

Tierschutz erLeben. Devising a “Comic Automaton” to Innovate Learning

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Abstract: The ongoing German R&D project Tierschutz erLeben aims to improve the animal welfare learning experience, primarily for agricultural students. The knowledge domain is shaped by many interrelated facts, often about informed decision-making under specific circumstances and the possible consequences. Unsatisfactory frontal teaching prevails in the current praxis. In contrast, the abstraction level and the complexity are less demanding. An interactive simulation close to reality is not necessarily a solution as it can be inefficient and incomplete, failing to cover all necessary facts. We are working on an innovative gamified approach based on the concept of interactive comics, which shall be more efficient than realistic simulations potentially encompassing all necessary facts. In our sense, an interactive comic is a form of a simulation with a comic’s feel and look. We call it a Comic Automaton. As with every comic, our system presents only relevant story events, thus promoting efficiency. Textual descriptions, diagrams, and other means that help attain completeness are easily incorporated. A Comic Automaton is highly interactive. The immediate goal of the learner is to interactively and iteratively create a story about management in animal husbandry, where every decision is correct and substantiated. Accomplishing a complete, correct comic is an indicator of learning success and shall be an experience of fun and satisfaction. Decisions of the learner, including mistakes and lacuna of knowledge, will trigger automatic continuation of the comic. For example, a comic frame where the user decides not to feed enough milk to a calf will trigger an automatic new frame where the calf becomes weak and possibly even dies. Especially in the field of animal husbandry, virtual exercises that might also have a bad outcome for the animals are very important. Without real animals coming to harm, important lessons can be learned from these mistakes. The details of the Comic Automaton are ongoing work. Two user-centred workshops were held so far to unfold further and test the ideas.

Keywords: Simulation, Decision-making, Animal husbandry, Animal welfare, Storytelling

1. Introduction

The common practice of livestock farming is discussed controversially in society, and various approaches aim to improve animal welfare in livestock farming (Spiller et al., 2015; Boehm, 2010).

However, scientists from the agricultural and animal sciences also complain about a gap in the transfer of knowledge from research to practice (Hoischen-Taubner, 2021) and that the knowledge is not fully implemented on farms (PaeRi, 2020).

Creating attractive learning content that transfers new knowledge to trainees and students is crucial for effective application on farms. The innovative media didactics approach is a key focus of this project. The interdisciplinary team comprises game and graphic designers, media computing, veterinary and agricultural scientists and students.

How can realistic situations on farms be taught? And how can this be effectively processed in a digital form? Finding answers to these questions is a central goal of the R&D Project Tierschutz erLeben.

During the first year of the project, ideation and evaluation were on focus. Our initial approach developing a 3D game-like learning environment that would be visually and with regard to the behaviour of animals and things in it “realistic” was dropped early because “realistic” treatment of cows and sheep in a simulation is very time-consuming, and thus not an efficient approach to learn specific things. Instead, we decided to focus on a modus of representation and storytelling that would expose the user only to story and learning path-relevant farm events, skipping everything else.

2. Interactive Comics

We are currently developing and testing the Comic Automaton concept to meet the following requirements...

(a) it fosters learning by trying and doing, (b) it integrates learning assessment and a learning strategy, (c) it contains game elements for additional structure and motivation, (d) it is visually attractive and easy to

understand, (e) the experience is overall inviting and encouraging, rather than dry and “traditional”, (f) it represents and simulates correctly farm situations and animal behaviour, and shows consequences of correct and wrong decisions, (g) it is not only a platform for trying and testing, but also for learning for examinations, integrating text and visual explanations, rendering a textbook superfluous, in principle, (h) it allows for the easy integration of storytelling, for identification, structure, and other engagement.

In our approach, a comic consists both of “normal” comic frames, and of frames that allow interaction. These interactions (typically decisions) lead to specific narrative threads and outcomes. The comic is drawn automatically, and the story is told gradually as the learner engages with the interactive frames. Thus, students generate their own stories depending on their decisions. The learner can even experiment with intentionally wrong decisions (e.g. by wilfully providing a calf with unhealthy first milk) to understand the negative consequences without real animals being harmed.

Learners can change their decisions and observe alternative outcomes in the interactive comic. A storybook is generated to summarize learning experiences and achieve the goal of a mistake-free final comic.

Interactive comics (or game comics) are not yet sufficiently understood with respect to interaction and algorithmic storytelling, let alone in the context of a learning system (Goodbrey, 2017). As described by Neo and Mitchell (2016), there is still a conceptual gap between interactivity and narration. Therefore, we have to choose cautious steps in our project that allow for early testing and fast development of prototypes.

3. Methods

For the creation of the comic, we are developing the concepts for the interaction logic, algorithmic story generation (the ‘Story Engine’), and visual representations. In order to be able to set foot on the ground despite the complexity of the remaining open questions, we are currently anchoring our ongoing ideation process in linear stories and devising interactivity from there. First, we summarise the latest relevant content from the area of animal welfare, and didactically reduce it to its core.

The content is then put into a linear comic with illustrations that represent a “happy path” (Figure 1) on a farm. A happy path means here that all decisions in the story are correct regarding animal welfare. The “happy path” is then expanded to form a decision tree that branches out at the critical points of the story. This leads to interactive narrative threads. The result is a comic strip with a main “happy path” and branching stories, including “unhappy paths” (Figure 2). Note that this process and structure are a methodological step within the ideation and evaluation process and it still needs to integrate the final interaction design and algorithmic story control.

At the moment, branches are created where a wrong decision can be made or unexpected events occur. This lays the ground for the interaction of the learners.

We are using Unity game engine in a 2021 version, along with the Panoply plug-in for comics. However, Panoply’s flexibility for dynamic comic creation is currently in doubt, and we may consider replacing it with our own control modules.



Figure 1: Happy path of the colostrum management comic

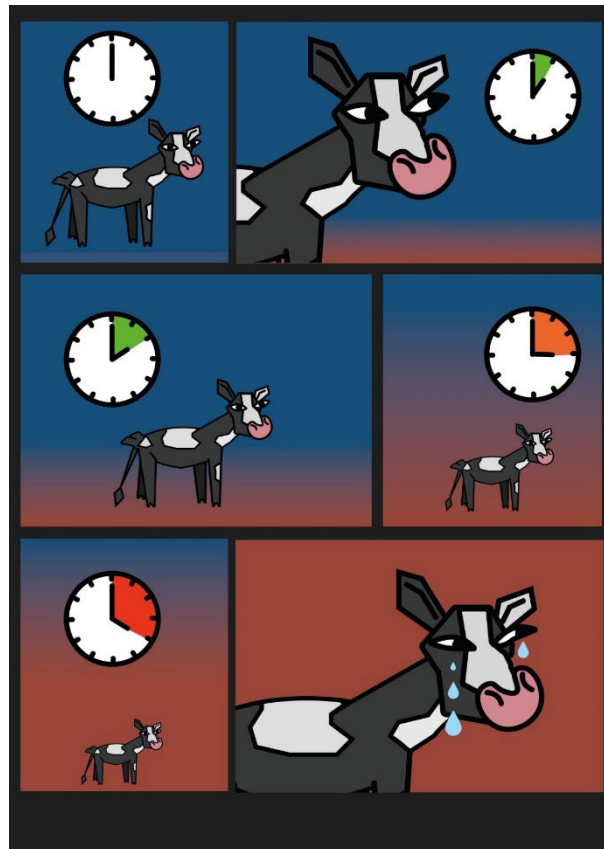


Figure 2 Example of unhappy frames

In order to successfully convey the learning objectives, it is of great importance to show negative results in the area of animal husbandry. What are the consequences if a calf receives too little, too late or inadequate colostrum (first milk)? How can the consequences of different choices be presented to each learner without monotonous repetition and over-complex implementation?

The format of an interactive comic promises, with comparatively little effort and introduction, to generate systematically different narrative threads with different outcomes. Several conceptual questions of the Comic Automaton are still under analysis. For example, it is not clear at this moment whether the Comic Automaton should take the learner back in time to branching points in order to allow correcting a wrong answer or if we should instead add a new storyline with a repetition of the previously quest in case of a previous bad decision of the learner, in order to allow making it right, without erasing the past.

Regular workshops with the target group are conducted to test ideas, concepts, and prototypes. Two different precursors of the Comic Automaton were evaluated in a workshop by means of an established User-Experience-Questionnaire (UEQ) according to Schrepp et al. (2014), qualitative questionnaires and brainstorming. In the UEQ, Prototype A (classic learning game) performed particularly well in perspicuity and efficiency, whereas Prototype 2 (learning machine) performed better in attractiveness, stimulation and novelty. It should be noted that only novelty showed a significant difference by means of a T-test. The state of the Comic Automaton presented in this paper will be tested for ease-of-use and usefulness in another workshop in the fall.

Undergraduate students are currently developing storylines for the Comic Automaton alongside the core team. Integrating the students into the conceptual processes exemplifies our efforts to involve the target group in the higher education curriculum.

One of the potentials of employing comics as a starting point lies in the simplicity of providing additional background information side-by-side with the main storyline. For example, concerning colostrum management, we can add frames explaining the consequences of drinking colostrum for the calves' body.

We simply draw a glassy calf (Figure 3) to visualise abstract biological processes within the comic and in its style.

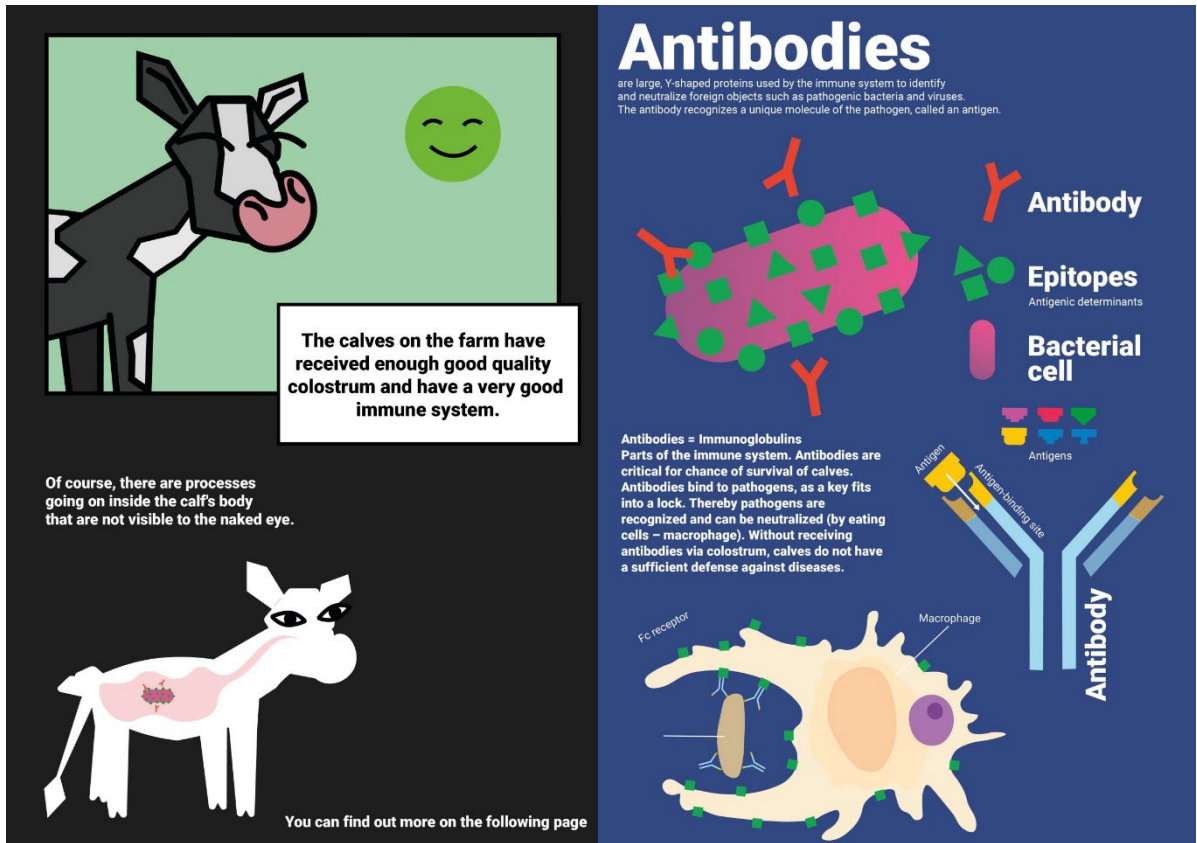


Figure 3: Information beyond storytelling



Figure 4 Using paper-prototypes for development

4. Conclusion and Further Approach

We are sure, departing from the workshop results and our conceptual work, that a Comic Automaton is a most promising approach to convey decision-making processes and courses of action in the domain of animal welfare, but certainly for a multitude of other areas as well. The conceptual framework for the interaction and learning path design, which sets the order and content of comic frames, is still being developed. The next step involves creating a Story Engine module for the automatic generation of the interactive comic

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