The “computer” tells a story?

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Abstract

Drawing and storytelling are essential activities of children in their early and elementary ages. These are best done by natural motoric and oral activities, however there are several ICT tools that were developed for this age group for supplementary activities using computers. All tools have different features that can be emphasized as beneficial for certain developmental activities.

The paper goes through discussing the types of storytelling tools TeaM lab developed during the past 25 years (*KIDLOGO* editor in Terrapin Logo, *Storyworld* in Comenius Logo, *LinoLiner* in “Imagine” during the MATCh project, *Interactive storytelling* in Creative Classroom and *TellingYouInPictures* editor in Colabs project using Imagine, and several other tools for expressing stories, poems and songs creatively, using interactive multimedia (within Imagine and Scratch), and describes their main features and developmental aims.

Figure 1. Interactive story made by children using TeaMstory builder at kindergarten

TeaMstory builder tool (created with Imagine) is the most recent development, which was introduced into three different kindergartens. The aim of the research was to deploy TeaMstory builder within the story creation and re-telling activity of each kindergarten, investigating how children are able to express their imaginations creatively and to what extent they are able to take part in the creation process collaboratively. The paper describes in more length how the features of each tool allows different developmental processes to take place.

Story related activities are perfectly suitable for kindergarten children, which reflects their fears and resolves them, creates an intimate sphere where internal ideas can be visualised and provides security due to the emotional binding towards the story teller person, thus a perfect form for internal visualisation takes place through the processing of experiences. TeaMstory builder encourages teamwork, interactions and a creative construction process.

Keywords

kindergarten, elementary, digital storytelling

Storytelling tools developed for early years

Providing tools for digital storytelling for the early and elementary years has been one of our constantly re-defined aims at TeaM lab (http://teamlabor.inf.elte.hu/) throughout the past 25 years, using the specific tools of each time period, looking for ways to develop cognitive skills. Drawing and storytelling are essential activities of children in their early ages. These are best done by natural motoric and oral activities, however there are several ICT tools that were developed for this age group for supplementary activities using computers. All tools have different features that can be emphasized as beneficial for certain developmental functions. Without giving any kind of global view on these tools, we point out some specific links: the pioneering work of Rachel Cohen (Cohen, 2005) - gave ideas to the development of several story tools and networks, who's main research goal was early age teaching of language(s); KidPix (http://pixelpoppin.com/kidpix/) - one of the first and most popular, that by now grew into a complex multimedia authoring tool; for current tools check out Alan Levine's collection of StoryTools (http://cogdogroo.wikispaces.com/StoryTools).

Earlier developments of TeaM lab

KIDLOGO (Turcsányi-Szabó, 1997a) was the first implementation in Terrapin Logo on the Commodore 64 (http://www.terrapinlogo.com/) that was introduced to kindergarten children using an icon driven environment to produce drawing in Logo style, adding music, animation and text to compose stories (See Figure 2.). These drawing activities, however, not only allowed the expression of creative figures, but were based on sound geometric principles (Turtle geometry) and also introduced the use of text (as visual element and also as name of sub-figure drawn, which could be redrawn from any position by evoking their name), visual problem solving (building figures from sub-figures) and programming (named sub-figures were subroutines after all) at an early age, which could be further cultivated in early elementary years. Even though the environment required the use of angles, kindergarten children had no problem with its understanding and fluent use. Children were also able to differentiate between the use of names as sub-drawings, as drawing processes (programming code) and finished pictures. Helping each other and working together was very common and they often shared their works as programming codes (Turcsányi-Szabó, 1997b). It must be mentioned here that this kindergarten project lasted for about 10 years (from 1984) and the only way the process could be handed over to the next generation is by the children themselves(!) constantly teaching the newcomers.

Figure 2. KIDLOGO icons on keyboard

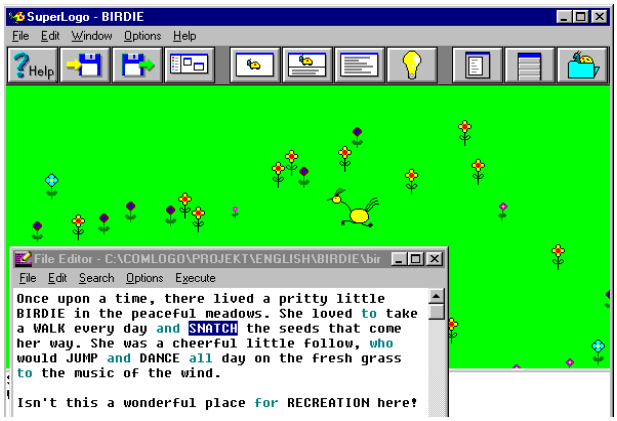

Figure 3. Comenius Logo Storyworld

With the appearance of Comenius Logo (1997), the new environment triggered the integration of special hyper-functions that would enhance the story environment. The introduction of complex animations, story editing and programming defined the environment to be used by elementary

aged children, who not only like to play with interactive storybooks, but would prefer to create their own. Here, different animations (not only drawn {by changing shape} but also programmed {actually movement: by changing angle and position}) could be assigned to words, expressing the defined movements. These words could then be used within the story composition and when the words were clicked, the animations were evoked. These sub-constructions could then be further used to create more complex functions and the whole story could be developed into a start-up program (see Figure 3.). The **Storyworld** was included in the NETLogo e-Learning (Turcsányi-Szabó, 2001a) material designed for children and their teachers, where experiences showed that that these circular activities (story – animation – procedural programming) actually triggered each other with high motivation. The Hungarian NETLogo portal (http://kihivas.inf.elte.hu/halogo/) provided an environment for a community to develop, where both children and teachers were mentored by university students, updating the material.

Several other forms of media design were also introduced within these materials, introducing action poetry and text based animations that modelled language constructions, as well as game design. Several competitions were launched in which John von Neumann Computer Society provided prizes for winners and these environment became country-wide used tool in fulfilling the ICT related parts of the National Curriculum. We used this material also within in-formal education together with another material (Creative Communication), with which we mentored children attending telehouses, through individual and collaborative activities. Creative forms of expression were one of the main ideas that were addressed using various tools, for mindmapping (Turcsányi-Szabó, Pluhár, 2003), graphic design, typography, narratives, animations, ...etc. (Turcsányi-Szabó, 2001b).

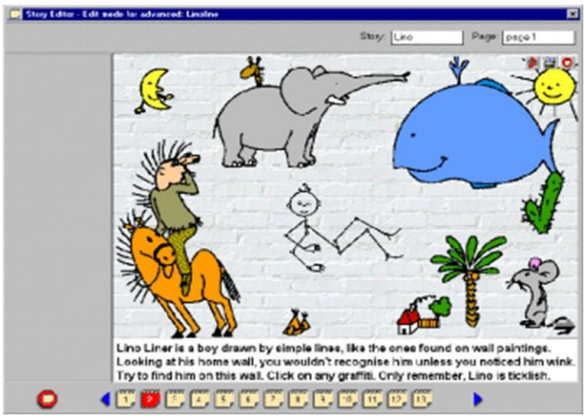

Figure 4. MATCh "Imagine" editor

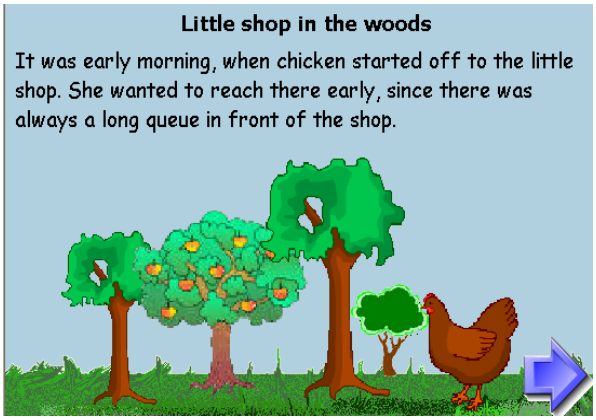

Figure 5. Imagine Interactive storybook

The **MATCh project** (http://comlogo.web.elte.hu/team/match/) gave a wonderful opportunity to experiment further with storytelling tools (see Figure 4.) and the results of the experiments with children gave us lots on further experiences and ideas for later implementation (Turcsányi-Szabó, 1999) as well as the very idea for developing "Imagine". With the appearance of the Imagine authoring tool (2006), again the notion of storytelling was picked up (see Figure 5.).

Colabs project (http://matchsz.inf.elte.hu/Colabs/) investigated how children can learn through the internet collaboratively - among others - the "Picture Communication" portal (see Figure 6.) was born, where internationally understandable stories could be produced by using the "TellingYouInPictures" editor to compose complex thoughts and using a multilingual picture dictionary (containing nouns, verbs, and adverbs) to express stories in form of sequential pictures (Abonyi-Tóth, Bodnár, et al., 2005).

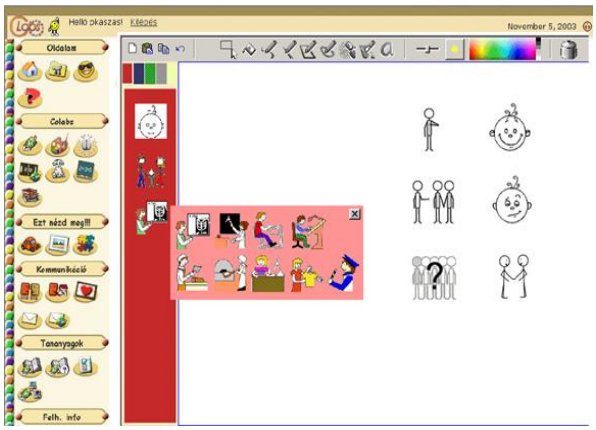

Figure 6. TellingYouInPictures editor

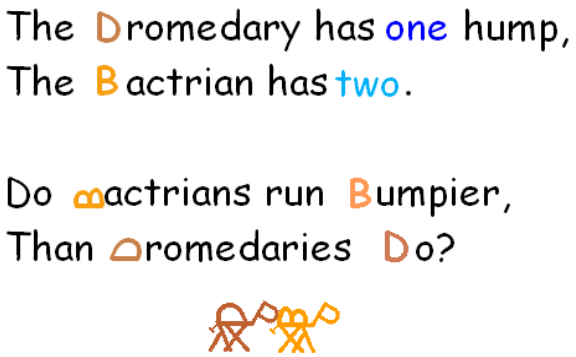

Figure 7. Different forms of interactive poems

Colabs project also stared out the basics of the **Creative Classroom** e-Learning material and activities that not only addressed digital literacy, but was an introductory course on programming in an object oriented environment and an inventory for different forms (see Figure 7.) of creative interactive expressions, which is freely available in both English and Hungarian languages and in Hungary it is frequently used in fulfilling parts of the National Curriculum (Turcsányi-Szabó, 2006a; Turcsányi-Szabó, 2006a;). Storytelling is again an essential part of the activities which has been emphasised by producing a Storyportal (http://meseportal.ini.hu/), which concentrates solely on the minimalistic direct manipulation and programming features of Imagine that allows the development of creative stories (Turcsányi-Szabó, Paksi, 2007). As an alternative tool for both storytelling and game creating, we developed the **Hungarian Scratch** portal (http://scratch.inf.elte.hu/), where children can go through a series of interesting bite-sized learning materials to learn how to develop complex expressions using LEGO-like code building structures in an object oriented environment.

TeaMstory telling

Features of TeaMstory builder tool

Throughout the past 25 years, kindergarten children were always in the main scope of attention. Thus a **TeaMstory** builder (http://teamese.inf.elte.hu/) was developed within Imagine, using an interface to suit early and elementary users in creating stories in collaboration.

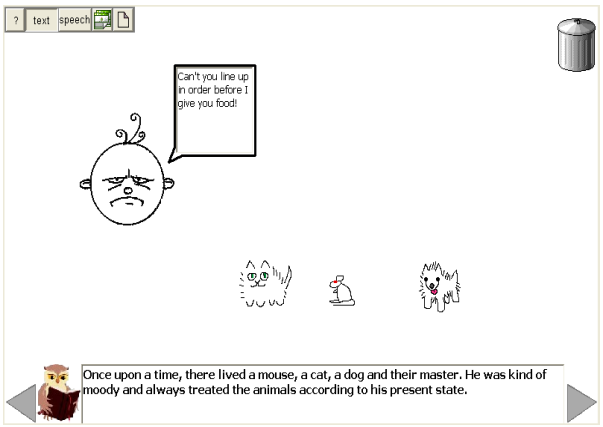

Figure 8. Editor configuration for kindergarten

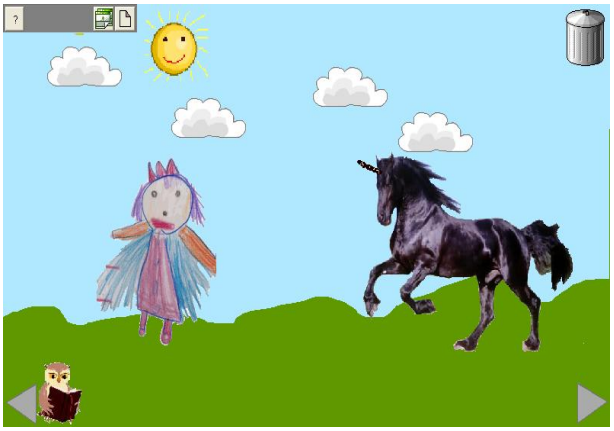

Figure 9. Editor configuration for elementary

The user interface of TeaMstory builder can be configured, depending on abilities and needs:

- The “text” feature allows the use of text within the story-box. Clicking on the story-box, the text-to-speech reads out the text inside in the language installed. Feature can be disabled.
- The “speech” feature allows the use of speech bubbles. Clicking on the speech bubble, the text-to-speech reads out the text inside in the language installed. Feature can be disabled.
- Shift between small and capital letters were possible and sound can also be enabled or disabled. *Features listed so far were designed to be used by those able to read* (Figure 8).
- Clicking on the background, a panel will appear with pre-installed actors. Clicking on one of them will make it appear on the background itself and the panel disappears.
- Right clicking the actor changes its appearance; middle click allows recording narrative for actor; left clicking will make the narrative be heard. The owl is the story teller, so the main recording of the story is to be assigned to it.
- Actors could be dragged on the background, thus their movements could be played out
- Normal direct manipulative features of Imagine allows drawing on the background, creating new actor (not involved in story starter) or saving one’s work.
- Actors and speech bubbles can be deleted by throwing them in the bin.
- New page button will create a new page with all the same functionality and actors involved in order to ease creation of the story-line.
- Clicking the right or left arrows, flips pages. *Remaining features for non-readers* (Figure 9).
- It is also possible to save the story on the web (when it is totally finished), but it requires a specific command to be written in the command line and clicking on the Enter key.

Kindergarten settings

The TeaMstory builder was tested in three different kindergartens (Pitypang, Meseerdő and Bükköny) with different perspectives of childcare and technology use. ICT is since long part of Pitypang kindergarten’s every days, which eases various administrative tasks, aids preparation of activities and provides enhanced forms of communication with parents, where several computers, cameras, printers and scanner are part of the openly used tools (by children too). Computers are also present in the homes of children and by showing proper attitudes with ICT use through the rules implemented at kindergarten (e.g. computers can be used for max 20-25 minutes at a time by usually about two persons together), teachers believe that these attitudes would be transferred into homes as well. Creating, recording, illustrating, producing story books and re-telling stories are essential part of the literature activities of Pitypang kindergarten (Méder, Varga, Knizner, 2005). TeaM lab has good working relation with them since five years by continuously developing edutainment tools for their specific use (http://pitypangovoda.hu). The other two kindergartens, Meseerdő (which is private kindergarten) and Bükköny (standard governmental kindergarten), though well equipped, do not have any specific relation with ICT.

The aim of the research was to implement TeaMstory builder within the story creation and re-telling activity, investigating how children are able to express their imaginations creatively and to what extent are they able to take part in the creation process.

The main research took part at the Pitypang kindergarten, where TeaMstory activities were integrated into the normal storytelling activities of the kindergarten. The sessions took place every Friday (lead by the researcher) for three months, 1-1 ½ hours in overall length, during which about 10-12 children took part with self initiated circulation.

In the first stage, the story books previously created on paper by children with their own drawings and story text (written on the pages by the teacher) were scanned and processed into interactive story books by adding animations and interactive elements. Children were thrilled to see their own creations and impressions become alive. They re-told lot of experiences while playing with their own interactive narratives and recalled a lot of events specific to them in relation to the story elements. They could move characters or click on them to invoke animations imposed by the story and listen to small sound elements too. They enjoyed very much these

interactions; however the “closed” product had its limits for interaction, structure and implementation that were not mirrors of children’s own fantasies, but that of the creators.

TeaMstory builder had an original version published in the SchoolNet digital repository by the developer (Turcsányi-Szabó, 2006b), which was used as an initial tool by the researcher (Pasaréti, 2009) and developed further through an action research cycle, which collected, analysed and advised further modifications in order to achieve aimed research goals, by modifying or implementing new functionalities, according to the experienced needs. The final configuration used in kindergarten switched off speech bubbles, alternatively used story-box with capital letters and switched of text-to-speech (though at times it was used for fun).

In the beginning, the researcher showed children the use of tools and how they can express their ideas with existing functionality, she helped children attaining their aims, later just acted on wishes of children and as times passed children slowly came forward to do the activities themselves, leaving the researcher in the background for “just-in-case” needs. The bigger ones quickly mastered all functions in order to build their stories and the smaller ones managed with more collaboration: one clicked on middle mouse button to start recording, while the other started talking holding the microphone and the third became responsible for the background (see Figure 10.). The computer provided instant feedback, no stress if at fault, so mistakes were realised by children and corrected by themselves or asked for help where needed.

Figure 10. Working in collaboration

Figure 11. Bewildered by story telling

Developmental experiences

Apart from proper body-build, children need to acquire several skills before entering school in order to be able to master reading, writing and arithmetic, the basics of which lie in attentive involved activities (137/1996 (VIII. 28.) Governmental regulation).

Developing skills for aural self expression

One of the requirements for school entry is that the child should be able to easily memorise short poems, nursery rhymes and stories. The repetitive listening to finished stories helps children with memorisation in the first place, furthermore the recorded enthusiasm in story telling proves the amount of motivation children possessed when mastering the story elements. Each child wanted to be Little Red Riding Hood, Piggy or the wolf in turn, to be able to express his/her version and children were eagerly helping each other to recover forgotten parts, discuss or debate happenings of a tale. It was quite evident how the amount of narratives developed and grew within children’s memories.

The recognition and application of visual sequencing is also an important ability that TeaMstory builder provided by the sequential construction of story parts (which parts come first and which part follows), their circumstances (season and timing of the day or weather conditions).

A trivial requirement for children is to be able to express oneself in short compound sentences in which the freedom of story development within TeaMstory allowed children to develop such skills. At first the sentences were less fluent, but later one came after the other and whole story telling sessions evolved (see Figure 11.).

Developing skills for visual self expression and fine motoric skills

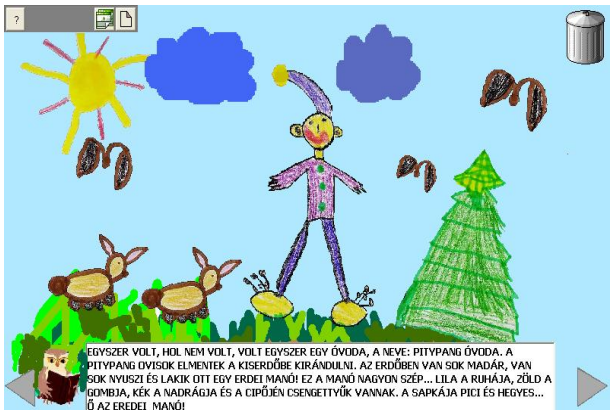

Figure 12. Editor configuration for kindergarten

Figure 13. Editor configuration for elementary

Keyboarding, the fluent use of the mouse for drawing and different manipulative activities develop fine motoric skills, but these were extended by off-computer activities, like drawing on paper (see figure 12) or folding Origami figures (see Figure 13), which are normal kindergarten activities. Children were happy to see the connection of their new activities with that of the usual, it gave them a break from computer use and something to take home after the activities. The manual works were scanned and imported within the TeaMstory world, which triggered further motivation upon recognising their own creations to go further in developing the story.

Children gave no preference in selecting figures (see Figure 9.) that were realistic (photo-like) or draft scratches created by themselves, they chose at random, but once their own products were involved, they made several proud comments on who's work that was.

There were always more children awaiting their turn at the computer, so a relevant rooster emerged quickly: while some children were busy at the computer, others earned their turns by creating further visuals to be involved at the next stage. Thus stories often developed depending on the actual fantasies lived through on spot, the final creations and their sequences of involvements.

The use of the drawing tools was also a highly appreciated activity on its own. First they had to master the use of background drawing tools, in which choosing the proper colour was an important event in itself, then the creation of smaller figures and filling larger areas with certain colours. The bigger ones later found out how to create filled geometric figures in order to ease object creation. Later they learned how to modify drawings of actors within the Logomotion editor of Imagine, which very well illustrated the emergence of existing figurative schemes within children, e.g. they drew spots of skirt, apron, boots and wrinkles for a grandmother figure.

Developing mathematical skills

Some stories involved counting and sequential skills, like the Carrot story (see Figure 13.), which children played and recited several times dragging the actors into their right positions.

Spatial orientations were also important while playing with a story, as the places of actors were modifiable. The notion of: *inside, outside, under, over, behind, in front, beside, right* or *left* were easily practiced during story telling. Any number of actors could be created in a row and if actors were not needed any more, they could be thrown inside the bin in order to practice having more or less of them at a time.

Teamwork

TeaMstory (or any other story building or gaming tool for that matter) is not a "nanny" and was not developed to substitute educator/parents or caretakers, but rather provide a tool with which they could enhance their communicative interactions. At first children need help, advice and later an action triggers reactions as means of communication in collaborative involvement with a sibling, parent or caretaker that the child feels comfortable with and at ease to open up his/her full spectrum of fantasy. Children working together help each other, give advice, solve conflicts, take good care for everyone to take turns and learn how to socialise on the way. They are good at collaborative problem solving under such relevant situation and specific roles emerge on the way and prove to them the importance of teamwork to attain good results that everyone enjoys. Thus TeaMstory builder had a great role in forming effective production groups, exploring individual add-on values, adjust individual will to possibilities and acceptable morals, develop unselfishness and urge to help the other, heading the right way in the process of socialising in Vygotsky's term of "*zone of proximal development*" (Vygotsky, 1986).

Reading and writing

There is no aim in kindergarten to teach children reading or writing, however it must be noted here, that more children master reading skills at the age of kindergarten then in the past decades as media is very much effecting the lives of children. Reading is the foundation for literacy as computer use the foundation of digital literacy. The TeaMstory builder allows the use of text for those children who wish to explore the world of words at their own space. But, more importantly the tool allows an enjoyable form of concentration for about 15-25 minutes, which is definitely a requirement before entering school.

There were no significant differences in use among the three visited kindergartens, except from the reaction time of children towards technology tools. While children at Pitypang kindergarten wanted to take part in story building from the very first session, children in the other two kindergartens were able to be actively involved only after a few more sessions. Apart from that, they were also deeply involved in all sorts of similar activities and developed their own skills likewise as fluently as the others.

TeaMstory at school

The features of TeaMstory builder allows it's more sophisticated us for children who already know how to read and write, developing several key competencies (DeSeCo, 2005):

- Language studies: to express thoughts/emotions not only in words, but in writing as well – in one's own mother tongue as well as some other foreign languages.
- Digital competencies: to interact with information using technology and the ability to communicate using media.
- Mathematical competencies: apart from the expression of quantities and location and times based relations, context based narrative problems can be composed easily.
- Art education: aesthetics and creativity can be further developed using visual multimedia elements and lots of imagination. Visual representation of stories, poems, special or just every day happenings. Music and singing activities can well be integrated too.
- Special education: the tool can produce interactive activity book for children with special needs, that can integrate media elements to better express the intended content.

Conclusion

Games are the most important developmental activities for early age children, allowing free association of ideas that are basic physiological needs at this age, which should be a continuous, long lasting recurring process in the everyday's of small children. The unstructured experiences accumulated from the outside as well as inside world of a child can become structures within acted games, thus it becomes an important activity. Especially around 5 years of age the social activities start to gain significance, providing: belonging, security, identity, binding, joy of doing something together, possibility of interactions and communication (Zsubrits, 2007). Story related activities are perfectly suitable for kindergarten children, which reflects their fears and resolves them, creates an intimate sphere where internal ideas can be visualised and provides security due to the emotional binding towards the story teller person, thus a perfect form for internal visualisation through the processing of experiences (137/1996 (VIII. 28.) Governmental regulation). However, computer related activities should not be used instead of other games, but as a tool for games; only developmentally appropriate activities should be chosen; only activities that are relevant for this age group can keep up children's motivation; it should not substitute human interactions, but should facilitate them; it should not take away much time from indoors or outdoors activities vital for this age (Turcsanyi-Szabo, 2004).

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