rabbit-assisted period) indicted a significantly bigger reduction of stress level than that of the majority school group.

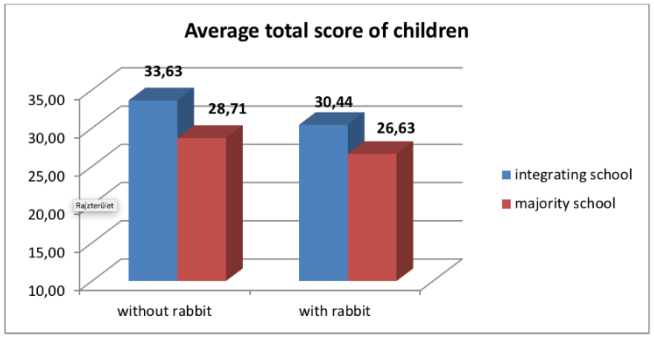
The difference of the results in the two schools demonstrate that the high stress level in the integrating school could have been reduced by rabbit-assisted education, too, although, their stress level did not reach the lower level of the majority school group. According to the classification, the integrating group moved from "anxious/stressed" to "slightly stressed". On the other hand, in the majority school the classification of the group changed from "slightly stressed" to "normal", in response for the same intervention.

Figure 3.
Children's average anxiety level in the rabbit assisted vs the non-assisted periods.



Summarizing the scores of all the animal-assisted and control periods, an 8.45% difference in score was detectable between the animal-assisted and the control periods. This means a 2.64 score difference in average in favor of the assisted periods vs. the non-assisted ones. As a consequence, the average of all pupils (including both groups) moved from "slightly stressed" to "normal".

Figure 4 .
Children's average anxiety level in the majority and the integrating schools.



We also compared the extent of the changes in each school separately. The presence of the rabbit induced a 9.48% improvement of the stress level in the integrating school, while in the majority school the improvement was 7.24%.

As expected, there were big differences in the scores and the changes of scores of individual pupils. Pupils were classified into three groups according to their initial anxiety score. Then we investigated the change in the scores of these groups. For the group of "stressed" pupils, their average showed an improvement of 5.06% in the rabbit-assisted period with respect to the control period, as shown by their respective average scores of 36.19 and 31.13. This resulted in their classification change from "stressed" to "slightly stressed". Some of them improved as much as 19-20 scores by the end of the intervention, and the average improvement has reached 10 scores.

Table 1.
Group of anxious children.

Ø – rabbitless period, R – rabbit assisted period, Ø avg – average of rabbitless period, R avg - average of rabbit assisted period, d (%) – difference in %

	1st child	2nd child	3rd child	4th child	5th child	6th child	7th child	8th child	
Ø	48	40	50	44	52	37	39	41	
Ø	46	40	50	43	41	26	34	30	
R	34	31	32	40	40	31	31	27	
R	42	26	37	38	37	21	23	25	
Ø	36	21	40	40	36	20	22	24	
Ø	41	22	41	39	36	27	25	27	
R	46	20	35	31	36	21	21	29	
R	41	20	37	40	39	20	20	25	
									avg
Ø avg	42,75	30,75	45,25	41,50	41,25	27,50	30,00	30,50	36,19
R avg	40,75	24,25	35,25	37,25	38,00	23,25	23,75	26,50	31,13
d (%)	2,00	6,50	10,00	4,25	3,25	4,25	6,25	4,00	5,06

In the "slightly stressed" category, a 1.94% improvement was observed; here the improvement was not as pronounced as in the "stressed" group. Some of the pupils in this group made a 7% improvement, some others did not show any change at all.

Table 2.
Group of less anxious children.

	9th child	10th child	11th child	12th child	13th child	14th child	15th child	16th child
Ø	34	32	32	31	31	33	33	34
Ø	36	29	21	28	29	29	31	25
R	33	25	24	26	28	29	27	22
R	29	38	21	20	28	32	28	28
Ø	32	31	26	20	22	32	27	29
Ø	36	32	29	20	26	36	30	23
R	24	31	28	20	28	35	28	27
R	24	31	27	20	31	35	26	24

Ø avg	34,50	31,00	27,00	24,75	27,00	32,50	30,25	27,75	29,34
R avg	27,50	31,25	25,00	21,50	28,75	32,75	27,25	25,25	27,41
d (%)	7,00	-0,25	2,00	3,25	-1,75	-0,25	3,00	2,50	1,94

For pupils in the normal category, only an immaterial (0.68%) improvement was observed. For most of these pupils, no change in stress level was registered. Moreover, in some cases, a slight negative effect of the presence of the rabbit was registered. For this group, the animal-assisted training seems to be is unnecessary; apparently, they can manage the stress caused by school on their own. Occasionally, the presence of the rabbit may even disturb them in their learning activity.

Table 3.
Group of normal stress level children.

	17th child	18th child	19th child	20th child	21th child	22th child	23th child	24th child	25th child	26th child	27th child
Ø	24	29	28	24	29	29	22	24	29	28	26
Ø	22	39	20	21	28	29	22	28	29	29	26
R	20	36	22	22	30	28	20	25	26	20	27
R	26	33	20	21	29	33	20	22	26	20	23
Ø	21	36	22	22	32	25	22	36	27	20	27
Ø	25	33	20	20	31	26	23	33	26	22	27
R	25	38	20	20	32	32	21	22	29	20	23
R	25	42	20	20	35	33	21	26	28	20	24

Ø avg	23,00	34,25	22,50	21,75	30,00	27,25	22,25	30,25	27,75	24,75	26,50	26,39
R avg	24,00	37,25	20,50	20,75	31,50	31,50	20,50	23,75	27,25	20,00	24,25	25,57
d (%)	-1,00	-3,00	2,00	1,00	-1,50	-4,25	1,75	6,50	0,50	4,75	0,68	0,68

Below we post the result of the t-test on the difference of the two schools, with significance level $p<0.0001$.

Table 4.
T-test, between schools.

School	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
Majority		152	27.6711	6.2145	0.5041	20.0000	52.0000
Integrating		64	32.0313	8.1493	1.0187	20.0000	50.0000
Diff (1-2)	Pooled		-4.3602	6.8412	1.0194		
Diff (1-2)	Satterthwaite		-4.3602		1.1366		

School	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
Majority		27.6711	26.6751	28.6670	6.2145	5.5856	7.0041
Integrating		32.0313	29.9956	34.0669	8.1493	6.9416	9.8698
Diff (1-2)	Pooled	-4.3602	-6.3695	-2.3508	6.8412	6.2499	7.5570
Diff (1-2)	Satterthwaite	-4.3602	-6.6165	-2.1039			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	214	-4.28	<.0001
Satterthwaite	Unequal	95.246	-3.84	0.0002

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	63	151	1.72	0.0078

Below we post the result of the t-test on the difference between the rabbit-assisted and the control periods, with significance level $p<0.0001$.

Table 5.
Assisted vs. non-assisted periods.

N	Mean	Std Dev	Std Err	Minimum	Maximum
108	2.4074	5.4224	0.5218	-10.0000	18.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
2.4074	1.3731	3.4418	5.4224	4.7831	6.2606

DF	t Value	Pr > |t|
107	4.61	<.0001

Below we post the result of the d-values on the difference between the group of anxious, slightly anxious, and normal anxiety level pupils, with significance level $p<0.0098$.

Table 6.
D-values, anxious, slightly anxious, and normal anxiety level.

Class Level Information		
Class	Levels	Values
Anxiety	3	slight anxiety

Number of Observations Read	216
Number of Observations Used	27

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	91.0843519	45.5421759	5.64	0.0098
Error	24	193.8187500	8.0757813		
Corrected Total	26	284.9031019			

R-Square	Coeff0 Var	Root MSE	d Mean
0.319703	120.9750	2.841792	2.349074

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Anxiety	2	91.08435185	45.54217593	5.64	0.0098

4. FUTURE RESEARCH DIRECTIONS

The question whether AAIs in classroom promote or not pupils' *learning success* was set as the primary goal of our long-term research. As a first phase, our first pilot investigations suggest the beneficial effect of rabbit-assisted interventions for the *stress level* of pupils of first grade. Next, we are going to perform the same investigation with a much larger number of participants. In order to make further steps, first the teachers who are involved in our research should gain a solid methodological know-how about the proper involving of animals into particular phases of the teaching process. It is also our goal to investigate the effect of rabbit-assisted interventions on further emotional skills and social competencies, and ultimately, on learning success. To that end, a standardized set of methods, which fit to early childhood's psychological features and cognitive skills should be developed, too.

5. CONCLUSION

Our pilot research suggests the beneficial effect of rabbit-assisted activity on the anxiety of first grade pupils. Our study also suggests that the beneficial effect has a positive correlation with the strength of anxiety of pupils measured at the beginning of their first school year: For the stressed pupils the rabbit-assisted intervention was very beneficial, for the slightly stressed pupils it was beneficial, whereas for pupils with normal stress level the intervention was mostly neutral. The comparison of the two groups (majority school vs. integrating school with children of special needs) shows the significantly greater extent of benefit of the rabbit-assisted intervention for the latter group. The comparison of the teaching periods with or without the rabbit clearly shows in both groups the decrease of the stress level in the rabbit-assisted periods, and the increase of the stress level in the control periods. Summing up, our findings indicate that rabbit-assisted methods, in general, does have a complementary role in pedagogy. In particular, rabbits may successfully be applied in the regular educational process.

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ACKNOWLEDGEMENTS

This work was supported by the EFOP-3.6.1-16-2016-00007 project.

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