

**Design-based research as a method to implement
learning-arrangements on school field trips**

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1 Introduction

Over the course of several years, researchers of the Institute of Geography at the University of Bremen have worked on numerous concepts for school trip activities for pupils that are action-orientated as well as task based by incorporating the station learning method. The following paper will discuss how field trips to agricultural locations can guarantee an improved quality of station learning itself as well as an improved quality of the individual stations.

The following investigation is based on three different types of learning concepts, whereas these learning arrangements are designed to be implemented on either dairy or laying hen farms. The first concept is to be conducted at a location that is a prototypical dairy farm in Northern Germany ("Weser-Elbe-Dreieck"), the second one at a prototypical poultry farm in South-East-Oldenburg – an area of agricultural ennoblement. The third learning arrangement deals with the topic "sugar beet" and can be carried out independent of a specific location. These variations of station learning were scientifically monitored and evaluated by means of Design-Based-Research (DBR). Consequently, it should be figured out whether the DBR method is suitable for the evaluation of school trip activities at agricultural locations.

2 Development of Station Learning Activities for Topics on Agricultural Production

During the past few years, school trip activities of this kind have been applied and have become increasingly common. Nonetheless, only few comparable learning arrangements that focus on agricultural topics for 15 to 19 year-olds are aimed at the implementation within nearby rural locations, exist.

Surveys conducted by students (who are in training to become teachers) of the University of Bremen revealed that pupils are in great favour of school field trips of the kind. It is evident that these kind of learning arrangements improve opinion-forming skills on important topics such as agriculture, nutrition and the environment. Moreover, their everyday behaviour regarding consumption and food habits are influenced as well.

This task-based and action-orientated station learning was developed in compliance with teaching guidelines of the respective German federal state. During the conception of the stations, components of scientific research methods were considered, as well as knowledge of task-based, action-orientated and product-orientated learning.

3 Design-Based Research for Implementation

DBR, which is a relatively contemporary form of research approach, increases the innovation capacity of research on teaching and learning methods and delivers insights on learning and teaching processes that are of practical relevance (Klees/Tillmann 2015, p. 92). The first is to identify whether there is a demand for action, whereupon a first outline can be drawn. Following, the outline's feasibility must be validated. In this case, the first designs of the different field trip learning

arrangements were reviewed by pupils, as well as by students from university. They discussed every single item of these arrangements. By making use of questionnaires, the students analyse and evaluate the arrangements in a careful manner. Based on these hints and points the scheme will be reviewed – it is called Re-Design. From own experience, this process of revision repeats itself two to five times to ensure quality development.



Figure 1: Design-Cycle (own illustration)

DBR is specifically recommended for transferring a theory into practice, which in return leads to an improved learning situation in the real world (Hempowicz 2016, p. 51).

4 Extra-mural Learning at the Dairy Farm

We came up with five stations for the station learning at the dairy farm. The topics are as follows:

1. Location requirement and conditions of production
2. Feeding of dairy cattle
3. Products from the dairy
4. Production processes of dairy products
5. Agricultural economics and dairy farming

In the following section, some of the feedback will be pointed out exemplarily. For example, after dealing with the second station, one of the students said: “All input channels were addressed.” Especially the conscious perception of the feed - maize and grass silage and concentrated feed pellets- and its smell were pointed out, emphasised several times and valued. Moreover, the station that deals with the dairy

production processes was stressed and well-received, because it made the processes easy to comprehend.

5 *Extra-mural Learning at the Laying Hen farm*

The topics that we came up with for the five phases of the station learning activities on a school field trip to a laying hen farm are as follows:

1. Ecological evaluation: Husbandry systems and egg production regarding ecology and the economy
2. Solving a Mystery: Intensive agriculture in the context of regional and international interdependences
3. Analysing satellite imagery: (Digital) exploration of agricultural areas for visual changes

The Mystery received positive feedback, since it links social and economic aspects. Satellite imagery is analysed during the third station, which students praised because it is close to the reality (Meer 2017).

6 *Station Learning “from sugar beet to sugar”*

Within the scope of a Master project at the University of Bremen, Institute of Geography, another action-orientated station learning exercise was designed on the topic “from sugar beet to sugar”. The different stations deal with questions about crop farming, agricultural production, the economy and human nutrition. This prepares pupils for their school field trip to a sugar factory. The target group of this teaching unit are pupils from grade 9-11 at grammar or comprehensive schools.

The station learning activates different senses and incorporates a variety of methods. During the evaluation period, students highlighted the experiment where pupils had the chance to extract sugar from sugar beet by themselves. Moreover, research- and discovery-orientated activities in connection to the crop plants were highly praised (cf. Linthe 2017).

7 *Conclusion*

Meyer zu Erbe et al. encourage the integration of agricultural issues accompanied by school field trips into the planning of geography lessons, since this way pupils have the chance to gain real-life experience on certain topics. Additionally, a continuous assessment of these school trip activities is crucial (Meyer zu Erbe et al. 2016, p. 16).

In conclusion, DBR has proven itself to be a suitable systematic method regarding agricultural station learning activities on school trips. Therefore, additional action-orientated learning arrangements considering agricultural topics should be developed in future.

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