Logical Games as an Educational Tool
in the Social Media Environment

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Abstract. Games provide people mainly with entertainment. The purpose of this article is to show some positive side effects of games. The main benefit might be educational. Some games whose main purpose is educational will be analyzed herein. Normally learning is sometimes tedious and unpleasant; therefore, teaching using games in a manner that is pleasurable for students is welcome and should be encouraged.

The proposed games have the following properties:

1. **Appearance** – The game has a pleasant, changeable design.

2. **Adaptation** – The player’s level of mastery is recognized by the program underlying the game and the game's level of complexity is governed by the player’s skillfulness.

3. **Determinism** – The players’ decisions are supported by their use of logic.

4. **Diversity** – Unlimited types of games may be classified into two different modes:
   a. **Automatic** – generated randomly according to the player’s previous constraints and according to the players’ interests and proficiency;
   b. **Human** – the player or the instructor creates by himself the game for another player.

5. **Universality** – The “Logical Mosaics” covers unlimited educational domains of knowledge, for example, foreign languages, mathematics at various levels, and economical factors, chosen by the player when setting up the game. Other aspects of universality lie in its training and in testing its logical reasoning, which is the basis of any knowledge area. The logical reasoning is directed especially towards searching for the common denominators essential in Data Mining.

6. **Sociability** – The players may compose the games and distribute them
among themselves and organize competitions through cooperation and forums. All of these operations are ideal when using the social media and lead to improved behavioral skills and increased knowledge for the participants.

The positive characteristics mentioned above make the game relevant, since they are characteristics of educational games and include the following aspects: knowledge, intelligence – developing innovative skills, and encouraging positive behavior.

The term “self-generating game” refers to a system that generates, through a game, a basic – final game. Such games are termed “generic games”. Two generic games, namely, games generating final, indivisible, games will be represented. These games are called “Logical Mosaics” [1] and “Out of Three”.

We define and describe a tool designed to develop and retain the intelligence of various target groups, through a competitive game for multiple players or through a single-player game.

1. Target groups
   a. Pre-school children
   b. School-age children
   c. Older adults (for entertainment and to delay dementia)
   d. Teachers (of children and teenagers)
   e. Social workers (who work with older adults)

2. Usage: as a tool for teams (competitions) or single players (similarly to solitaire). The aims, defined for each target group, include entertainment, competition, learning, and teaching.

This tool allows teachers and social workers to teach knowledge and skills through play.

**Logical Mosaics**

**Stages of Project Development**

1. *Developing the graphical* means for building a mosaic. A mosaic can be defined as a collection of polygons that must be placed adjacently according to various rules, defined for each mosaic. The collection of polygons is placed in such way as to create a meaningful graphic object.

2. *Constructing a tool* using a database that includes a repository of concepts and rules for creating links between them;

3. *Developing a database* using the above tool in various fields (for example, the basic features of the object: color, shape, quantity (see Fig. 1);
language: grammar rules, vocabulary; languages (games can be adapted to foreign language learning, see Fig. 2); sciences: chemistry (the periodic table); arithmetic (see Fig. 3), local geography (names of rivers, streams, and mountains) (see Fig. 4).


![Figure 1. The Logical Connections between the Triangles That Have a Common Edge. For Example, DB is Common to the Following Triangles: ΔABD ≈ ΔBDE.](image)

![Figure 2. (a) Tangram with Matching Rules (Phrase-Book Type). Each Edge of the Polygon Has a Question in English, Q. The Player Should Place the Correct Answer in English, A (See the Example in (b)). In the Game, Qi and Ai are Replaced by Complete Sentences.](image)
Figure 3. Arithmetic Problem: Two Triangles are Adjacent If They Share a Common Edge (One of the Triangles Contains the Problem and the Second Triangle Contains the Solution). For Example, $\triangle ABC \cong \triangle BCD$ is Obtained Because the Shared Edge, BC, is Part of the Triangle ABC that Contains the Problem “5+3” and the Triangle BCD Contains the Solution “8”.

Figure 4. “Scatjectives” Played Using Hexagons.

Stage of Operation – Two Modes

1. Using the mosaic and an existing database:
The game can be played as a competitive web-based game for multiple players, a board game for a group of players, a game for a single player against a computer, or for one person playing alone, similar to tangrams [3] (see Fig. 5).
There are three optional moves:

a. Place a stone next to an existing stone, based on its features, with the aim of ultimately creating a meaningful shape. Players focus on the content of the stone but may utilize its shape or color.

b. Use statistical inference to determine the shared features for a given sample of matchings (this action is the opposite of (a)).

c. Independently build up a database, leading players to develop databases that they have improved.

2. Here we introduce new pieces of the game, which represents new designs and a new knowledge base that serves professional groups (teachers, social workers, psychotherapists, and others).

Features

1. The tool should be adaptive to ensure that the game matches the player’s level. The game analyzes the player’s level in the first few games.

2. Variety – The player can select shapes other than triangles (see Figs. 4, 5, and 6 using hexagons and other figures).

3. Parameters:

a. The shape of the final solution (Fig. 5).

b. Solvability – the stones placed on the board should form a final conventional shape, or allow one of the players to discard one of his stones at the end.

Conclusions

The introduced family of games is suitable for several purposes. The game is universal; its destiny is driven by the infrastructure – knowledge base that supports it.

Some social environments that benefit from the game are as follows:

1. The knowledge base as seen (Fig. 1) supports literacy [5-7] in learning a language.

2. It supports mental health in postponing dementia [4], using the knowledge base representing general knowledge, for example geography (Fig. 4), history etc.

3. Other fields may also be incorporated into the game, according to the
participants’ request; the game is community based and can be used at almost any age; it develops sociability in the vicinity of the participants or in unlimited areas in our era of massive social media.

4. The treated games are different from the games defined in Game Theory [2], which is a simultaneous game, in which two opponents take turns simultaneously. In this way, the players learn to obey the game’s rules.

5. Statistics – the games gives some experience in randomness and statistics used in psychology [8-11].

References


