

EcoFarmer

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Abstract

Agriculture is indispensable for humankind survival, however mankind is leaving the countryside towards urbanized areas, abandoning that most important activity. This thesis describes the serious game developed to portrait the agricultural scenery of Castro Verde region, teaching about the difficulties faced by the local farmers, how agriculture affects the steppe birds, and how the birds influence the local tourism. The game was also designed to be entertaining in order to be played, otherwise players would get bored and avoid playing it, making it impossible to transmit the knowledge to them.

Conclusions of the evaluation of this game showed that it was efficient in teaching about the agriculture impact on the steppe birds, and the difficulties the farmers face in order to get profit from their lands. Gamers have also found the game interesting despite it being an unfinished work which can be improved, by making it more appealing and fun.

Keywords: Serious Game, Agriculture, Castro Verde, Steppe Birds

Introduction

Agriculture is indispensable for humankind survival considering it is one of its main providers of food. However rural areas are becoming desertified, since man is migrating towards urban areas, abandoning this most needed activity.

It is not only mankind that can profit from this activity, as the lands transformed by agricultural activities became the habitat of many species. For example, in Castro Verde, a region of Portugal, steppe birds need humans to plow the soil, so bushes are cut, and they can build their nests on the floor. Without farming, these birds will not breed on those bushed areas. However if the agriculture activity is too much exploited, their eggs might be smashed. Thus there must be a balance.

This work presents Ecofarmer, a serious game developed to portrait Castro Verde's agricultural reality, teaching about the farmers' difficulties, how the agriculture options affect the steppe birds and that these birds are important to the region.

Related work

Agriculture in Castro Verde

Every region has certain climate and soil properties that influence the kind of crops that can be planted on those lands. For this work, only the characteristics of Baixo Alentejo region, more specifically Castro Verde, will be considered.

Castro Verde has a Mediterranean climate according to the Köppen-Geiger classification (Kottek et al., 2006). This climate is characterized for having warm temperatures, a hot and dry summer, with precipitation mostly on autumn and winter.

The soil in Baixo Alentejo is not very fertile. In fact, since the Wheat Campaign, between 1929 and 1932, the soil got exhausted and erosive (Dias, 2009; M.J. Roxo & Casemiro).

All these factors affect the types of crops that can be produced on those lands. The most profitable ones are upland cereal, legumes, tomatoes, sunflower, potatoes, corn, olive, cork tree and vineyard. The livestock in this region is mainly composed by sheeps, cows and pigs.

In order to spare the land from exhaustion, a crop rotation system, where part of the land at rest, is used. Usually the cropless lands are used to raise flocks and cattle.

Farming Business Alternatives

There are many activities, other than agriculture, a farmer can do with his property to increase his revenue.

For instance in order to benefit from the local rural tourism, the landholder might create pedestrian, cycling or equestrian routes in his properties. An information stand, that offers horse riding classes and rents or sells equipment (binoculars, maps, canteens, compasses, bicycles, GPS equipment), might get money from this kind of tourism (Sarmento, 2010). A pedagogic farm is another idea that reutilizes the resources the farmer already has, like the crops and livestock, and grants some extra revenue.

Eco-Tourism Housing is a good way to get money from local tourism. The landowner can construct a guest's house, which can be rented, occupying a small portion of in his land. In addition, a restaurant might be a good complement, offering the taste of the local products and gastronomy. Building a swimming pool or a garden is also a good option, which will not only attract more guests, but can also be used for owner's leisure.

There are also some activities that a farmer can organize to attract people to the property, like rally papers or tractor rides. In complement, building a mill can be a great opportunity to display the traditional folk art of bread making, supplying the visitors whit the opportunity to experience the process in first hand and consequentially attracting more tourist to the property. The bread and the other farm products could be sold on a selling stand on the property (Sarmento, 2010).

Installing a solar energy system, will not only reduce costs, but will also grant some revenue by selling the surplus electricity to the electric company.

There are many other options that can increase the farms revenue, like creating a four wheel motorcycle circuit or building a paintball camp. But these options will disturb the peace and quiet enjoyed by the rural tourists.

All of these business alternatives have revenues and expenses associated. The consequences of the investments decisions depend on other external variables, e.g., if there is not a large enough number of tourists visiting the property, the businesses will only generate debts, because the relations between expenses and income will not be sufficient to grant profit.

Biodiversity Agriculture Dependent in Castro Verde

Cereal steppe or pseudo-steppe is an habitat man-made, which is characterized by having dry land cultures (cereal and livestock), few trees, high number of fallow lands, low relief and precipitation (LPN, 2002). These habitats are propitious to the Iberian steppe birds to live in, since they nest on the bushless floor, have better hunting sight and consume the local vegetation.

However, people are changing this environment by diminishing the crop rotation cycle, overgrazing, changing the cultures to forestry ones, constructing infrastructures (roads, dams power lines, fences) and abandoning lands (ICN, 2006; Rita Alcaraz & Estanque, 2009).

Farmers benefit from the birds presence, since they attract "bird watching" tourism to their local villages. The local producers not only receive payments for environment services from local development programs, e.g., the Proder program¹,but can also sell their products to the tourists (Alcaraz & Estanque, 2009).

In order to maintain the biodiversity of birds, farmers need to remove fences from their property or signalize them, so birds can walk through properties, see them and avoid colliding with them. Dry land cultures with crop rotation system must continue, with more than 50% of the property being at rest. The number of livestock on the fallow lands must be limited, and in reproduction season machinery work must be avoided, to prevent eggs from being smashed. Local producers can also construct artificial nests, so birds can reproduce in their properties (Alcaraz & Estanque, 2009).

The most notorious steppe birds that can be seen in Castro Verde are (Sarmento, 2010):

Abetarda (*Otis tarda*)

Sisão (*Tetrax tetrax*)

Peneireiro-das-torres (*Falco naumanni*)

¹ www.proder.pt

Rolieiro (Coracias garrulus)
Tartaranhão-caçador (Circus pygargus)
Cortiçol-de-barriga-preta (Pterocles orientalis)
Grou (Grus grus)
Alcaravão (Burhinus oedicnemus)
Milhafre-real (Milvus milvus)

Agriculture Video Games Analysis

There are a great number of agriculture video games available in the market. Most of them are simple, low budget, online flash games, mainly targeted to casual gamers. But there are also more complex ones, targeted to a less casual audience. In this section, several of those games will be surveyed and evaluated in order to understand what makes them fun to play.

In order to evaluate and compare those games, an heuristic evaluation was developed. This heuristic evaluation was made by the observation of common patterns between the chosen agriculture games.

The metrics considered were:

- Appealing characters - characters that represent players or other agents, and were made with the intention to make the player empathize with them.
- Unlockable content - in-game content that can only be accessed or used after the player completes some required objectives.
- Possible actions - there were four kinds of actions that were familiar to most of the agriculture video games, basic(b), complementary(c), advanced(a) and extra(e). The basic actions (b) are to plow, plant seeds, sprinkle and harvest. The complementary actions(c) are to use pesticides or fertilize the crops. The advanced actions (a) are managing livestock or buying and using tools. The extra actions (e) are those that allow players to edit or embellish their avatars or farms.
- Game speed - if the game is in real-time, turn-based or by ticks. Real-time games progress as time goes by. Turn-based games progress, when the user ends the turn. In ticks-based games, players accumulate ticks as time goes by, they can do action by expending ticks. If a gamer runs out of ticks, he needs to wait until the ticks replenish, so he can do the intended action.
- Easiness to play - for this evaluation, games that require a great effort to be learned to play are not considered easy.
- Clear goals or missions - if the game has predefined missions or goals that the user must accomplish.
- Tutorial - if the game has any kind of in-game tutorial, learning levels or missions.
- Rewards - if the game gives any kind of reward to the players as he progresses through the game or as he accomplishes some determined goals.
- Story - if the game has any kind of story.
- Personalization - if it is possible to personalize the avatar or the farm.
- Sound - if the game has sound.
- Serious Game - if the game's primary goal is other than entertainment.
- Social - if the game provides any kind of social interaction with other human players.

Twenty seven agriculture video games were tested and compared. Figure 1 shows the results of the evaluation.

By analyzing Figure 1 we can conclude that the majority of the games have appealing characters, unlockable content, real-time progression, tutorials, goals or missions, rewards, sound and are easy to play. The most common actions available in the games are the basic,

Game	Appealing Characters	Unlockable Content	Actions	Game Speed	Easyness to play	Tutorials	Goals / Missions	Rewards	Story	Personalization	Sound	Social	Serious Game
3rd World Farmer	✗	✗	b,a	real time	✓	✓	✓	✗	✗	✗	✗	✗	✓
Bet The Farm	✗	✗	b,c,a	real time	✓	✗	✗	✗	✗	✗	✓	✗	✓
Celtic village	✓	✗	b,e	real time	✓	✗	✓	✗	✗	✗	✗	✓	✗
Dora's magical garden	✓	✗	b	real time	✓	✓	✗	✗	✗	✗	✓	✗	✓
Dwarf Village	✓	✓	b,a	real time	✓	✓	✗	✗	✗	✗	✓	✗	✗
Farm Fun	✗	✓	b,a	real time	✓	✗	✗	✗	✗	✗	✓	✗	✗
Farm man	✓	✗	b,e	real time	✓	✗	✓	✗	✗	✗	✓	✗	✗
Farm mania	✓	✓	b,a	real time	✓	✓	✓	✓	✗	✗	✓	✗	✗
Farm Simulator 2009	✗	✓	b,c,a	real time	✗	✓	✓	✓	✗	✗	✓	✗	✓
FarmerJane	✓	✓	b,a	real time	✓	✓	✓	✓	✗	✓	✓	✗	✗
Farmerama	✓	✓	b,c,a,e	real time	✓	✓	✓	✓	✗	✓	✓	✓	✗
FarmVille	✓	✓	b,a,e	real time	✓	✓	✗	✓	✗	✓	✓	✓	✗
FrontierVille	✓	✓	b,a,e	real time	✓	✓	✓	✓	✓	✓	✓	✓	✗
Goodgame Farmer	✗	✓	b,c,a,e	real time	✓	✗	✓	✓	✗	✗	✗	✓	✗
Growing For Life	✓	✗	b	real time	✓	✓	✓	✗	✗	✗	✗	✗	✓
Happy Farm	✗	✗	b,c,e	real time	✓	✓	✗	✓	✗	✗	✗	✓	✗
Happy Gardner	✗	✓	b	real time	✓	✗	✓	✗	✗	✗	✗	✗	✗
Harvest Moon DS	✓	✓	b,c,a,e	real time	✗	✓	✓	✓	✓	✓	✓	✓	✗
John Deere American Farmer	✗	✓	b,c,a,e	real time	✗	✗	✓	✗	✗	✓	✓	✗	✗
My Wonderful Farm	✓	✓	b	real time	✓	✓	✓	✓	✗	✗	✓	✗	✗
Plantasia	✓	✓	b,e	real time	✓	✓	✓	✓	✓	✓	✓	✗	✗
Rune Factory a Fantasy Harvest Moon (DS)	✓	✓	b,c,a,e	real time	✗	✓	✓	✓	✓	✓	✓	✓	✗
SimAgri	✗	✗	b,c,a,e	ticks	✗	✓	✗	✗	✗	✗	✗	✗	✗
SimFarm	✗	✗	b,c,a,e	real time	✗	✗	✗	✗	✗	✓	✗	✗	✗
The Farmer Game	✗	✓	b,c	real time	✓	✗	✗	✗	✗	✗	✓	✗	✗
Virtual farm	✓	✓	b,a,e	real time	✓	✓	✓	✓	✓	✓	✗	✓	✗
Youda Farm	✓	✓	b,a,e	real time	✓	✓	✓	✓	✗	✗	✓	✗	✗

Figure 1 - Heurist Evaluation of Several Agriculture Video Games

advanced and extra.

Most of the games don't include the complementary actions. Though they add more options to explore in-game they are considered disposable by the majority of the tested games.

The story, personalization and social interaction are strongly discriminated by most of the games. Also, only five of them are considered serious games.

Despite some characteristics being present in most of the games, it does not necessarily mean there are indispensable for a game to be successful. For example, FarmVille does not have clear goals and is social, but still it is the most successful of those video games.

Despite being neglected by most of the games, the social component is very important to players, since the most successful agriculture games have this component (FarmVille, Farmerama and FrontierVille). This might be caused by the viral behavior of these kind of games, i.e., in order to progress faster in the game players need their friends help, so they invite them to play. These friends get caught in the game and to progress they ask their own friends to play, and so on (Poole,2010).

Implementation

Game Overview

Ecofarmer is a game that was developed in order to make players aware of the importance of agriculture, not only to humans but also to other species. This game represents Castro Verde's reality, where the agricultural activity isn't very profitable but the steppe birds depend on it to nest and inhabit the region.

The Game

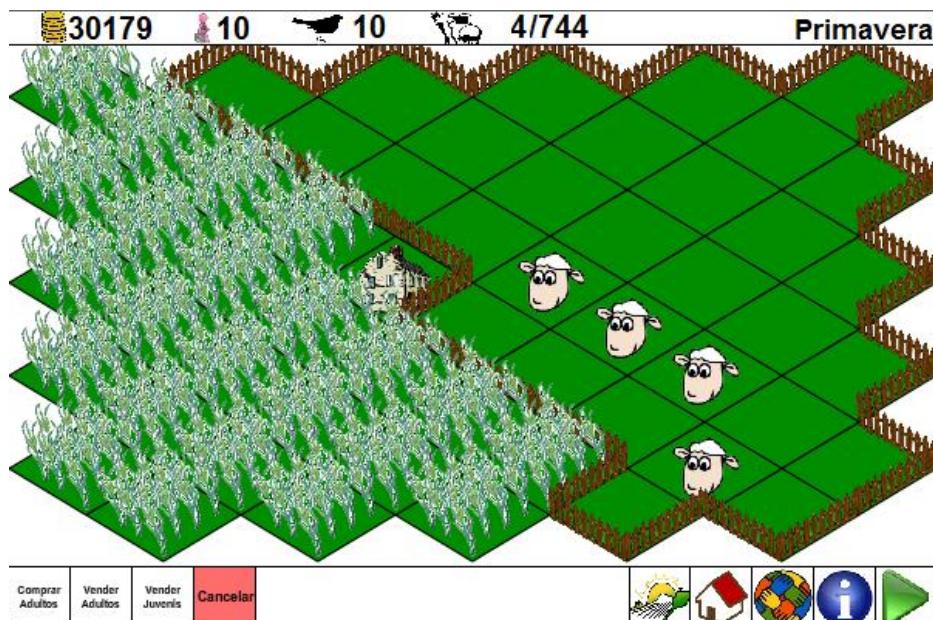


Figure 2 - Ecofarmer View

When the game (see Figure 2) begins, the player is shown a diamond grid representation of an abandoned farm, with each diamond representing a terrain portion. One of the diamonds has a house on it, the rest of them represent farmable land. Since the farm was abandoned, all the farmable land is full of bushes. These bushes prevent the steppe birds from inhabit and nest in there, therefore there aren't birds at the property, neither birdwatchers.

In order to succeed in the game, the player has to manage his property, restoring the local steppe birds' population, while profiting from the agricultural activities. To fulfill these objectives, the player starts with 50000€ to manage the farm. To get extra revenue, the player can apply to the ITI agricultural subsidy and build some infrastructures to reduce the seasonal expenses and gaining income from the local tourism.

Technologies

LPN asked the game to be persistent and easily integrated on Facebook. Considering this the game was to be in 2D with isometric view and Facebook integrates flash easily, the Adobe Flash CS3 Professional was chosen to develop the game in flash.

Considering that to make the game persistent a database is needed, PHP can be used as a middleware between the flash game and the database, and the Facebook's API it is in PHP, XAMPP was chosen since it includes PHP and database (MySQL) in one product. Finally XML was chosen to store the default settings, since it can be easily changeable, without programming and recompiling the game.

These technologies are related between them as shown in figure 3.

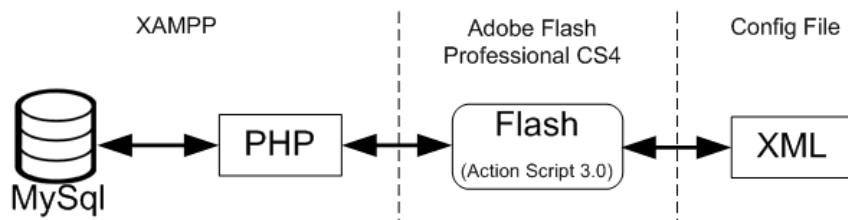


Figure 3 - Relations between the technologies used to develop the game

Game Mechanics

EcoFamer is a turn base game, where each turn corresponds to a season (spring, summer, autumn and winter). The first season is autumn, and at the beginning of each autumn an annual report with the values of the income and expenses is shown, allowing the player to study and reconsider his game decisions.

The player can group several terrains into an area, making it easier to do the same actions to several terrains at the same time. The terrains have several states, they might have bushes, crops, cattle or nothing, they change their states if some actions are made following the model presented in figure 4.

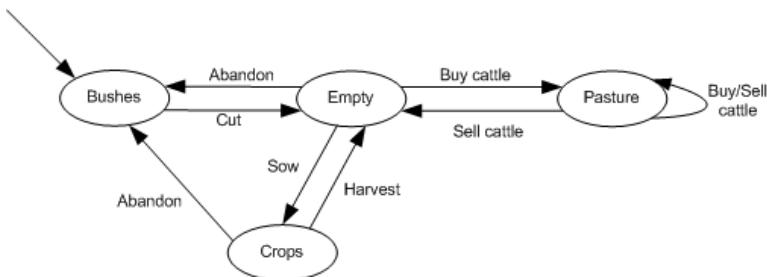


Figure 4 - Tillable Terrain State

Cereal crops take three seasons to reach their maturity and legumes only one season. The cereal crops must be planted in the autumn in order to be harvested in the summer, otherwise they will die in the summer from the drought and heat. However the legumes can be seeded in all seasons except summer, or they will die from the drought and heat.

Infrastructures have a different approach, instead of being possible to make any structure available in any allocated space on the structures view, each structure has a specific allocated space, in which it is only possible to upgrade or downgrade that specific infrastructure, as it is presented in figure 5. The lowest level possible is zero, in which the terrain is presented as empty, on the other hand the highest level possible for all structures is three.

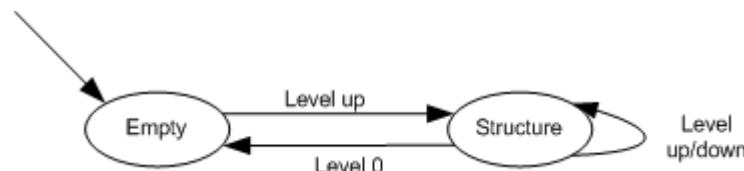


Figure 5 - Structures Terrain States

The various game components interact with each other as shown in figure 6. There are three types of relations between game components, benefic (it will improve the other), harmful (it will damage the other), or hybrid (in some conditions it will be benefit while in others it will damage the other component).

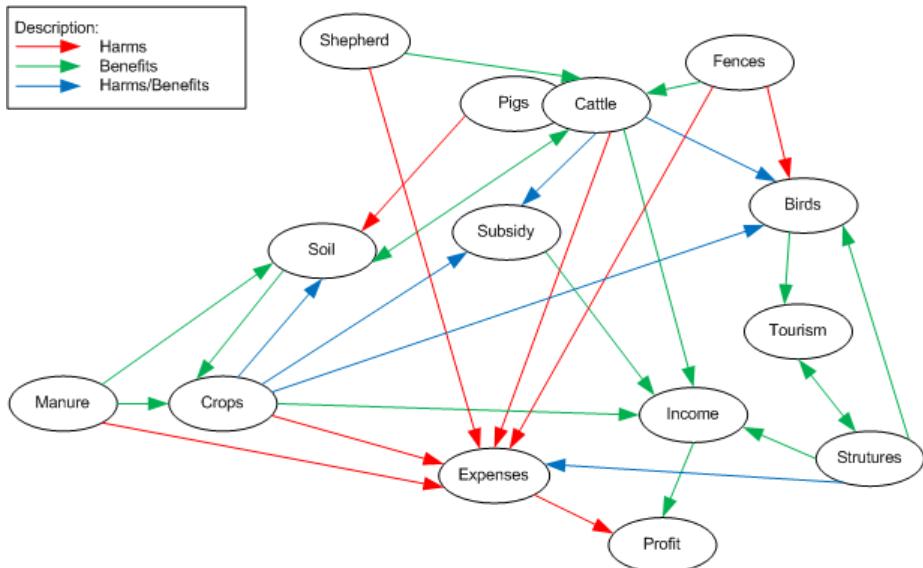


Figure 6 - Game Components and the relation between them

Evaluation

Evaluation Methodology

The objectives of the tests are:

- Determine if the user improves his perspective about agriculture.
 - Analyze if the user learned about the way agriculture affects the steppe birds in Castro Verde.
 - Determine if the game is fun and entertaining.

The game evaluation was made using casual and hardcore gamers, which played the game for the first time. Before playing the game the players were asked to answer a survey about their gaming skills, opinion on agriculture, knowledge about agriculture and steppe birds.

Then the users were given a user ID and asked to accomplish the in-game objectives in five years:

- Level the house up to level 3.
 - Collect all the steppe birds.
 - Maintain a positive money balance.

Finally the players were asked to answer a final inquiry on their opinion about agriculture and the game, and their knowledge on steppe birds and agriculture was again surveyed.

By comparing the mean results of both inquiries it was concluded if the objectives were fulfilled. The final inquire was also be useful to perceive if the players were satisfied with the game and to define future improvements on it.

The Surveys

The surveys were both written in Portuguese since the game was only tested with Portuguese gamers. Scales questions are made using an even scale (between one and six) to prevent people to vote in the middle value. this way it can be identified if their opinion is more negative or positive than the average value (three point five).

The first questionnaire (Q1) was composed by eight questions:

- I.1 - How often do you play computer games?
(Answers: Never, Rarely, Sometimes, Often)
- I.2 - Have you ever done any agricultural work?
(Answers: Yes, No)
- A.1i - What is the probability of you making career in agriculture in the future?
(Answers: 1 - Impossible, ..., 6 - Certain)
- A.2i - Do you think agriculture is profitable?
(Answers: 1 - Not profitable, ..., 6 - Very profitable)
- A.3i - Do you think agricultural subsidies are important to farmers?
(Answers: 1 - Dispensable, ..., 6 - Indispensable)
- A.4i - Do you think agriculture is indispensable to ...
(Chose from the following: The human being; The human being and some other species; The human being and all other species; Any animal species.)
- A.5i - Pick the steppe birds from the following:
(Chose from the following: Pigeon; Bustard; Eagle Owl; Kestrel-of-towers; Crow; Imperial Eagle; Little Bustard; Stork; Don't know)
- A.6i - From the following measures, pick the ones that benefit the steppe birds:
(Chose from the following: Fence the terrain; Make artificial nests; Plant all property; Plant up to half the property; Have swine cattle; Don't have swine cattle; Plant legumes in the Spring; Plant legumes in Autumn)

This survey has the objective of knowing the thoughts and knowledge of the gamer on agriculture and steppe birds.

The final questionnaire (Q2) was composed by eleven questions :

- A.1ii - What is the probability of you making career in agriculture in the future?
(Answers: 1 - Impossible, ..., 6 - Certain)
 - A.2ii - Do you think agriculture is profitable?
(Answers: 1 - Not profitable, ..., 6 - Very profitable)
 - A.3ii - Do you think agricultural subsidies are important to farmers?
(Answers: 1 - Dispensable, ..., 6 - Indispensable)
 - A.4ii - Do you think agriculture is indispensable to ...
(Chose from the following: The human being; The human being and some other species²; The human being and all other species; Any animal species.)
 - A.5ii - Pick the steppe birds from the following:
(Chose from the following: Pigeon; Bustard²; Eagle Owl; Kestrel-of-towers²; Crow; Imperial Eagle; Little Bustard²; Stork; Don't know)
 - A.6ii - From the following measures, pick the ones that benefit the steppe birds:
(Chose from the following: Fence the terrain; Make artificial nests²; Plant all property; Plant up to half the property²; Have swine cattle; Don't have swine cattle²; Plant legumes in the Spring²; Plant legumes in Autumn)
 - F.1 - How do you think of the game?
(Answers: 1 - Very boring, ..., 6 - Very Interesting)
 - F.2 - Is the game easy to understand and play?
(Answers: 1 - Very hard, ..., 6 - Very easy)
 - F.3 - Did you fulfill the objectives given to you by the survey responsible?
(Answers: Yes, No, Don't know)
 - F.4 - would you like to play it again?
(Answers: Yes, No, Don't know)
 - F.5 - Please give the game a suggestion or critic.
- (Open question)**

² Correct answer

The first six questions of the final survey are used to compare with the corresponding ones of the first survey (questions three to eight), and see if the user's opinion and knowledge on agriculture and steppe birds has improved. The remaining questions serve to evaluate the game, and get more feedback from users.

Results

This evaluation was made with twenty persons whom filled the questionnaires and played the game. Figure 7 summarize the results of the questionnaires:

	Never	Rarely	Sometimes	Often		Mean value (1 - 6)
I.1	20%	30%	35%	15%		F.1 4,2
	Yes	No				F.2 3,55
I.2	35%	65%				F.3 4
						F.4 12
A.1i	2,1					A.1ii 2,2
A.2i	2,75					A.2ii 2,15
A.3i	3,95					A.3ii 5,05
	Correct Answers					Correct Answers
A.4i	65%					A.4ii 85%
	correct	wrong	Don't know			
A.5i	57,69%	42,31%	7			A.5ii 76,88%
	Correct Answers	Incorrect Answers				Correct Answers
A.6i	62,50%	37,50%				A.6ii 88,75%
						Incorrect Answers 11,25%

Figure 7 - Answers to Questionnaire 1 on the left, to Questionnaire 2 on the right

Results Discussion

The first question of the first survey (Q1) show the sample of inquiries has a great number of casual gamers, some hard core gamers and some people that do not play videogames. The second question shows that the majority of them (sixty five percent) had never had worked in agriculture.

Figure 8 compares the related results of both surveys. By analyzing it can be concluded if the objectives were accomplished.

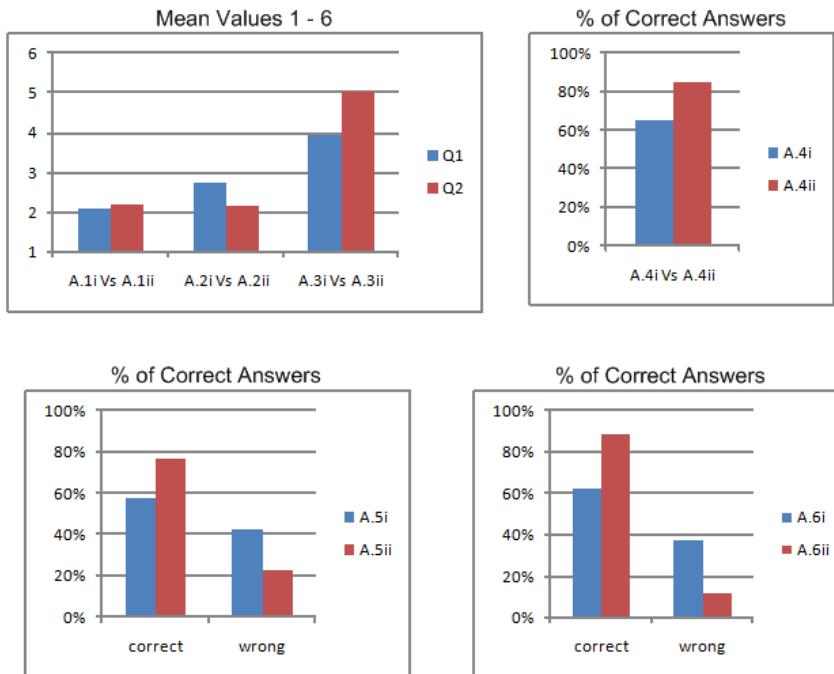


Figure 8 - Comparison between Q1 (blue) and Q2 (red)

Perspective on agriculture

User thoughts on agriculture:

- By comparing A.1i and A.1ii (Q: What is the probability of you making career in agriculture in the future?), a slight increase in the probability of following a career in agriculture is noticed (zero point one), after playing the game. However since the sample is only twenty people long, this result is not significant enough.
- By relating A.2i and A.2ii (Q: Do you think agriculture is profitable?), is concluded that after playing the game, gamers thought that agriculture is less profitable than before.
- While analyzing A.3i and A.3ii (Q: Do you think agricultural subsidies are important to farmers?), it is concluded that after playing the game, users thought subsidies are much more important to farmers than before.

In conclusion the game changed the view of the gamers over agriculture. After playing, players understood better the difficulty of being a farmer in Castro Verde, where the soil is not very fertile, the climate is aggressive and subsidies are indispensable to gain some money.

Thought there was a slight increase in the appeal of working in the future in agriculture, this result can be ignored since the sample of inquiries is too little, and it could be an answer made to please the inquirer. Better results for this answer could be obtained if the game showed agriculture as more profitable and modern activity with lots of technological advanced resources.

Knowledge on How Agriculture Affects the Steppe Birds

- By comparing A.4i with A.4ii, an increase on the correct answers is observed. After playing the game a larger number of persons thought that agriculture is indispensable for humans and some others species.
- After analyzing the results of the comparison between A.5i and A.5ii, it is noticed that the number of correct answers increased from fifty seven point sixty nine percent to seventy six point eighty eight percent correct answers. This means that after playing the game, user could identify better the steppe birds from other kinds of birds. Also after playing the game, there were not people answering "Don't Know", while before were seven. This means that after the game, even though there was an increase of the number of persons trying to guess the birds, there were nineteen percent more correct answers, which showing that the game was effective in teaching the birds to gamers.
- The comparison between A.6i and A.6ii, shows that after the game, player could identify better which measures benefit the birds. This is supported by an increase from sixty two point five percent to eighty eight point seventy five correct answers.

In conclusion the objective of teaching about steppe birds and the way agriculture affects them was accomplished. After the game, players could identify better the steppe birds and indicate which agriculture measures were the best for them.

Game Likability

- By analyzing the rest of the answers from Q2 questionnaire it is possible to know some of player's thoughts on the game. F.1 and F.4 show that gamers liked the game, considering it more interesting than boring, and the majority of them (sixty percent) would like to play it again.
- F.2 presents a near average value; this means that gamers did not find the game neither easy nor difficult to understand. However F.3 indicates that the great majority of the players (seventy five percent) did not accomplish the proposed initial objectives. This can be explained by the initial try and fail learning approach from the players. Only a few read all the information on agriculture and birds, the majority started playing the game and learned with their mistakes, reading the information only to understand why they failed.

- From the suggestions left on F.5, was concluded that users would like to have better graphics, sound, more useful information, seasonal reports, bigger letters on the buttons, a better tutorial and a cooperative multiplayer component.

Though most of the players did not accomplish the proposed objectives, they did find the game interesting, and would like to play it again. Also, the game was not as simple to understand as intended. A better tutorial system is needed to make the player learn the mechanics and the rules of the game faster at the beginning. A good choice could be a walkthrough a year tutorial, with several objectives to accomplish each season, which would teach the primary actions and the most important measures to make through the game.

Some suggestions from F.5 should be also considered to improve the fun and entertainment of the game, like adding sound, better graphics, more useful information, seasonal reports and a cooperative multiplayer system.

Summary

Ecofarmer is a serious game which was developed considering the Castro Verde region, where agriculture is not profitable because of the soil and weather, but it is essential for the survival of the steppe birds. Its' purpose is of changing the view on agriculture, teaching that agriculture is not only important to humans but also to other species, and which measures are the best to benefit both humans and steppe birds.

The game succeeds teaching about the agricultural reality of Castro Verde. After playing the game, users understand better the adversities that farmers face, and how important subsidies are to make a living. The results also showed that the game also succeeds in teaching about steppe birds and the agricultural measures that can damage or benefit them.

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