

COMPARISON OF SLOVENE AND CZECH STUDENTS' IDEAS ABOUT HUMAN EVOLUTION

Barbara BAJD, Jiří MATYÁŠEK

Abstract: *Evolution, including human evolution, is an important component of secondary school biology curricula. Human evolution can be taught in an interdisciplinary way to include not only biology but also history, geography, ecology, sociology and language. The topic is naturally interesting to many students for most like to know something about man's origin, where and when the first prehistoric humans appeared, how they migrated around the world and what the consequences will be if we do not conserve biological diversity and adopt a sustainable approach to planetary resources. Even young children in primary school are interested in prehistoric life, including dinosaurs, and it is important that primary school teachers have some basic knowledge about our evolutionary history and that of our animal relatives. In our survey we wanted to obtain information on what intending primary school teachers know about human evolution when they enter the Faculty of Education, and how much they learned about the subject in upper secondary school. We compared ideas about human evolution of Czech and Slovene students after finishing the upper secondary school. We wanted to know if there is any differences between these two groups and if they have sufficient information about this topic to teach it in an informed way to their pupils.*

Keywords: *human evolution, students' ideas, Slovene students, Czech students*

Introduction

Each of us has a natural interest in our origins, and it is important to tap into that curiosity, and to use it as a means of imparting information and ideas about human evolution that can be used to exemplify broader concepts in the life sciences, and to encourage an appreciation of biological diversity. So primary and secondary schools could profitably pay more attention to this subject.

Recent discoveries – many of them spectacular- have provided a much more detailed picture of human evolutionary history, significantly modifying earlier ideas about our ancestry. The subject not only attracts much public interest but also has major educational benefits: human evolution exemplifies many general evolutionary

principles, illustrates the synergy of focussed multidisciplinary approaches in the life sciences, and reinforces teaching of environmental conservation, human relations and social responsibility. At the same time the study of human evolution responds to student's natural interest and curiosity about their origins. It serves to illustrate many important principles and aspects of evolution generally, and has important additional benefits. One important theme in human success has been the crucial importance of social developments (group size and structure, personal relationships, co-operation, language, the development of technology) influencing biological evolution. Another is the increasing control by humans of their environment, so emphasising the inter-connections between ourselves and our surroundings. And a final, important benefit is that knowledge of our evolution underlines both the importance of the individual (each of us is unique) AND, since we all share a common origin and important attributes, emphasises the commonality of all human beings. This is important to counter 'us versus them' attitudes, racism, excessive nationalism, chauvinism and xenophobia, all of which contributed much to human misery throughout the twentieth century.

The purpose of this study was to obtain information about ideas of human evolution of students in the first year of their university after finishing upper secondary school, as a follow up to an earlier survey of ideas about human evolution among nine-year-old children in Slovenia (Bajd, 2001).

With this study we wished to compare the answers of Slovene and Czech students in the first year of University study. The Czech Republic has a long and well established tradition in palaeoanthropology and many important and spectacular sites of human fossils and artefacts, although most of these date from the later phases of prehistory in central Europe (Neanderthals and early modern humans). Slovenia, by contrast, has far fewer sites and fossil discoveries although there is a possible Mousterian (Neanderthal) flute from Divje babe and the famous Neanderthal site of Krapina is close by in Croatia. We were concerned to investigate whether there are any differences in the responses to questions about human evolution from Slovene and Czech students, currently studying to become primary school teachers. We provisionally suggest that any such contrasts in national responses might reflect differences in general public awareness about the subject in the two countries and/or differences in the amount of time spent and treatment of the subject in the differing national curricula of upper secondary schooling. We are concerned to explore whether schools pay enough attention to this subject.

Methods

Our study is based on 82 Slovene and 79 Czech students in the first year at the Faculty of Education, from University of Ljubljana and Masaryk University, Brno and who will go on to become primary school teachers. None of them studied palaeoanthropology specifically at university so that all their knowledge of human evolution has been obtained in upper secondary school and through other sources such as books, TV and the internet. We gave the students the same questionnaire in their respective languages which included 15 open-ended questions. The responses to each question

were divided into two or more categories, and are represented by graphs. The questions were the following:

1. How many years did you study biology in upper secondary school?
2. Did you learn about human evolution in upper secondary school?
3. If the answer is 'yes', about how many school hours were spent learning about human evolution?
4. Do you think that prehistoric animals and plants look like those of today?
5. Did early humans live at the same time as dinosaurs?
6. Did prehistoric humans develop and change over time?
7. Does evolution work on living organisms today?
8. Which organisms among the following (man, bird, reptiles, insect) appeared on Earth last?
9. Where was prehistoric man living?
10. When did prehistoric man first appear?
11. Where did early prehistoric man rest? (Tree, cave, sea shore, river bank, do not know)
12. How big was the brain of early prehistoric man? (As big as we have, as big as a chimpanzee, a little bigger than we have, a little smaller than a chimpanzee has, do not know)
13. What did prehistoric humans eat? (only different plants, plants and animals, only animals, only fruit, do not know)
14. When did prehistoric humans first appear in Europe?
15. Where did you learn all about this?

Results

”How many years did you have biology in upper secondary school?”

The majority of Slovene students (62%) had three years of biology, and 27% two years. Only 4% had four years. The majority of Czech students (59%) had four years of biology and 11 % of students had one, two (10%) or three (9%) years of biology (figure 1).

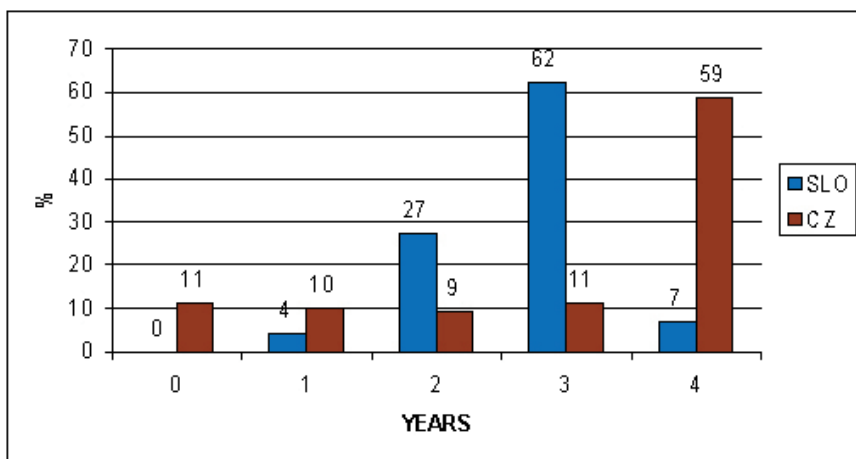


Figure 1. How many years did you study biology in upper secondary school?

Did you learn about human evolution in upper secondary school?

71 % Czech students and 62% of Slovene students studied human evolution in upper secondary school, but they did not spend many hours on this topic. More than half the students indicated that they spent less than 5 hours, and one quarter of both groups of students no more than 10 hours.

With only a few exceptions (3%) all Slovene and Czech students recognised that prehistoric animals and plants did not look like those of today.

All the students knew that humans were evolving over a long period and the majority (95% to 99%) also knew that evolutionary forces are currently impacting on living organisms.

However, students' ideas about the time scales involved were less accurate. Surprisingly, some (9% of Slovene and 3% of Czech students) believed that early humans lived at the same time as dinosaurs – a notion doubtless persisting from their early childhood. Even the question “which organism appeared last in the evolutionary scale (man, insects, reptiles or birds)” was not an easy one for some students: 12% of Slovene and 6% of Czech students did not answer that man appeared last. Other responses also revealed students' uncertainties about the timescales involved in human evolution. We got very different replies to the question: “When do you think that the first prehistoric man (hominids) appeared?” 12% of Slovene and 11% of Czech students think that this was 10 millions years ago, 37% and 33% respectively 7 millions years, and 29% and 37% 3 millions years. 15% Slovene and 19% Czech students think that this happened as recently as half a million years ago.

Although more than half students (61% Slovene and 64% Czech) answered that the first hominids lived in Africa, SE Asia and Australia were also mentioned several times as places of origin (figure 2).

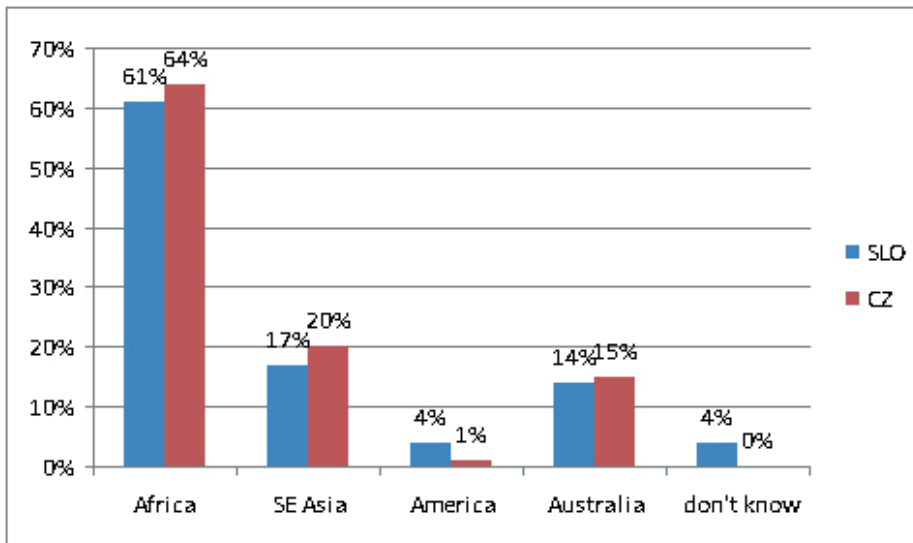


Figure 2. Where was prehistoric man living?

In reply to the question: “Where was prehistoric man resting?” the majority of Slovene students (89%) answered that they were living in caves compared with less than half of the Czech students (45%). 48% Czech students but only 11% of Slovene students considered that prehistoric man was resting in trees.

The majority of both Slovene (77%) and Czech students (91%) think that the earliest hominids had a brain the size of the chimpanzee. The others thought that the brain was as big as that of modern humans or even a little larger (figure 3).

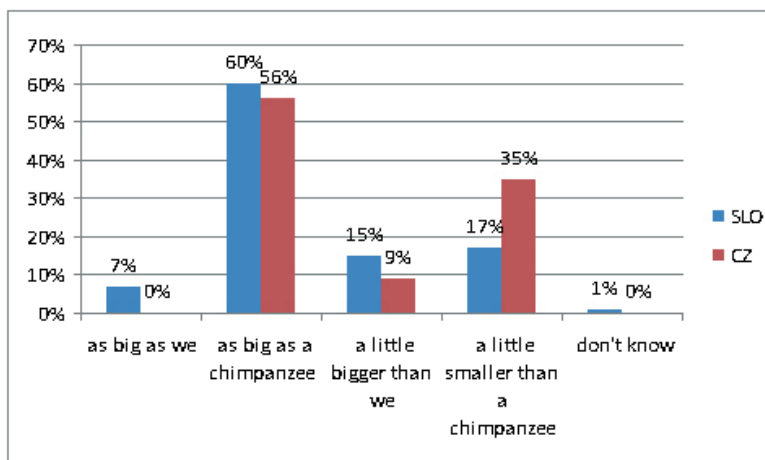


Figure 3. How big was the brain of early prehistoric man? (As big as we have, as big as a chimpanzee, a little bigger than we have, a little smaller than a chimpanzee has, do not know).

Notions about diet differed markedly: the results indicate that 82% of Slovene students and 49% of Czech students think that prehistoric man was eating plants and animals, whilst only 17% of Slovene but 46% of Czech students think that he was eating only plants (figure 4).

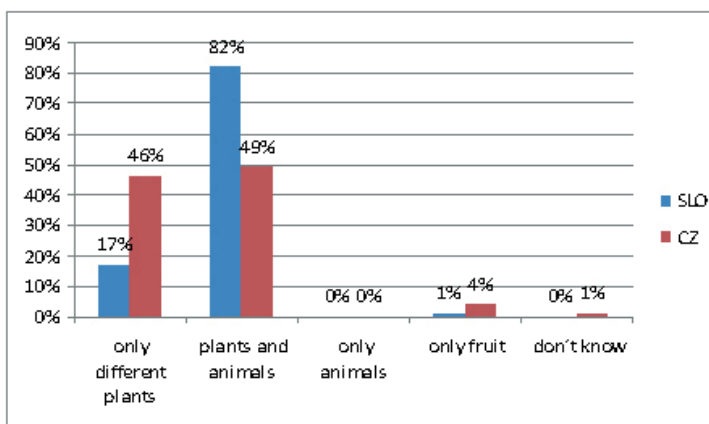


Figure 4. What did prehistoric humans eat? (only different plants, plants and animals, only animals, only fruit, do not know)

More than half the students (53% Slovene and 56% Czech) thought that first prehistoric man first appeared in Europe 2 million years, whilst 16 % of students of both nationalities mentioned 1 million years. 12 % of Slovene and 18% of Czech students think that the initial colonisation of Europe happened half million years ago whilst 13% Slovene and 10% Czech dated it as recently as 50,000 years ago (figure 5).

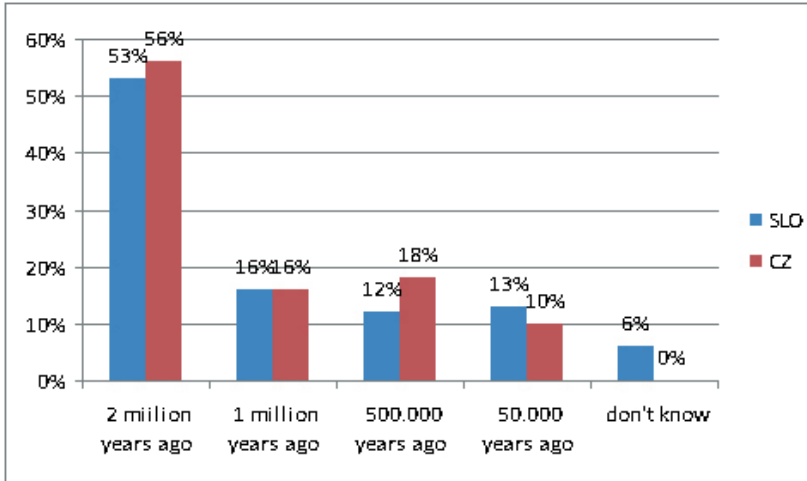


Figure 5. When did prehistoric humans first appear in Europe?

In reply to the question: “Where did you learn all about this?” 38% of Slovene and 69% of Czech students obtained their knowledge in school, while 25% of Slovene and 11% Czech students indicated that they learned about this from TV, with 16% Slovene and 9% Czech mentioning books and journals as their main sources of information on this topic (figure 6).

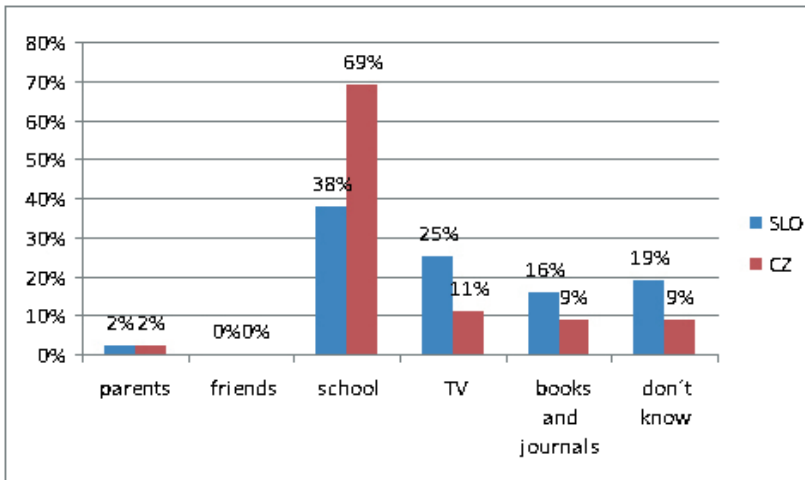


Figure 6. Where did you learn all about this?

Discussion

The educational context to these results differs between the two countries, specifically in the time devoted to biology within the secondary curriculum. Slovene students have mostly either three (62%) or two years (25%) biology. Majority of Czech students enter university with four years of biology (59%) and some with only one year (11%) or two years (10%).

In spite of these differences in Slovene and Czech upper secondary schooling more than half the students were taught about human evolution for less than 5 hours. Only 25 % to 32 % mentioned more than 5 hours teaching, and in no case was there more than 10 hours spent on the subject. So both groups of students should have received about the same amount of teaching in human biology and evolution.

Despite this broad comparability of treatment, there were undoubted national differences in students' responses to the questionnaire.

More Slovene students were confused about the time frame of human evolution, thinking that prehistoric man lived at the same time as dinosaurs. In addition 12 % of Slovene students have no clear ideas about which organism appeared last in the evolutionary time scale. In the answers on this question Czech students were better. The survey also reveals other problematic responses to questions dealing with the time of human evolution. So around one third of students think that the first prehistoric man appeared 7 millions ago, one third 3 millions years ago, just over 10% as long ago as 10 millions year ago, and 15-20% as recently as 500.000 years ago. Students also have no clear idea when the first prehistoric man appeared in Europe. More than half the students opted for 2 millions years ago, and only 16 % of students of both nationalities gave the correct figure of around 1 million years. It is true that this is a rapidly changing area with new findings nearly every year and periodically the re-dating of earlier discoveries through the development of new techniques. The latest finding of human fossils in Spain dated 1.1 millions years ago at Atapuerca, Spain (Carbonell, 2008) has significantly extended the time frame for human occupancy of Europe from the previous oldest find, also from Atapuerca, of 780.000 years ago. Since this is a very recent development students may not be expected to know of such current discoveries, but the extent of students' misconceptions about the larger time frame for human evolution, and their apparent notion of the contemporaneity of dinosaurs and humans is troubling. It may well be that the popularity of cartoons like *The Flint Stones* and movies such as the *Jurassic Park* series create major misconceptions about the past, but this does not explain the differential responses of Czech and Slovene students to these questions. More detailed questioning and analysis will be helpful in exploring these issues.

The majority of Slovene students (89%) think that early prehistoric man was resting in caves (89%) and rather fewer (11%) in trees. The Czech students were approximately equally divided in their responses to this question: 45% indicated caves and 48% in trees. Those who mentioned caves were probably thinking of Neanderthal or early modern humans in Europe. It is interesting that Czech students were better in answering that question given that in the Czech Republic there are many caves with evidence of human occupation, but students were aware we were asking about the *earliest* prehistoric humans.

A surprising proportion of students also have no clear idea where the first hominids or prehistoric humans occurred. Although rather more than 60 % of students knew

that Africa was the ‘cradle of humanity’ a surprising number mentioned Australia and even America as the place of origin. Recent discoveries indicate that early *Homo* first migrated out of Africa about 1.7 millions years ago, moving into areas of Asia.

About 60 % of both groups of students had a realistic view of the size of the brain of earliest hominids. If we aggregate with these those who stated that early hominids had brains a little smaller than that of the chimpanzee we get a better result (Slovene students 67% and Czech students 91%). Unfortunately, however, some students of both nationalities thought that the earliest hominids had brains similar in size to those of modern humans (21% of Slovene and 9% Czech students). Again, the differing national responses will repay further investigation.

In relation to the diet of prehistoric humans the results show that the great majority (82%) of Slovene students but only about half (49%) Czech students think that they were eating both plants and animals. It was also evident that when mentioning animals students were thinking of bigger animals, and not insects or eggs for example. The response that early hominids were eating only plants were more numerous among Czech (46%) than Slovene students (17%), and so more correct. It seems that students who considered the diet to be primarily animals had in mind later prehistoric man like Neanderthals or archaic modern man rather than the earliest prehistoric man.

For both groups of students the main single source of their information about prehistoric humans was from school. However, while Czech students mentioned mostly school (69%) and less TV and books/journals (20%), for Slovene students TV and books/journals combined were a more important source of information (41%) compared with school (38%). It may be that these national contrasts in sourcing information may underlie the contrasting misconceptions about timescales and regions of origin noted above.

The investigation shows that while there are some differences in the responses of Slovene and Czech students to questions about their knowledge of human evolution, both groups show similar misconceptions. Czech students gave better answers on questions about prehistoric humans’ diet, where they were resting and the size of the brain in earliest *Homo*. Both groups of students included in the investigation have some ideas about human evolution, but the responses of the Slovene students suggested that they were more familiar with later prehistoric humans such as the Neanderthals and not the earliest forms such as *Australopithecus*, still less *Ardipithecus*. The results of this questionnaire survey also suggest that students’ knowledge of human evolution is more or less learned by heart and that they do not connect their knowledge of this topic with, for example, their understanding of geography or the geological time scale.

SROVNÁNÍ PŘEDSTAV SLOVINSKÝCH A ČESKÝCH STUDENTŮ O EVOLUCI ČLOVĚKA

Abstrakt: Evoluce, vč. evoluce člověka, je důležitou součástí středoškolské výuky biologie. Evoluce člověka může být vyučována interdisciplinárně, s prvky biologie, geologie i dějepisu, zeměpisu, ekologie, sociologie a cizích jazyků. Téma je přirozeně atraktivní pro mnoho studentů, neboť mnozí se rádi něco dovědí o původu lidského rodu, kde a kdy se objevil první pravěký člověk, jak migroval po světě a jaké by mohlo

mít následky, kdybychom nezachovali biologickou diverzitu a dlouhodobě udržitelný rozvoj. Dokonce i malé děti na základní škole se zajímají o pravěký život, vč. dinosaurů a je důležité, aby učitelé za základní škole měli základní znalosti o naší evoluční historii a evoluční historii našich zvířecích příbuzných. V našem výzkumu jsme chtěli ověřit znalosti studentů – budoucích učitelů základních škol o evoluci člověka, v období, kdy vstupují na pedagogickou fakultu, kolik se toho naučili na střední škole. Porovnávali jsme znalosti o evoluci člověka u českých a slovinských studentů po skončení střední školy. Chtěli jsme zjistit, zda jsou nějaké rozdíly mezi těmito dvěma skupinami z obou zemí, zda mají dostatek znalostí o tomto tématu, aby ho pak mohli kvalifikovaně učit své žáky.

Klíčová slova: evoluce člověka, nápady studentů, slovinští studenti, čeští studenti