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Farming Systems Facing Climate Change and Resource Challenges

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FARMLIFE: INTEGRATION OF FARM LIFE CYCLE ASSESSMENT IN EDUCATION

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Abstract

Due to increasing demand regarding climate change and environmental pressure, numerous methods to assess sustainability on farm have been arising through the last two decades. This fact also led to the development of the farm management-tool FarmLife (www.farmlife.at), allowing the comprehensive assessment of the farmer's operating data and a subsequent management change in economic and ecological respect.

Literature shows that previous research for sustainability assessment on farm deals with many different tools, indicators and methods for evaluating them. What is missing so far is a concept to address the educational sector for a wider range of knowledge transfer to the next generation of farmers. Agricultural education must deliver practical relatedness to resource and nutrient management, environmental and economic impact as well as insight in their interdependencies and possibilities of appropriate acting on farm.

Hence, our aim was to tackle an interdisciplinary teaching concept for agrarian colleges and high schools by means of software-modulation of the farm-management-tool FarmLife for the differing demand, development of appropriate educational material and a train-the-teacher concept. For this purpose, an elaborate package of education material and loosening games has been compiled and regular courses are offered for teachers of agrarian schools.

Both, the newly adapted tool and material are coordinated and enable different ways of working in class as well as a usage in different subjects throughout the curriculum. Assessment of the students' home-farm or choosing an ambitious topic for a project work is possible and encourages the students' communication and realisation at their home-farm. In the long term, FarmLife should shape the future of young farmers after their school-leaving qualification, in order to minimise losses and to define strategic planning targets. Experts from Austria and Switzerland ensure scientific as well as pedagogic competence and advance the development of the tool in technical, functional, and pedagogical aspects. Users' experiences tell us that the whole package is highly recommendable in spite of some initial difficulties in implementation at the various colleges and high schools.

Key words: sustainability assessment, FarmLife, farm-management, agricultural education

1. Introduction

One of the huge challenges of today's agricultural research is to find the right way for an efficient and effective communication between scientists, farmers, trade and consumers and – last not least – policy makers. In our times, it is our duty to deal with the assessment of sustainability and, the validation and comparison of the different assessment methods gains in interest. Hence, various methods for sustainability assessment in agriculture have been arising on the market during the last 2 decades (Bockstaller et al. 2009).

Since the nineties of last century – in fact since the Brundtland definition of sustainable development (World Commission on Environment and Development, 1987) – scientists

have been trying to develop methods to assess the sustainability of farms and to determine a pool of conclusive indicators as a basis for a coherent and consistent assessment (Boggia and Abbozzo 2002; Zahm et al. 2008). Many different tools evolved (SALCA – Gaillard and Nemecek 2009; RISE – Häni et al. 2003, to mention two of them, only), currently being in utilisation the more or less, and the variety is still increasing.

Depending on the scientists having been developing the different tools for sustainability assessment, their main emphasis lies on different aspects, thinking of data collection, expenditure of time, thorough analysis, coverage of the different environmental and agrarian sectors, spatial dimensions, group of intended users, practicability etc. Some of them still have to work on the user-friendliness of their tool to make it practicable and understandable. As Roesch et al. (2016) argue, for example, some tools rely on very sophisticated modelling and background calculations and are quite difficult to understand by non-scientists. Their research deliver a scientific base for a future use of synergies between existing tools like SALCA, RISE and SMART. Mostly, they offer high-level results calculated from large amounts of data, usable for scientific aims, only. Their usage requires a high standard of knowledge and is a very time-consuming process.

Contrarily to them, other methods are easier to understand and often seem to be less detailed and/or deliver less exact results, because of their differing method of data-capturing or questioning technique and an arbitrary determination of reference values (Guggenberger 2019). This, however, is the price for a quick and easy feasibility in practice. Descriptions of the different tools are to find at Gaillard and Nemecek (2009), Häni et al. (2003), Herndl et al. (2015), Roesch et al. (2016), Schader et al. (2016), Van Cauwenbergh et al. (2007), and Zahm et al. (2008).

All this led to the development of the farm-management tool FarmLife at the AREC Raumberg-Gumpenstein (A). It has emerged from the Swiss SALCA and been adapted to Austrian conditions in a close cooperation between Agroscope (CH) and the AREC (Bystricky et al. 2015; Bystricky and Nemecek 2015; Herndl et al. 2015). This online-tool (farmlife.at) tries to find a middle course between scientific accuracy and practicability for the users.

In the end, most of the previous tools lack concerning the implementation through missing communication activities. Hitherto, concrete communication concepts to address the education sector in agriculture are missing, although this represents an important forward-looking aspect. Especially our young future farmers have to be trained in sustainable farming by means of farm-related learning and an interdisciplinary access in order to understand the interrelations of their acting on farm and environmental impacts on resources. Especially on agrarian high schools, the topics sustainability in agriculture and society as well as environmental and resource management together with climate adaptation gain in importance in various curricula. However, up to now, the realisation of placing these topics in the different subjects and the essential interplay of the concerned teachers is missing very often.

Hence, we created an interdisciplinary teaching concept for Austria's agricultural colleges and agrarian high schools by means of modulating our farm management-tool FarmLife and compiling a package of education material, which is to be explained in the next section of this article.

Subsequently, the superordinate aim of this work is the broad implementation of the teaching concept regarding resource management and sustainability assessment in Austria's agricultural colleges and high schools. The paper aims to demonstrate the pedagogic concept as well as the intentions behind, and to shed a light on its implementation in agrarian education.

2. Material and Methods

Addressing the curricula of agrarian colleges and agrarian high schools, the pedagogical concept should work as an interface of agricultural science, education and agrarian practice (figure 1).



Figure 1: FarmLife as an interface between science, education and practice

Going along with our aim of the implementation of a new teaching concept in terms of sustainability assessment we started from our farm management tool FarmLife (www.farmlife.at, figure 2), which has been being tested in several projects up to now. Basing on this tool, the idea was to complement it by means of a comprised offer of presentations, learning material, tasks, and literature for the pupils/students (aged around 14-19) and to pimp it with some loosening games and activities for teaching.



Figure 2: Screenshot www.farmlife.at, start page

Hence, the pedagogical offer consists of three parts well completing each other and waiting to be applied in class in parallel.

The idea standing behind is to stimulate the teachers' teamwork of agricultural colleges or high schools. Optimally, a "FarmLife-team" should form up in order to assume responsibility for its implementation at the respective school.

2.1 Utilisation of the online-tool farmlife.at

The tool offers the possibility of an academically accompanied and individualised farm analysis (on yard gate limit) and classification, change of *or* development of *new* strategies, and repeated screening of data. It shows the different sections of a farm and it depicts interdependencies between location, animal husbandry, feeding, plant production, fertilisation, houses, agricultural machinery, and the markets. The tool's objective is to promote the eco-efficient management of Austrian farms. For a demo-version log in as max.mustermann@farmlife.at with the password 123456 or Elisabeth.musterfrau@farmlife.at with the same password, the latter one being a student's account.

As we knew from previous projects at the AREC, the tool was a good foundation but not enough for placing a real teaching concept in agricultural schools. On this account, the tool was subject to a broad revision resulting in a clearer user-interface, a much better user-friendliness and the preparation for utilisation in class, which is to be explained here, now.

The tool provides an easily understandable surface starting with the above buttons (figure 1). In the section "information and registration", some short videos offer a reduced information-platform on farmlife.at and can serve as a user guide.

Because it would be very time-consuming to organise the whole data-capturing of their home-farm together with the students (apart from the fact that by far not all of them have a farm at home), the tool has specially been prepared for class by providing individual students-accounts.

Instead of opening a regular farmer's account, students can register as such of a defined agricultural college in Austria. In this way they get access to a large list of model farms with different agro-systems (dairy farms, suckler cow, pig fattening, arable farming etc.), having been compiled from different FarmLife-projects and being ready to choose one of them for working in class. That is, students have the possibility to select one of these real farms as his or her project-farm and to get insight in the data and results of this farm, "peering over the farmer's shoulder". As the data of these farms are highly anonymised, the students can have a look in all captured data on the selected farm's inventory (area, houses and stables, machines, animals), its purchase and sale as well as on its fieldwork and yields, but without being able to change anything or to recover the identity of any farm.

Looking into the farm's results, they find a subdivision in resource-management, nutrient management, pollution and emissions management, and economic success. A large amount of key figures (e.g. buildings and facilities or age of different machines) and results in terms of environmental impact (e.g. global warming potential, land consumption etc.) of the selected farm can be looked at.

After a small introduction in class, they should be able to form their own opinion in terms of the farm's management and to interpret the results. Links to an online library installed in the FarmLife-tool's result-section provide additional information on special key figures of the project-farms.

On the right hand side of the charted results to every key figure and environmental impact, the students find interactive knowledge questions, which can generally concern this knowledge field or be related to the chosen project-farm's results. These questions to the four sections of results allow individual online-answers and interpretations by the students, for example as a homework or as a final paper. As the students' accounts are accessible for the respective students, only, they have the possibility to print a pdf-file containing their completed questions and answers in order to hand them over to their teachers. Thus, the completed list of answers can be used as a check of the learning objectives. On higher colleges, there is the possibility to write a creative and individual thesis basing on own (self-captured) data or the data from a chosen project-farm. It is possible, as well, to refer to one production branch, only, or to compare different agro-systems. Students are free to find an interesting topic and can ask for help from the research group for eco-efficiency at the AREC Raumberg-Gumpenstein.

2.2 Learning material

The second part of our pedagogical concept consists of a large package of learning material divided into two sections – an introductory section and the real FarmLife-section. In total, there are 12 modules filled with learning material being related to the online-tool (Finotti and Gruber, 2017). An introductory paper for the teachers provides a short description of the modules and explains utilisation in class.

Figure 3 shows the introductory path of five modules thematically leading to sustainability assessment, life cycle assessment and eco-efficiency.



Figure 3: thematic structure for the introductory modules

The module "History of environment" deals with the interaction between humans and their natural and cultural environment. Some keywords to this topic are biodiversity, land cultivation, soil, water, air, urbanisation, global trade, tourism, and climate change – all of them being in continuous correlation to each other.

Three modules dealing with sustainability include the topics sustainability in agriculture and in society as well as assessment of sustainability. What means sustainability in agriculture and in society? How can agriculture have a promotional impact onto society and how can society forward and claim sustainability in agriculture? These modules slowly lead into the fifth module covering life cycle assessment and eco-efficiency.

The sixth module (see below) already represents a first general introduction to the FarmLife-tool, but in principle is part of the introductory section, as well. Modules no. 7 – 12 are the core of FarmLife-modules leading from a detailed explanation of the data capturing and realisation of results to the interpretation of the latter ones. The distinct modules are oriented towards the fields of knowledge in the tool:

6. General introduction to the idea of FarmLife
7. Data-capturing in FarmLife
8. Result sections in FarmLife: Resource management
9. Nutrient management
10. Pollutant management
11. Economic success
12. Overall assessment of the farm

Learning material for each of the 12 modules consist of:

- Power point-presentations
- Small booklets
- Leaflets with the most important information on the respective topic
- Worksheets (partly directly related to the project-farms in the tool)
- Additional literature and information for teachers

The introductory part of modules can thematically enrich the subjects or fields agrarian marketing, ecology, climate (change), environmental resource management, whereas the definite FarmLife-modules suit a range of agricultural subjects like plant production, animal husbandry, agricultural engineering, and business management.

2.3 Educational games and activities

People like to play for fun and joy in succeeding. Experts emphasise the boost of learning ability and retentiveness of humans through a playful and emotional access to things. On this pedagogical background, the package of FarmLife for agricultural schools – beside the actual tool – offers a range of such approaches.

To this end, the AREC's research group for eco-efficiency designed some games in order to help teachers to loosen their lessons. Simultaneously, the students can learn a lot by means of these games.

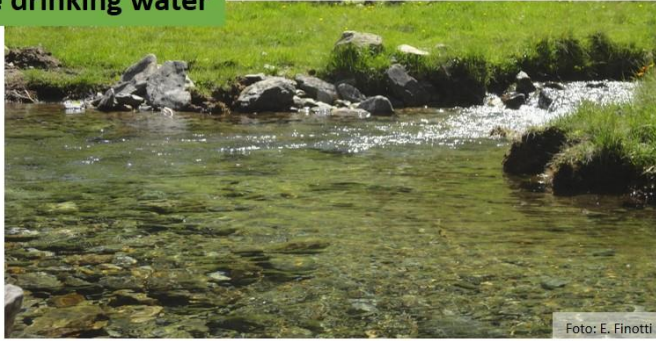
In total, four special games or activities have been created, all of them to be applied with students from 14 years of age (that is for agricultural colleges and high schools):

- i. Price and value (figure 4): The assessment of everyday needs and the term "appreciation" play a crucial role. By means of a package of 30 small cards, the students should realise the difference between the price for something and its individual and/or emotional value. That is, they should estimate the market price for the given example and assess their individual benefit or profit of it.
Example: according to his card, a student should estimate the market price of 1

litre drinking water. He estimates a price of 0.2 cent. He answers the second question on the card like that: "Drinking water is subject to special regulations. Nevertheless, its quality can be different. Always depending on my current situation (where am I, am I thirsty or not, is there enough drinking water available etc.), my personal benefit of one litre high-quality water is very high. Therefore, under special circumstances, I would also pay more for it."

- ii. How to communicate value: the teachers gather about 20 different milk cartons and write the price/litre on them. The students should realise the correlation between marketing instruments (information, labels, messages, values, pictures on the cartons) and product price. Subsequently, they estimate the value of the respective milk and put the carton on one of previously prepared 3 pieces of paper with the terms "high", "medium" or "low" quality. They should discuss in a group the appreciation for milk and its quality.
- iii. Word clouds: A third activity deals with the three dimensions of sustainability (economy, ecology, social matters). The game needs three dices with pockets for small pieces of paper. Each dice stands for one of the dimensions and contains six questions to this topic. Students throw the first dice from one to each other and answer the questions, spontaneously and as quickly as possible in order to get 30-40 answers (double entries are possible), being converted into simple terms by the teacher, who then creates a word cloud of the terms showing an interesting result for discussion. **Example:** Three of the six questions for the ecology-dice are: (1) Which are the farm's impacts on environment? (2) How does the farm pollute soil, water and air? (3) What does the farmer use over many years?" Example-answers for these questions are: (1) emissions, (2) pesticides, (3) agricultural machinery.
- iv. FarmLife Tactics (figure 5): it is a quite complex role-play. Here, correlations between agriculture, trade, consumers and society/politics become clear. A game-board with areas of environment (landscape, water/soil/air, animal welfare, climate) is the foundation together with some playing cards with special tasks and play money. Special tasks on the cards demand certain amounts of money and cause different effects on environmental fields. The participants filling the roles of i) a farmer, ii) the trade, iii) the consumer and iv) society/politics (like indicated at the edges of the game-board) should try to act possibly eco-efficiently.
In a lively discussion between the participants, they should use their knowledge from the FarmLife-modules as well as from interpreting their selected model-farm and understand the dynamics between the four actors as well as the consequences of their actions on environment and on their own welfare.

1 litre drinking water



Your task:

- 1) Estimate the price of 1 litre drinking water!
- 2) Evaluate YOUR personal benefit of it!

Figure 4: example for the package of 30 small cards of the activity “price and value”



Figure 5: the game board of “FarmLife Tactics”, 2019 developed by the research group for eco-efficiency of the AREC Raumberg-Gumpenstein

Beside these described games, we also created and/or adapted some other activities for application in class:

- i. A small form of a science slam especially for FarmLife
- ii. Patchwork-texts with reference to the project-farms
- iii. Thinking-caps method (discussion with different roles)
- iv. The common land dilemma (dealing with the problem of consumption, e.g. fish in a lake, and resource management: “How much can we all fish without endangering fish stock?”)

Summarising, the offer of FarmLife – besides of the online tool with its students-accounts and project-farms – comprises a large package of education material and educational games. Lots of literature, references, links and instruction videos as well as two image films refine it, additionally.

The different types of application of this package as well as its dissemination and feedback from the educational sector are debated in the following section.

3. Results and Discussion

The main result is the application of our whole package (tool, education material and games) by teachers in agrarian colleges and high schools in Austria, which can either take place embedded in different subjects in class or as a special project (e.g. a project-week or some project-days) for the students, maybe including a final paper, as well.

The tool's producers have tried to offer a good mix of thorough analysis and accuracy with user-friendliness and feasibility for the practitioners and comprehensibility for trade, consumers and society/politics. In order to place the tool in the Austrian education sector, the attempt has been made to adapt it for its application in class and to complete it with educational material. In total, there emerged a pedagogical concept for a competence- and future-oriented knowledge transfer with practical relevance in agricultural schools.

The use of the tool www.farmlife.at is free, and it is accessible for everyone. The entire education material is available on the learning platform of the website of the University College for Agrarian and Environmental Pedagogy (HAUP) in Vienna.

There is the possibility to work with own data from the students' home-farm or by means of project-farms (model-farms), which is much easier and less time-consuming, because the collecting of data ceases. In parallel, tool and education material (worksheets etc.) can be used, as they complement each other.

3.1 Application examples and feedback

Tool/worksheets/games: *Students find a disassembly of their selected model-farm's fertiliser into its components and its evaluation in the result-section nutrient management in the FarmLife-tool. The section pollutant management shows the fertiliser's possibly toxic impact on environment referring to nitrogen and phosphorus input in water. Interactive online-questions deal with avoiding loss of phosphorus, among others. Additionally, students find learning material to these issues and worksheets referring to their model-farm and can interpret the farm's results. Furthermore, the "Price and Value"-activity refers to these issues by means of different cards (e. g.: "Estimate the market-price of 1 m³ fertile soil!"). At the game FarmLife-Tactics, at least one of the playing cards also refers to this issue. The (farmer's role) task on it: "I intensify vegetable growing in order to be able to feed even more persons." In the role-play, the "farmer" has to convince the other actors, who consider their own benefit, to co-finance his project, which has also certain impacts on environment.*

Feedback: As we already know from several teachers of different colleges, they are very impressed with the interaction of tool, learning material and games/activities. Of

course, the latter ones are very popular among the students. Teachers told us that they like to utilise the interdisciplinary material, because it facilitates a good lesson planning and stimulates a deeper understanding of mutual interactions in agriculture. Especially FarmLife-Tactics causes professional and emotional discussions.

Pedagogical concept in a college: *after having attended our teacher training, one of the colleges in the federal province Salzburg contacted us, because they have an engaged plan for their students in the three years of curriculum. We are going to help them with an information meeting for the students' parents to start the project:*

- *1st year: data collecting from the home-farms of the students' parents (data of 2020)*
- *2nd year: days of action with intense data-input in the FarmLife-tool*
- *3rd year: data evaluation in different subjects (plant production, animal husbandry, techniques, business management). That is, frequent integration of tool and teaching package during the school year*

Feedback: For now, it is rather difficult to deliver a large amount of feedback to our pedagogic concept. There is a thesis being written by a student of the University College for Agrarian and Environmental Pedagogy in Vienna, at this time. The paper's aim is a qualitative analysis of the schools' opinions and their ways of application, they have tried until now. From our teacher trainings and subsequent contact to the schools, we got some feedback to our questions, which are to find in the respective paragraph, here.

Always at the end of our teacher trainings, we carry out a small final workshop, in which the participants give us feedback to the courses and to their view of the pedagogical concept and possibilities to increase the consciousness for appropriate interdisciplinary teaching and learning.

First questions deal with the previous proceeding of knowledge transfer from class to agricultural practice and with the importance of the topic sustainability (assessment) at school and for the students. In most of the agricultural colleges and high schools, there is relatively high linkage of theory and practice by means of model plants, excursions, field-walking, practice-classes at the school's own farm and, sometimes, adult education for farmers, as well. However, there is rather little teamwork between the distinct teachers of different subjects in order to promote an interdisciplinary view of options for action on farm.

The issue sustainability and its assessment has very different status in the various schools. It is addressed in different ways in several subjects over the curriculum. Until now, there seems to be no real plan to integrate the topic in all the concerned subjects and to come to an agreement in terms of a temporal and knowledge-related proceeding in class.

Almost all the participants of our previous teacher trainings gave us a very good feedback on the courses in terms of structuring, contents, comprehensibility, offered material, and applicability. The difficulties, however, are to be seen in the facts that mostly, the teachers of different subjects hardly utilise their synergies. Thus, a better teacher teamwork has to be pursued. A special contact person from the AREC is desired, who gives some accompanying help in the implementation and maybe in potential production of final papers by the students. A merging of lessons, better structuring and conveying of contents suitable for the students, maybe in interdisciplinary projects or lessons, would be necessary.

Aggravating factors for the implementation can be rigid structures (schedule), missing support and cooperation with colleagues and headmaster as well as a full course of the year reducing flexibility at school site.

The implementation of a school-internal “FarmLife-network” was the idea of some teachers, in order to integrate colleagues and eliminate technical uncertainties. Another idea was to establish a network between schools, research and economy for collecting of data, information exchange, discussions and appreciation between the multipliers of knowledge transfer (sometimes partner companies of school classes). Concretely, the following partners could make sense: Chamber of Agriculture, Rural Training Institute, agricultural colleges (needing more technical input from science), agricultural graduates and masters, machinery rings, organic farming organisations, market partners, school partnerships. Partly, these co-operations already exist.

Further multiplication effects could be utilised to disseminate the importance of a common effort for interdisciplinary learning at agricultural schools, especially regarding the issues sustainability, resource management and climate change. Beside the already mentioned institutions, this could be realised by symposia, educational referents in the regions, work groups, annual meetings or regulars, training days to list some of them. Some of the concerned teachers are of the opinion that, on the long run, life cycle assessment has to become compulsory as basis for support.

3.2 Communication and dissemination

Basing on our material, we started some communication strategies in order to promote and disseminate our concept in the Austrian federal provinces. Direct contact not only to university, but also to regional school inspectors for agriculture, headmasters, subject coordinators and specially engaged teachers of several schools help to place the program in their curriculum. In this respect, FarmLife and our pedagogical concept was one of the issues in several headmasters’ conferences in some of our federal provinces.

In spring 2019, we started to offer regular courses for teachers. The course “FarmLife for Practice – Train the Trainer”, an advanced training for all teachers of agrarian schools, is a two-day seminar, which takes place twice a year. In these courses, we present our pedagogical concept with the tool and its application as well as the education material plus the games and give an insight to teaching methods and possible theses. Additionally, the specialist background to FarmLife delivers a small contribution.

The same course has already been carried out as one-day seminar, being part of the advanced training days in the provinces that take place for the teachers of agrarian schools every year. On request, we can also carry it out for a small number of interested teachers at the AREC.

Furthermore, FarmLife is part of the lecture *education management* at the mentioned university.

An educational concept for students at the University of Natural Resources and Life Sciences in Vienna has also been worked out and has been starting in cooperation with the Division of Organic Farming in November 2019. Here, FarmLife is part of the course “Cycle of Materials”. The students will get to know and utilise FarmLife and have to write a seminar paper on it.

The utilisation of FarmLife in agricultural practice as well as in class shows the whole range of different aspects to be considered on farm and the interactions of location, animal husbandry, plant production, feeding, fertilisation, houses and machinery on farm and so on. Furthermore, it can help to develop the strategies for a change in the management of certain sections on farm. Applying FarmLife, the users can realise, which part of their enterprise has to be changed for a better overall result and more economic and ecological efficiency.

Additional to our online offer of tool, literature, videos and education material, we decided to create a special “FarmLife Education Box” to support the schools concerning implementation. Essentially, this real wooden box contains a flash drive with the total of our information and material. Additionally, we put the game-board of our designed FarmLife Tactics, including the necessary game material, into the box. In future, every school sending one or more teachers to our FarmLife courses will receive this box.

3.3 The practical relevance of the education concept

Overall, the effective sphere of the pedagogical concept is to be seen globally (figure 6).

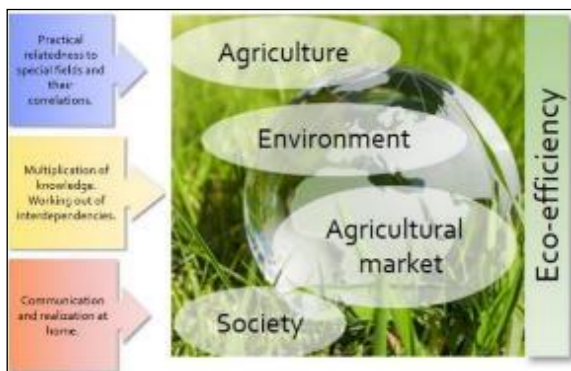


Figure 6: sphere of the pedagogical concept

Agricultural education:

The youth benefits from a plus of interdisciplinary and practice-related learning and more teamwork of the concerned teachers. Furthermore, many interesting topics for diploma theses arise. Many of the concerned students are of rural origin and are therefore quite interested in practical learning and improvement in terms of income and environmental impacts. Of course, in the beginning, it is necessary to develop a school-individual concept for starting the “FarmLife-project”. Here the AREC can provide assistance.

The support of the future young farmers is the essential point. They bear individual reference to different aspects of life, like desired income and product prices, family situation, product quality, environmental impacts etc. How did the students grow up and which basic values did they learn? Here we are again with the game of “price and value”, and with attitude and appreciation: generally, decisions are supported by a set of basic values and attitudes and have to be made by means of individual relations to different aspects. This often causes ambivalence (Hänze 2002). Therefore, options for

action always have positive and negative aspects. More knowledge offers decision support in the direction of an environmental-friendly, ecological management. Thus, the way of communication between science and agricultural practice (Baumgartner et al. 2016) seems to be quite crucial to obtain the desired effect at (young) farm managers. This, of course, also applies for society, trade and policymaking.

In class, by means of interdisciplinary teaching (far from clearly defined subjects) there is enough possibility to draw the students' attention to the correlations of farm management and environmental impacts. However, there is still a lot to be done in terms of the headmasters' and teachers' engagement to implement our concept.

Agronomic community and society

The benefit for the agronomic community and for society lies in the fact that an interaction becomes possible by means of the farm-management tool FarmLife – on the direct way to the farmers as well as via educational institutions by means of a comprehensive pedagogical concept with a wide range of knowledge and ideas. The direct effects in agriculture and environment arise from a broad analysis of the farms' data and the development of further strategies by the farmers. Society and policy makers get more insight into life cycle assessment for agricultural products.

Benefit for other countries

The reader's benefit lies in getting to know a new pedagogic concept and its way of working in Austria, up to now. This can get the ball rolling for possible adaptations and its utilisation and implementation in other countries. –

Due to the direct contact between many teachers and the research group, the teaching concept with tool and learning material plus games for agricultural schools is subject to constant quality control and serves as an interface between science, education and practice. It promotes collective learning not only in agricultural practice but above all at the rural youth representing the next generation of farmers. This is a help for environment on the one hand and, on the other hand, enhances the influence of up-to-date research findings in terms of resource management and climate in agricultural practice as well as in politics, trade and society.

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