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AFFECTIVE DOMAINS, INTRINSIC MOTIVATION AND GAME-BASED APPLICATION IN EARLY CHILDHOOD EDUCATION

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Abstract

Game based application and gamification is an approach for motivating and engaging participants using game-like design elements. Integrating game-like design elements in educational application and educational context have the potential to increase children´ intrinsic motivation and other related affective domains such as persistence, goal orientation and enjoyment. Some empirical studies provided proofs that gamification and system of rewards could influence children's motivation and level of cooperation. There is a lack of empirical research focusing on effectiveness and possibilities of development of intrinsic motivation and related affective domains with the help of ICT used in kindergartens and early childhood education.

The purpose of this research is to examine the influence of an educational game and its impact on chosen affective domains. 45 children from 3 kindergartens used original designed game application for two months. The used questionnaire "Game application's influence on affective domains by preschool children" consisting of 18 questions was created by collecting responses from 18 kindergarten teachers. For analysing and categorizing Likert scale was used. This study showed a positive impact of game based application on chosen affective domains (namely intrinsic motivation, persistence, goal orientation and joy/pleasure) without using wide spread reward system like badges, hints, praises etc. typical for extrinsic motivation.

This study is considered as a base for the next research which will be aimed on 7 affective domains and specific features of educational game applications which support motivation and other domains in the most effective way.

Keywords: Intrinsic motivation, affective domains, ICT, ECE, game based application

1. Introduction

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Motivation is a crucial drive by which learning behaviour can be stimulated. According to Bandura's social cognitive theory (Bandura, 1997), motivation is "goal-directed behaviour. People engage in motivated behaviour when they expect to succeed at a task and when they believe that the outcome of that success will be useful" (Bandura, 1997).

Some authors (Deci and Ryan, 2000, Berschenke, 2013) stressed the role of intrinsic motivation and demonstrated that participating in intrinsically motivated activities leads to greater learning, performance, persistence, creativity, self-esteem, vitality, and general well-being. Schunk et al. (2008) states that index of motivation can be seen as persistence which is defined as time spent on a task before quitting. Persistence is related to greater learning and achievement.

Other theories (Dweck & Leggett, 1988, Dweck, 2002) emphasised the role of goal orientation that links attributions which people make for success and failure to the goals that they adopt toward task. They defined learning orientation, with which the students show more positive affect, more interest, higher cognitive engagement, greater effort and more persistence. The second attitude explains performance-oriented students are those who place emphasis on getting good grades, rewards, beating other students and demonstrating high ability.

Motivation literally means the desire to do things and it's the crucial element in setting and attaining goals. The researches give evidence that level of motivation and self-control can be influenced (Berschenke, 2013, Dichev& Dicheva, 2017). Game applications use a lot of elements of gamification (game-like elements in non-game context). The main goal of gamification is to motivate participants and encourage expected behaviors in a meaningful way (Deterding, et al., 2011; Dichev & Dicheva, 2017; Shi, 2014). Current researches on gamification, in educational context, describe how badges affect learners of different skill levels (Abramovich, Schunn, & Higashi, 2013), how badges influence and how leaderboard can impact learning and motivation (Christy & Fox, 2014).

We suppose that suitable game applications equipped with specific characteristics and gamification usage has crucial potential to empower learners with a more engaging learning experience, higher motivation and better performance and achievements needed.

2. Problem Statement

We concentrate on stimulating and sustaining of children's motivation and the opportunities for optimising learning outcomes in particular areas.

It is not clear whether preschool children, in order to be well motivated, need to get the system of extrinsic rewards which is common and wide spread or if there are other options how to motivate children and how and to what extent to support intrinsic motivation and other related affective domains with help of ICT.

Unfortunately, there seems to be a lack of empirical studies on evaluating the efficiency of game application on intrinsic motivations and other affective domains.

There are rare studies which would compare motivation approaches that are connected not only with extrinsic motivation (like badges, points) but also with features that can increase the level of intrinsic motivation.

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3. Research Questions

1. Is this proposed design of an educational game application without typical extrinsic motivation elements effective for preschool children?
2. Are preschool children interested in playing without getting a typical reward?
3. Does the use of means of information and communication technology (ICT) have negative impact on daily work in kindergarten class?
4. Are teachers interested in using game-based learning application in education of preschool children?

4. Purpose of the Study

The purpose of our study is analysing and verifying of effectiveness of the educational game application on some affective domains of preschool children.

The study wants to verify and if a designed model of game app without elements which boost extrinsic motivation (such as badges, points, and leader board) is enough interesting for children. Further, we focus on it if a game based on a story, narration and feedback has a positive impact on motivation and some other affective domains that are crucial for further learning and education of preschool children. New approaches as affective learning, micro learning and adaptive learning have been raised recently in the field of education and have been incorporated in the educational game application used in this research.

5. Research Methods

5.1. Participants in pilot study

Preschool children from 3 kindergartens in the Czech Republic were participants in this research. 45 children were included into the target group and they were in age from 4 until 7 years.

The kindergartens which took part in the study educate children without special educational needs (SEN) and the children with some SEN as well. 4 children had visual special needs, 5 had speech special educational needs and 5 of children had a symptoms of ADHD. Teachers and parents agreed with carrying out of the pilot research in particular kindergarten.

5.2. Description of the game based applications - “I’m going to school!”

The game application “I´m going to school” was used in this research. This tool (designed and developed by S. Pekarkova, T. Sykora, 2015) is the educational game application whose structure and included features are specific from different aspects.

The structure of the application is divided into *small units* focusing on specific topics (e.g. recognizing of the right place of subject, recognizing of some visual patterns or solving pre- mathematical tasks at different levels of difficulty etc.). Thus the content consists of tasks of six main *cognitive domains* for preschool children such as visual discrimination, spatial ability, temporal ability, language and speech, mathematical skills, hearing and auditory discrimination. The game application consists of

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planned short episodes that represent a *complete story* together. The other important point to be stressed is that the educational application has a *narrated guide* (Mr. Mouse Adam) who explains instructions to a player and shows and explains each new task. After each single task is being completed the guide provides *clear feedback* on the correctness. The educational application estimates a suitable *level of difficulty* based on the previous player´s results (either too hard or too easy level could demotivate the player). The game will start next playing at an adequate level, which corresponds with the children´s current capabilities. Thus a child can solve tasks without repeating failure. The application collects and *assesses data* about the level achieved in every task and can also provide useful information for parents and for kindergarten teachers about the area in which a child has some weaknesses and would need more professional support.

The application for preschool children has been tailored appropriately to the age (4-7 years) by using suitable graphics, animations and illustrations or a talking guide, using pauses in the game with mini stories where the child can relax and play freely with some new added details.

The characteristics of **game-based learning** were adopted when designing the educational application. The story in the application is important to engage the children into the active discovering and learning. The children can adjust their achievements according to immediate feedback in response to their mistakes. Thanks to the task content which has gradually rising difficulty, the learning pace is tailored to each individual child.

5.3. The Questionnaire "Influence of game application on affective domains by preschool children" for teachers

The Questionnaire for teachers contains 23 questions. These questions for teachers are aimed to evaluate particular behaviour by preschool children when playing the game application. The selected questions are based on previous interviews and workshops with 18 kindergarten teachers who originally raised many different questions and pointed out areas of their interests when speaking about affective domains in context of playing an educational game application. After analysing teacher´s responses, similar statements and questions were selected and further categorized into 4 basic affective domains – pleasure/joy, motivation, persistence, goal orientation. These domains are defined as particular areas of Approaches to learning as well.

All items in questions are based on 6-point Likert scale. A 6-point Likert scale questions were used to measure respondent´s agreement with the statements. The teachers needed to choose one from 6 descriptive options in every question for each child included into the research. The values of different levels of each domain has been defined as follow: 1- no evidence of specific behaviour, 2- poor level, 3- level of below average, 4-average, 5-over average, 6- very high level).

6. Findings

We present the results with the help of percentage which represent outcomes from all questions from particular domain.

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- The educational game-based application with particular features (narrated guide, feedback, story etc.) showed that 63.5% of children group was motivated better and their motivation was higher and permanent for a longer period in comparison with standard work when using worksheets or other materials.
- |According to the teacher's answers the application supported 75% of all children while working on tasks with higher difficulty. The children did not give up harder tasks while working with the educational game application. A very important outcome is that the children with special educational needs are included in this percentage result.
- During play sessions 63.5% of all children showed higher interest and longer persistence to search for right solution and finish their tasks in comparison with work on worksheets which are common part of school preparation for preschool children.
- According to the teachers´ answers the most motivated aspect (59.4%) was enjoyment from playing the game. The second most important motivation aspect (22.6%) was the effort to finish the game. Although the children did not get any badges, hints and other extrinsic incentives they enjoyed the game and wanted to go it through to the end.
- According the teachers most of the children (43.8%) expressed their desire to play the game because "it is a fun". The second main reason (3.4%) of child´s motivation was "they want to play with Mr. Mouse". It might be perceived they created some identification with Mr. Mouse and wanted to help him in his story. The third significant reason was children´ own perception "they are learning and feeling happy about it".
- More than 31% children were keen on doing the tasks in which they have evident weaknesses and failed at the beginning a few times. Furthermore, the motivation was gradually increasing by 16.1% of children during play sessions. The answers of the teachers showed that 19.4 % of children played only those tasks in which they perceived to be successful.
- According to teachers' observation more than 84% children showed higher ability to focus on chosen tasks in game application. They also wanted to complete and finish their work even it seemed to be time-consuming for them. In this result the children with ADHD syn. are included also and the teachers commented that these children finished their works surprisingly well very often.
- The analyzed answers also presented the current perception of ideal "time duration of using tablets in kindergarten". The teachers let the children play mostly once in one week (45%), and 32% of children played twice a week. The time period for using the application in learning process all teachers spontaneously confirmed as optimal was 20 minutes for one playing session.
- From the view of school readiness it is interesting to discover which tasks the children preferred to play and to which the children came back more frequently- the tasks for visual discrimination, mathematics skills and for spatial skills.

7. Conclusion

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The analysed data helped to answer whether young children need to be motivated mainly with elements of extrinsic motivation or if they can be effectively motivated with elements which are typical for intrinsic motivation. We concluded that generally used rewards (hints, badges, points) are not a critical point for game-based learning of young children. Most of children played the tasks at difficult level without losing their motivation and joy even if they did not receive common extrinsic benefits. Many children did not stop playing some tasks even if they did not succeed after several attempts. *"Between the tasks which children liked and their success in solving of these tasks there wasn't the relation of direct proportionality. For example in spite of many fails on searching for right solving the children most favourite task were Planets (mathematical ability)."*

The children did not avoid to play tasks from specific cognitive fields in which they perceived some weaknesses. The results in chosen affective domains (intrinsic motivation, persistence, enjoyment and goal- orientation) showed improvement in skills of children without SEN and in the children with SEN as well. These results show very high potentials of ICT tool how to improve specific skills and minimize particular difficulties in some cognitive areas of pre-schoolers before attending the school.

The educational game had positive impact on learning orientation instead of performance orientation which emphasis rewards and getting "good grades" (Dweck, 2002). Most of the children did not perceive they failed to find a solution but continued to play and discover another solution. This positive attitude might become stronger because no extrinsic motivation in game was used and therefore absence of repeating signs of failure was there.

A clear outcome is that the teachers are interested in new technology and they do not deny its use in education as something that does not belong to kindergartens.

Our further research will be oriented on comparison of the game application using the specific features (narrated guide, narrated instruction, meaningful story, feedback etc.) with the game application without them in order to analyse which components and characteristics are crucial for motivation and learning of preschool children.

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