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## ASSESSING PRE-SERVICE TEACHERS (DIS) LIKING OF SOME ANIMAL SPECIES

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### Introduction

Different animals can evoke positive or negative emotional responses in humans, although there is great variance in the quality and strength of the accompanying feelings (Jacobs 2009). Human perception of animals is partially subjective and it is affected by contextual cues, and may change over time. For instance, a change in knowledge and understanding may influence human's perception of animals (Batt 2009). The particular physical and behavioural characteristics of organisms undoubtedly shape people's attitudes toward them. There were many studies conducted in this field over the last decades. An overview shows that some findings are more, other less, consistent. It is generally presumed that humans will prefer species' that are perceived to be similar to them (Plous 1993). Additionally, if animals were perceived to be more physically similar to humans, this led to the assumption that they are more similar mentally to humans (Knight et al. 2003). On the other hand, Beatson and Halloran (2007) found a converse effect. After the subjects watched a video of bonobos mating they experienced negative feelings towards this species. It is suggested that recognition of similarities between humans and animals may make humans uncomfortable and consequently less disposed to have positive feelings towards them.

In an international study, Kellert (1993a), found that adults particularly liked large animals, especially those with considerable intelligence and the capacity for social bonding. Bjerke and Østdahl (2004) found that Norwegians living in an urban environment liked small animals such as small birds, squirrels, dogs, etc. Kellert (1993b) hypothesized that one factor, that may cause humans to avoid invertebrates "is the possible alienation from creatures so morphologically and behaviourally unlike our own species" (Kellert 1993b, p. 852). Wagler & Wagler (2011) found that pre-service elementary teachers that received frequent direct contact with Madagascar hissing cockroaches in an educational setting during their pre-service training programs had their attitudes and beliefs changed in a positive way toward that arthropod but not toward other arthropods. Bjerke & Østdahl (2004) found that, in addition to invertebrates, people dislike bats, rats and mice. Furthermore, birds

**Abstract.** *The purpose of this study was to investigate attitudes of students, in particular primary school and biology pre-service teachers, towards specific animals in order to determine principal reasons for (dis) liking them. The sample consisted of 309 university students. Two factors were extracted termed "pleasant animals" and "unpleasant animals". "Unpleasant animals" were characterised by certain commonly perceived features such as being dirty, dangerous, distinctive and fear evoking while "pleasant animals" were typically beautiful, clean, pleasant to touch, intelligent and responsive. Students with more positive attitudes toward the Biology subject also expressed more positive attitudes toward animals, especially toward "unpleasant" animals. And students with more frequent exposure to natural environments had more positive attitudes to "pleasant animals".*

**Key words:** *animals, attitudes, biology education, experiences, pre-service, primary school education, teacher.*

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and mammals had greater support for conservation over reptiles and invertebrates (Czech et al. 1998). Torkar et al. (2007) found that the main influences for Slovenian students' attitudinal differentiation for animals were: "humanlike" characteristics, prejudice towards certain animal, animal's living environment and fear towards potentially dangerous animal.

A considerable number of studies on attitudes towards animals have recorded gender differences. Lindemann-Matthies (2005) showed males generally like wild and exotic animals whilst females rather prefer pets. Kellert & Berry (1987) found that women were more humane and moralistic about animals than men, but they were also more negative in attitudes toward some animals than men. In another study, less liked animal species were found to be more interesting for males and those that were liked were more popular for females (Bjerke & Østdahl 2004). Similar gender differences were also documented relating to humans' fears of large carnivores; females were expressing greater fear to phobic animals than males (Røskafte et al. 2003).

Information concerning students' interests may help teachers to devise strategies to enhance students' engagement in biology (Uitto *et al.*, 2006). Only a few studies focused on pupils' and students' attitudes toward biology as a formative influence on their attitudes. We are not aware of studies which investigate a relationship between attitudes towards biology correlated with attitudes towards animals. There are, however, studies which investigate attitudes to biology only (Prokop et al. 2007b) and we know of some studies evaluating peoples' knowledge of certain animals or group of animals that have related this to their attitudes toward them (Prokop et al. 2009, Torkar et al. 2010).

Scientific information sources also shows that care for the environment in adulthood is frequently associated with experiences and time spent in nature, particularly in childhood (i.e. Chawla 1998, 1999, Palmer et al. 1998, 1999, Tanner 1980). Direct contact with animals changes peoples' attitudes toward different types of animals (i.e. Barney et al. 2005, Wagler 2010, Wagler & Wagler 2011). Also Wagler (2010) proved that pre-service elementary teacher's attitude toward an animal affected their belief about using that animal in their future science curriculum. Specifically, if a teacher had a positive attitude toward an animal they were more likely to believe they would use that animal in their future science curriculum. Conversely, if a teacher had a negative attitude toward an animal they were much more likely to believe they would not use that animal in their future science curriculum. Therefore, it is of great interest to study attitudes towards animals among teachers. School teachers are aware of social pressures on them to be model citizens and that their actions help establish the next generation's moral compass (Jacobson et al. 2006). Teachers influence pupils' attitudes towards science subjects (Lederman-Matthies 2008) and they are often role models in the pupil's formation of environmental attitudes (Chawla, 1998, 1999, Chawla & Flanders Cushing 2007).

### *Purpose of the Study*

The aim of the study was to investigate attitudes of students, pre-service primary school and biology teachers, towards specific animals in order to determine principal reasons for (dis) liking them. This study has provided some evidence of pre-service teachers' attitudes and discusses the effects of different pre-service training programs for primary school teachers and biology teachers. It also determined how the gender, biology education (years of biology in secondary education, attitudes toward subject biology) and students' frequency of experiences in natural environments influenced their attitudes towards animals. Effects of students' experiences within nature and with biology education on perceptions of specific animals were also measured.

## **Methodology of Research**

### *Construction of Questionnaire*

Students' attitudes to animals were measured by a questionnaire. In the first question students expressed their (dis) liking towards 27 relatively common animals on a 5-point Likert scale (1-very unpleasant feelings, 2-unpleasant feelings, 3-neutral, 4-pleasant feelings, 5-very pleasant feelings). The list



of 27 animals has been developed based on our previous study (Torkar et al., 2007). The second question was connected with the first. Students were asked to choose an animal (from first question) that well represents one of eight perceptions of animals: dirty, dangerous, disgusting, fearful, beautiful, clean, pleasant to touch and intelligent. Every animal could be included in more than one category. The third question focused on frequencies of students' experiences in natural environments: fresh water environments, marine coastline, meadows, woods, parks and mountain habitats. They had to choose between options: never, rarely (at least once a year), occasionally (at least once a week) and often (at least once a week) for each environment. The last two questions focused on biological education, more specifically, on how long students had been taught biology in their secondary school and their attitude toward the Biology subject was measured on 5-point Likert scale. At the end of the questionnaire students provided some demographic variables such as gender, age and place of permanent residence. The original form of the questionnaire was developed in the Slovenian language, translated into the Czech language and then translated into English for publication purposes. The construct validity of the questionnaire was established through review by authoritative subject specialists in zoology (researchers in the Faculty of Education and also in the Faculty of Natural Sciences) and also by explorative factor analysis (see Statistical procedure). Reviewers were asked whether the items were relevant to the aims of the study, and revisions, based on their comments and suggestions, were incorporated into the final version.

#### *Participants*

The study was conducted during the spring semester 2009. A total of 309 students from two universities (from Slovenia and Czech Republic) participated in the study. The total number of participants equals the number of students attending university courses at the time of the study. Students' ages ranged between 18 and 33 ( $x = 20.45$ ;  $SD = 1.97$ ). The sample size consisted of 150 pre-service primary school teachers and 159 pre-service biology teachers. There were 30 males and 279 females. Comparisons based on country and gender were performed. The dependent variable (students' attitudes to animals) was controlled by age as a covariate. There was a disequilibrium in distribution of males and females within the sample, but the result of the Levene's test for the homogeneity of variances ( $F = 0.10$ ;  $p = 0.75$ ) allows the use of analysis of variance.

#### *Procedure*

Questionnaires were administered in two universities. Students were reassured that the questionnaire was anonymous, that it was not a test, but rather a research attempt to explore their attitudes toward animals. No time limit was given during completion of questionnaire, but the longest time taken to complete it was approximately 15 minutes. The distribution of the questionnaire was done by researchers or by teachers who were instructed on its distribution. In one case, the teacher was present during the session when a researcher distributed the questionnaires among students.

#### *Statistical Procedure*

The attitude scores ( $n = 27$  items – in this case animals) were subsequently submitted to factor analysis with Varimax rotation and two factors with eigenvalues greater than 1.0 were derived. One of factor represented a group of "unpleasant animals" and the other represented a group of "pleasant animals". These two factors explained 41 % of the total variance. According to Reckase (1979), the prime factor should explain at least 20 % of the total variance. In agreement with this suggestion, the first factor "unpleasant animals" explained 31.57 % of total variance and the second ("pleasant animals") factor 9.43 % of the total variance. The "unpleasant animals" category included 15 animals and the "pleasant animals" category included 9 animals. Three animals with factor scores of more than 0.35 loaded in more than one factor and were excluded from the subsequent analyses (Anastasi, 1990). The suitability of factor analysis as an approach for analysing the data was evaluated by the Kaiser-Meyer-Olkin (KMO) measure

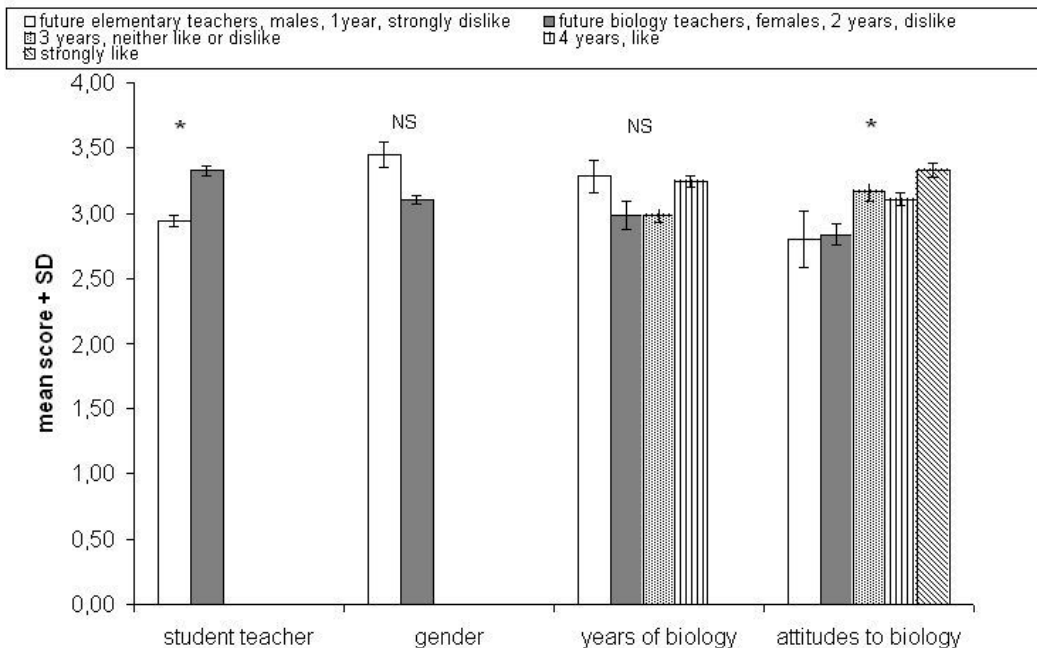


(the index for comparing the magnitude of the observed correlation coefficients to that of the partial correlation coefficients). The value was 0.91, which allowed us to apply factor analysis. Bartlett's test of sphericity was used to test the null hypothesis that variables in the population correlation matrix are uncorrelated. The observed significance level is high ( $\chi^2 = 3405.98$ ;  $df = 351$ ;  $p < 0.001$ ). On the basis of this result we rejected the null hypothesis. The strength of the relationship among variables was strong. These indicators thus allowed us to use factor analysis for the data.

Reliability of the questionnaire was also evaluated. Cronbach's alpha for the whole instrument was 0.92, which indicates high questionnaire reliability (Nunnally, 1978). Analysis of covariance (ANCOVA) and multivariate analysis of covariance (MANCOVA) were used for investigating differences in results, and finally Pearson's product moment correlation coefficient was used for exploring the relationships between the results. Demographic variables (country, gender), data from questions about attitudes to biology and years of biology undertaken in high school were treated as independent variables. The dependent variables were the students' attitudes to animals and their experiences within the natural environment. The dependent variable students' attitudes to animals were controlled by age as a covariate.

## Results of Research

Figure 1 described the influences of different variables on students' attitudes to animals. Pre-service biology teachers had statistically significant higher scores ( $F(1, 306) = 9.18$ ;  $p < 0.05$ ). This means that biology teachers had more positive attitudes toward animals than primary school teachers. Gender is known to have a major influence on individual views about animals. Gender differences in the overall mean score were not statistically significant ( $F(1, 306) = 2.69$ ;  $p = 0.10$ ). Results also showed that the number of years studying Biology taken during secondary school education did not have any significant influence on attitudes towards animals ( $F(3, 290) = 0.43$ ;  $p = 0.73$ ). But the last variable, presented in Figure 1, showed that students' positive attitudes to Biology is in correlation with their positive attitudes to animals ( $F(4, 303) = 4.10$ ;  $p < 0.05$ ). Tukey's post-hoc test showed statistically significant differences between students with more positive attitudes towards Biology and those with neutral attitudes to the subject ( $p < 0.05$ ), and those who dislike the subject ( $p < 0.001$ ).



**Figure 1: Differences in attitudes toward animals by variables (country, gender, years of biology, and attitudes to biology). (\*  $p < 0.05$ , NS = not significant).**



Using factor analysis with Varimax rotation two factors were extracted, explaining 41 % of the total variance. After careful examination of the factor table three items were excluded from further analysis (otter, bear, snail), because their scores in both factors were more than 0.35. Table 1 shows the distribution of animals in the categories. In the first category are animals for which students expressed negative attitudes, and in the second category are those for which they expressed positive attitudes.

**Table 1. Factor analysis with Varimax rotation for attitudes to animals.**

	Unpleasant animals	Pleasant animals
Snake	0.61	0.02
Earthworm	0.58	0.17
Spider	0.64	-0.05
Fly	0.57	0.02
Rat	0.66	0.07
Frog	0.73	0.24
Pig	0.53	0.33
Scorpion	0.72	-0.03
Bee	0.45	0.22
Cockroach	0.65	0.04
Shark	0.61	0.13
Wolf	0.64	0.23
Salamander	0.74	0.20
Lizard	0.77	0.14
Octopus	0.63	0.21
Horse	-0.07	0.49
Rabbit	0.05	0.63
Fish	0.23	0.47
Squirrel	0.17	0.72
Dog	0.13	0.38
Bird	0.31	0.65
Cat	0.02	0.48
Dolphin	0.01	0.59
Parrot	0.23	0.64
<b>Eigenvalues</b>	<b>8.55</b>	<b>2.55</b>

The description of the categories was conducted on the basis of the second question in the questionnaire where students were asked to characterize animal species from the list of question 1. Students wrote one animal's name under characteristics: dirty, dangerous, distinctive, frightening, beautiful, clean, pleasant to touch and intelligent. "Unpleasant animals" were characterised by certain common features such as being dirty, dangerous, distinctive and evoke fear while "pleasant animals" are typically beautiful, clean, pleasant to touch, intelligent and responsive. In our study the highest scores were achieved by dolphin, dog and horse, and the lowest scores by cockroach, spider and bat.



Table 2 shows that animals, categorised as “unpleasant”, achieved lower attitudes scores in comparison with “pleasant” animals. Detailed examination of the variables (using Tukey’s post-hoc test) showed some statistically significant differences in the “unpleasant animals” category for the variables. In the first two variables the value was  $p < 0.05$ . Males and pre-service biology teachers disliked the “unpleasant” animals less. There were some significant differences in the variable “number of years of biology undertaken in secondary education”; statistically significant difference between groups of students with one year and those with three years of biology in secondary school ( $p < 0.05$ ) in favour of the first group. And between those with three and four years of biology in secondary school ( $p < 0.001$ ) in favour of the later. These results show no pattern and confirm our previous findings, that the amount of biology taught during secondary education does not predict students’ attitudes towards animals (see Figure 1). Attitudes to Biology were found to be a significant variable. There were statistically significant differences in attitudes towards “unpleasant” animals between those claiming that they like or strongly like the subject Biology and those who dislike or strongly dislike the subject ( $p < 0.05$ ). There was also a significant difference in attitudes towards “unpleasant” animals between those who like and strongly like the subject ( $p < 0.05$ ) in favour of later. The results also show that students with positive attitudes toward subject biology less dislike “unpleasant” animals.

**Table 2. Mean score of the factors (categories) for each variable and values of MANCOVA.**

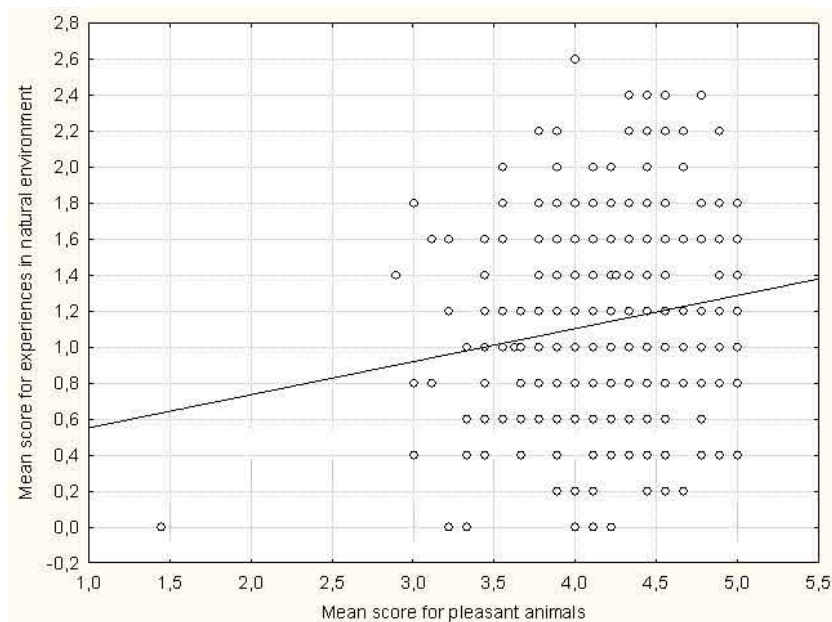
Variable	F (age)	F	W		Unpleasant animals	Pleasant animals
Students	3.06*	16.89**	0.98	Pre-service primary school teachers	2.25	4.20
				Pre-service biology teachers	2.87	4.15
Gender	20.22**	8.63**	0.95	Male	3.13	4.06
				Female	2.51	4.19
Years of biology	11.44**	2.65*	0.95	1 year	2.77	4.22
				2 years	2.38	4.12
				3 years	2.30	4.23
				4 years	2.76	4.13
Attitudes to biology	22.94**	2.06*	0.95	Strongly dislike	2.04	4.11
				Dislike	2.18	4.08
				Neither like or dislike	2.59	4.19
				Like	2.55	4.14
				Strongly like	2.82	4.26

\* $p < 0.05$ ; \*\* $p < 0.001$

Pearson’s product moment correlation coefficient was used to examine the relationship between animal scores and the total scores for frequency of experiences in natural environments. Overall, the animal scores were very poorly correlated with experiences ( $r = 0.07$ ;  $p = 0.21$ ). However, more detailed examination revealed that the category “unpleasant animals” displayed a low correlation with the frequency of experiences in natural environments ( $r = 0.04$ ;  $p = 0.48$ ), but the “pleasant animals” category was more significantly correlated ( $r = 0.17$ ;  $p < 0.01$ ). Results presented in Figure 2 show that students with more frequent experiences in natural environments had more positive attitudes to “pleasant animals”.







**Figure 2: Correlation between mean score of pleasant animals and mean score of frequency of experiences in natural environments.**

## Discussion

The main focus of this study was to investigate attitudes of students, pre-service primary and biology teachers, towards specific animals in order to determine principal reasons for (dis) liking them. Other questions explored or qualified attitudes revealed by the response to the first question. Our findings show that pre-service biology teachers had more positive attitudes toward animals than primary school teachers. The differences between two groups of pre-service teachers could be affected by different pre-service training programs. The pre-service training program for biology teachers is based on systematic zoology and botany. Pre-service biology teachers have frequent and systematic contacts with various animal species (live and dead specimens) that they study scientifically. While, pre-service primary school teachers have less and unfrequented contacts with animals in pre-service training program, limited to only two courses (Science and Science Didactics). Another important factor that should be also mentioned is student's motivation. Pre-service biology teachers are probably more motivated toward studying biology – the study of life and of living organisms.

The group of male students in the sample was very small and this could have an effect on the results, whereas we found no significant differences in attitudes to animals among genders. Other studies, such as Bjerke & Østdahl 2004, found some significant gender differences in attitudes to animals. Therefore, this finding should be further investigated in the future with a more gender balanced sample.

Animals for which students expressed their attitudes, were extracted into two factors, named "pleasant" and "unpleasant" animals. For the first they expressed positive characteristics, like beautiful, clean, pleasant to touch, intelligent and responsive, and for the second factor they expressed more negative, like dirty, dangerous, distinctive and evoke fear. The results confirm that people have positive attitudes toward "cute" animals, especially pets such as cats, dogs and horses, and exotic species like dolphins, tigers and lions (Lindemann-Matthies 2005). Bjerke & Østdahl (2004) noted in their study that people generally dislike invertebrates, bats, rats and mice, which is evident also from our results (Table 2). These animals are small, behaviourally and morphologically clearly dissimilar to humans (Bjerke & Østdahl 2004, Kellert 1993b, Prokop & Tunnicliffe 2008).

In the previous studies it was found that care for the environment in adulthood is frequently as-



sociated with positive experiences and time spent in nature, particularly during childhood (i.e. Chawla 1998, 1999, Palmer et al. 1998, 1999, Tanner 1980). Our findings confirm positive effects of people's experiences in nature, but it also shows that mainly this has an effect on students' attitudes towards 'pleasant' animals. Students with positive attitudes toward the subject, Biology, expressed more positive attitudes toward animals, especially toward "unpleasant" animals. It is essential that a quality science education experience begins in the primary school with curriculum that exposes students to different animals (e.g. AAAS 1993, Krek (ed.) 2011, NAAEE 2004). In particular, the quality of biology teaching could be improved by working with living organisms (Myers et al. 2003). Direct contact with living organisms provides information and experiences that are not obtainable by reading, viewing pictures, or examining models (Strgar, 2007) and thus changes peoples' attitudes toward animals (e.g. Barney et al. 2005, Dimopoulos & Pantis 2003, Tomažič 2011, Wagler 2010, Wagler & Wagler 2011). Teachers should, accordingly, encourage their pupils to more often explore natural environments and various organisms outside the classroom.

Lastly, a comparison of results with discussed studies has also shown that certain negative attitudes and perceptions toward animal species have the same patterns in different studied groups. These negative attitudes might reflect the lack of direct contact with animals and/or poor knowledge about the animals concerned. Several studies report on students' misconceptions about animals (i.e. Barrow 2002, Prokop et al. 2007a, Torkar & Bajd 2006). Usually, such misconceptions have a negative influence on pupils' attitudes, and thus teachers should investigate them in the classroom and prepare educational interventions in order to reduce their influence on students' knowledge and attitudes to animals.

## Conclusion

The present study explored the attitudes of pre-service primary and biology teachers, towards specific animals in order to determine principal reasons for (dis) liking them. It was also examined whether, and to what extent, gender, biological education and students' frequency of experiences in natural environments influenced their attitudes towards animals. Results showed some significant differences in attitudes toward animals among pre-service primary teachers and biology teachers in favour of later. Students with positive attitudes toward the subject, Biology, also expressed more positive attitudes toward animals, especially toward "unpleasant" animals. Frequent direct contacts with animals are important factors positively affecting attitudes toward animals, especially toward "pleasant animals". The findings of this study provide useful information for those that prepare future teachers and can contribute to social changes in relation to animals and nature.

Results are limited to two groups of pre-school teachers from two universities and to a relatively small sample size. Therefore, future comparative research across different universities and countries would provide a deeper understanding of teacher's attitudes to animals and provide more detailed data for educational implications.

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