Learning by designing learning objects in zoo and wildlife education

Jens Hepper M.Sc.
Leibniz University Hanover, Department of Vocational Education, Germany

Introduction
Zoo education can be considered the pioneer in vocational agricultural education, due to the fact that it is the first to integrate the principals of environmental education with vocational and continued education concepts. The aim of this study was to find out, if the design and construction of learning objects could be used in environmental and vocational education settings. The approach to this was qualitative. Educational methodology is based on "Forest Case Studies", abbreviated FCS, originally developed for learning in forest education. It contains elements of learning at school as well as forest related museums or collections and of course forests (Anon 2010, Enkenberg, et al. 2010, Enkenberg & Vartianinen 2010).

Methodology
The project started in 2011 and was completed in 2013. First the method was tested in a regular setting with a small class of 10 students in grade 9. After this there were two stages of an application in vocational classes. The first stage was set up to gain firsthand experience on using FCS for teachers and students and find differences between FCS-oriented approaches to learning versus the regular way of teaching with a class of 14 and control group of 13 students. Here written tests and group interviews were used to gain data on the effectiveness. The second stage was for the actual research and used the results of exams and group-interviews for information. The method was compared to teacher-centered and active learning environments and used 125 students.

Method FCS
During the first, articulation, phase the students are shown a phenomenon and formulate the driving question for the coming other phases. It is important, that the students find this question on their own. The students normally work in groups. In the next phase, the designing phase, the students conduct a literature review in the library or the internet and plan a mandatory visit to a place of learning (in this case a zoo). They choose real objects to study and start designing the structure. In the third collecting phase they actually visit the zoo, interview experts and start collecting data by doing their own research. This might be behavioural studies or whatever is appropriate for the phenomenon. The fourth phase, the construction phase, consists of organizing the data acquired through the research and visits to the learning environment. Through this they construct the learning object and find a possible explanation for the phenomena. Due to the fact, that the learning subjects in this research are animal related, the method should be named Animal Case Studies (ACS).

Test
Before using the method in the planned setting, I tested it for what it was intended for - environmental education. A group of 10 students, 9th grade (high/grammar school), had been working on a project to find out how many wild cats *Felis silvestris* were living in the local forests surrounding their hometown together with the local bureau for nature conservation. The students had been collecting genetic samples for two years. The hair samples were acquired from noninvasive hair snares, set up together with a forest officer and a conservation biologist. The pupils expressed a strong doubt on the reliability of the snares during an interview, due to the fact, that they were told, that this was the best way to gather the necessary material.

During the one year project we worked on this issue, starting by talking to environmental enrichment experts from the Hanover Zoo, studying big cats that where given scent enrichment in their enclosures and trying these scents on my own two Turkish Angora. Later constructing and trying different kinds of hair snares and finally collecting the samples in the wild. The whole project was considered very motivating for the students and resulted in a high level of trust in the results.

Study
To test the method in a vocational education setting we chose two groups of students that were both taking part in a one-year full-time education program in animal care and wanted to become animal keepers. The group taught through ACS consisted of 14 students (2, 12), aged 16 to 19 years, eight of them having special educational needs. These were considered particularly weak by the teachers and given a thorough methodology training in preparation of the project. The control group numbered 13 students (2, 11), aged 16 to 21 years, all of them from regular schools. Both groups had three weeks for the project and visited a local zoo in the beginning of the module. During the first day on the project test 1 was written to gain some insight on the existing knowledge of the students on the subject. At the end of the three weeks a second test was conducted. The third and final test was done six weeks after the students completed their projects.
None of the tests was announced, so they were unable to learn for these.

The two teachers responsible for the module worked as a team and were able to monitor the teacher behaviour of each other. The control group was given only one opportunity to visit the zoo, had no possibility to talk to experts and could rely only on the material given in the text books, while the ACS group could use all of these and were given semi-scientific access to scientific texts on the issue.

The results show, that the ACS group had very little knowledge in the beginning of the project, while the control group had a better average knowledge on the topic as predicted. The second test was more complex and tested the knowledge on those contents the control group definitely had in the lessons, while the ACS group, with the higher self-responsibility in constructing the learning process, may only have learned this while designing the learning objects. Surprisingly they performed much better at this test, compared to the control group. What is even more interesting is the fact, that learning by designing and constructing offered an increase in learning even though the project was over, as shown by the last test, similar to former studies on the effect of environmental education.

Beyond the mentioned effect on learning, the method seemed to induce a motivational increase for the students. Both groups included two pupils with an unusual high number of days spent skipping school. In the ACS-group no new days missing were counted during the project. That changed to the former behaviour when the students went back to "normal" lessons.

Furthermore the students in the ACS-group, who had preferred the internet for acquiring knowledge and solving tasks, changed to more scientific literature in the process; thus offering a solution for the problem in vocational agricultural education, that many learners are not able to use the literature available for self-organized continued education (Lehmann 2005).

The study might confirm, that ACS could offer an interesting approach to environmental and vocational learning in zoo-related educational settings. The competence and knowledge gain, by constructing and designing learning objects, improved gradually throughout the process and was considerably increased even beyond the run time of the project. On the other hand those who had experienced a regular learn-setting showed the "classical" symptoms of students only learning for a test and forgetting everything afterwards, which resulted in a considerable decrease in the knowledge. Confronted with these results the control group were asked to learn this method and be taught this way in the next part of their education.

Discussion

In forest-related learning environments the designing of learning objects is considered to be an elementary aspect of the educational concept (Pichler 2009). The influence of getting in contact with an inspiring expert seems to have a significant influence on later perceptions of the learner (Innocenti & White 1993, Hattie 2014). Designing of learning objects in a learning-environment where teachers and zoo educators work together as a team seem to be a sustainable and learner-oriented way for acquiring elementary competences and knowledge according to the principles of the WAZA conservation strategy (WAZA 2006). Phenomena suitable for this method might be everything, starting from evolutionary questions, human-animal-relationships, hibernation, eco-geographical rules, reproduction and maternal or paternal care in animals.

ACS and creative learning in a "school teacher - zoo educator - team" seem to be particularly suited for our aims in teaching students about zoos, wildlife and related issues.

References