Design and Application of Food Chain Game with Scratch

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Recently artificial intelligent (AI) and coding lesson has been getting importance all over the world. A lot of tech companies invest money on AI and coding. Many applications, software, coding, and AI should accompany to modern education. Ministry of National Education (M.E.B) put the coding lesson in Social Studies and Science High School's curriculum. Also Ministry of National Education (M.E.B) and YEGİTEK support all the school with technological devices like interactive boards, tablets and also educational software E.B.A. MEB is also trying to give importance to STEM. In this kind of education a lot of different branches are used together and precede the usage of the technology in education. On the other hand according to PISA, what has been taught in the schools was useless in Turkey because in the schools just information has been tried to convey to students but it is very easy to find and get the information with technology. So the important thing is not to get the information but how to use it.

540.000 students from 72 countries and 5 economic regions take part in PISA examination. In 2015 Turkish students are under the average in all branches, Maths, Science and Language and became 50th in 72 countries. With the help of FATİH project technological devices are started to be used in classrooms, however suitable software for the interactive boards aren't   be available now. For example it is observed that material used at smart boards aren't interactive, just pdf. formats are presented to students that is not away the old classical methods.

Along the coding lessons in the schools also there are many extra courses on the coding in many schools. The education would be more effective, permanent and entertaining if the teaching can be carried out for different kinds of intelligent and emotions. A game can be done this. Many researches proof that games has an important role in teaching. Educational games have been shown to contribute to learning positively because they support multimedia and have many stimulating objects. Also, thanks to the games, the students are able to learn by amusing and to keep their attention for a longer time.

The world has many kinds of energy in itself. Energy always changes such as light was captured in chemical in the plants and this accumulation was transformed into vitality energy (ATP) or this vitality energy may be transformed into psychical energy. In this project, one of the objectives of science lesson; food chain is aimed to be combined with coding lesson. On M-Block platform, food chain one of the subtopic of living creatures and vitality energy unit is set as a game by a programing language "Scratch". As for coding lesson, the objectives of in 6th grade ICT (information and communication technologies) lesson are being taught.

This project is a levelled game. The objective of the game is to teach what the living creatures consume or not. The player of the game learns the circles of the food chain at the end. When the player chooses the right nutrients for the living creatures, he gets a point. But if the player chooses the wrong nutrient, he loses a point. The source of energy the sun is always on stages with the player. When the level completed, each nutrients has a grave itself. All the living things belongs to that grave work out like decomposing mushrooms and everything is recycled to the nature.

In the game, the energy resources of the living things and the adventure of the energy cycle are taught. The game consists of five levels. Each level is moving through the types of energy that the creatures can or cannot use. In the transitions between the levels, the objectives are reinforced with multiple choice, short answer, and matching questions about the food chain and its components. This study contains a concrete example of the use of educational games.

It is envisaged that many abstract and difficult subjects will be transferred through game, facilitating narration and learning. The objectives involved in the unit in this study have been transferred through the game.

The students in the study are divided into two groups as experiment and control group. The subject was taught through the educational game designed for the students in the experiment group. In the control group, the subject was taught through presentation using traditional methods. The information of the students in both groups related to the food chain before and after the study was measured by pre- and post-tests.

It was observed that the learning level of the students in the experiment group participating in the course with the food chain game was statistically significant. As a result, it was observed the students had more fun and learned more efficiently by means of the game.

The study can be made more comprehensive by the development of applications for the different courses or different units in the same course.

Key words: Food Chain Game, Game Design with Scratch, Digital Games.