Radboud Repository

Radboud University Nijmegen

PDF hosted at the Radboud Repository of the Radboud University Nijmegen

The following full text is a publisher's version.

For additional information about this publication click this link.
http://hdl.handle.net/2066/214307

Please be advised that this information was generated on 2021-06-17 and may be subject to change.

Acquiring novel words in a second language through mutual play with child songs – the Noplica Energy Center

Laura E. Hahn
Centre for Language Studies, Radboud University
Nijmegen, The Netherlands
l.hahn@let.ru.nl

Maaike ten Buuren
Radboud University
Nijmegen, The Netherlands

Monique de Nijs
Radboud University
Nijmegen, The Netherlands

Tineke M. Snijders
Max Planck Institute for Psycholinguistics
Nijmegen, The Netherlands

Paula Fikkert
Centre for Language Studies, Radboud University
Nijmegen, The Netherlands
p.fikkert@let.ru.nl

Abstract

Child songs are a great source for linguistic learning. Here we explore whether children can acquire novel words in a second language by playing a game featuring child songs in a playhouse. We present data from three studies that serve as scientific proof for the functionality of one game of the playhouse: the Energy Center. For this game, three hand-bikes were mounted on a panel. When children start moving the hand-bikes, child songs start playing simultaneously. Once the children produce enough energy with the hand-bikes, the songs are additionally accompanied with the sounds of musical instruments. In our studies, children executed a picture-selection task to evaluate whether they acquired new vocabulary from the songs presented during the game. Two of our studies were run in the field, one at a Dutch and one at an Indian pre-school. The third study features data from a more controlled laboratory setting. Our results partly confirm that the Energy Center is a successful means to support vocabulary acquisition in a second language. More research with larger sample sizes and longer access to the Energy Center is needed to evaluate the overall functionality of the game. Based on informal observations at our test sites, however, we are certain that children do pick up linguistic content from the songs during play, as many of the children repeat words and phrases from songs they heard. We will pick up upon these promising observations during future studies.

Keywords
Language games, child songs, movement

Introduction

Child songs are a great means for language learning (Davis, 2017). A number of studies show a positive effect of using child songs within early language education (e.g. Albaladejo, Coyle, & Larios, 2018; Chou, 2014). Clearly, the songs' positive emotional connotation and their salient structure make them a good mnemonic for children as well as adults (e.g. Gingold & Abravanel, 1987; Lindstromberg & Boers, 2008; Purnell-Webb & Speelman, 2008).

Another important component of early childhood is movement during play, preferably outdoors (e.g. Aarts, Wendel-Vos, van Oers, van de Goor, & Schuit, 2010). Mutual play can serve as an informal learning context in which children pick up knowledge without being instructed explicitly (Acar, 2014).

The Noplica foundation designed a set of language games to stimulate language learning through mutual unsupervised play (www.noplica.nl). The language games are combined into playhouses, of which prototypes have so far been installed in an orphanage in Maharashtra, India and at schools in Rotterdam and Nijmegen, the Netherlands. So far, a Dutch and an English version of the playhouses have been created. One of the games of the Noplica playhouse is the Energy Center (see Figure 1).

Figure 1: Energy center set up in a language lab, with two children playing and led-lights indicating energy produced.

In this game, three children play together at a panel with hand-bikes. Each child choses one of the hand-bikes. Upon movement of the bikes, child songs start playing and colorful LED-lights indicate how much energy each child produces, that is, how steady the child is cycling. Soon after the cycling has started, the child songs are accompanied by musical instruments, one instrument for each hand-bike. The children can cycle for as long as they wish and get exposed to a set of twenty different songs. The songs feature different topics and vocabulary and are sung by male and female singers in a child-friendly way. During our informal observations at the prototypes we saw children cycling eagerly, competing for the LED lights to go higher and higher and becoming submerged in the songs. Children also switched bikes during playing, cheered each other to cycle more and were clearly enjoying game.

The aim of the current set of studies was to investigate whether playing in the Energy Center has a positive effect on children's vocabulary in their second language. That is, do children know or acquire more words after they have played in the Energy Center? We will present results from three studies: Study 1 is a field study at a Dutch pre-school with children that had Dutch either as their first (L1) or second (L2) language. The children had access to the Energy Center on the playground of their pre-school and listened to twenty Dutch songs. Before and after playing, a picture-word-matching task was run to investigate growth in vocabulary.

Study 2 was run in a language laboratory in the Netherlands with groups of Dutch children that did not know each other prior to the beginning of the study. Children visited the lab in groups of three children and played in the Energy Center for approximately ten minutes. They were exposed to an English version of the child songs. Again, a picture-word-matching task was run to investigate whether the words featured in the Energy Center songs are recognized better than two other sets of novel words.

Study 3 was run at an Indian orphanage with pre-school children of mixed language background (Hindi, Maharathi, and others). The design was the same as in study 2 (English child songs, picture-word matching task), however, this time children only listened to the songs while sitting in a circle, as the Energy Center was not yet installed at the field site.

Study 1: Field study with preschoolers in the Netherlands acquiring Dutch vocabulary

Method

Fourteen preschoolers (7 female, mean age: 3 years, 5 additional kids excluded) were recruited from a Dutch daycare and were tested on their receptive vocabulary in Dutch before and after they had access to the Energy Center (Dutch version). Participants either had Dutch as their first language (L1 group, n = 7) or as their second language (L2 group, n = 7). All children were diagnosed to be at-risk for language delays in Dutch. The Energy Center was installed on the playground of the daycare. Children had access to the Energy Center within groups of three to four children once a week over the course of four weeks. Each group would play approximately ten minutes, so that each child accumulated an estimated average of sixty minutes of playing time in the Energy Center. The Energy Center featured a set of twenty child songs with Dutch lyrics. The songs were playing in random order. A subset of three songs was additionally played in the classroom of the children for a single day. On this day, the three songs were repeated three to five times in a passive to semi-passive listening context, meaning that children were not listening attentively to the songs most of the time. Before and after the four-week playing period with the Energy Center, children were tested on their receptive vocabulary with a picture selection task (Pre- / Post-test). Children were asked to point at the correct picture in a panel of four pictures (30 trials, 1 per target word). Half of the target words came from the songs that were only played in the Energy Center (n=15, Energy Center Context). The other half of the target words was featured in the three songs that were played in the Energy Center and additionally in the classroom (n=15, InClass Context). The dependent variable was the percentage of correct responses in the Pre- and the Post test for the two learning contexts (Energy Center only, InClass) and the two Language Groups (L1, L2).

Results

Both Language Groups performed better during the Post-test than during the Pre-test (see Figure 2). The L1 group also showed an increase in vocabulary after having played in the Energy Center without additional exposure to the songs. The L2 group, however, needed the aided benefit of in-class exposure.

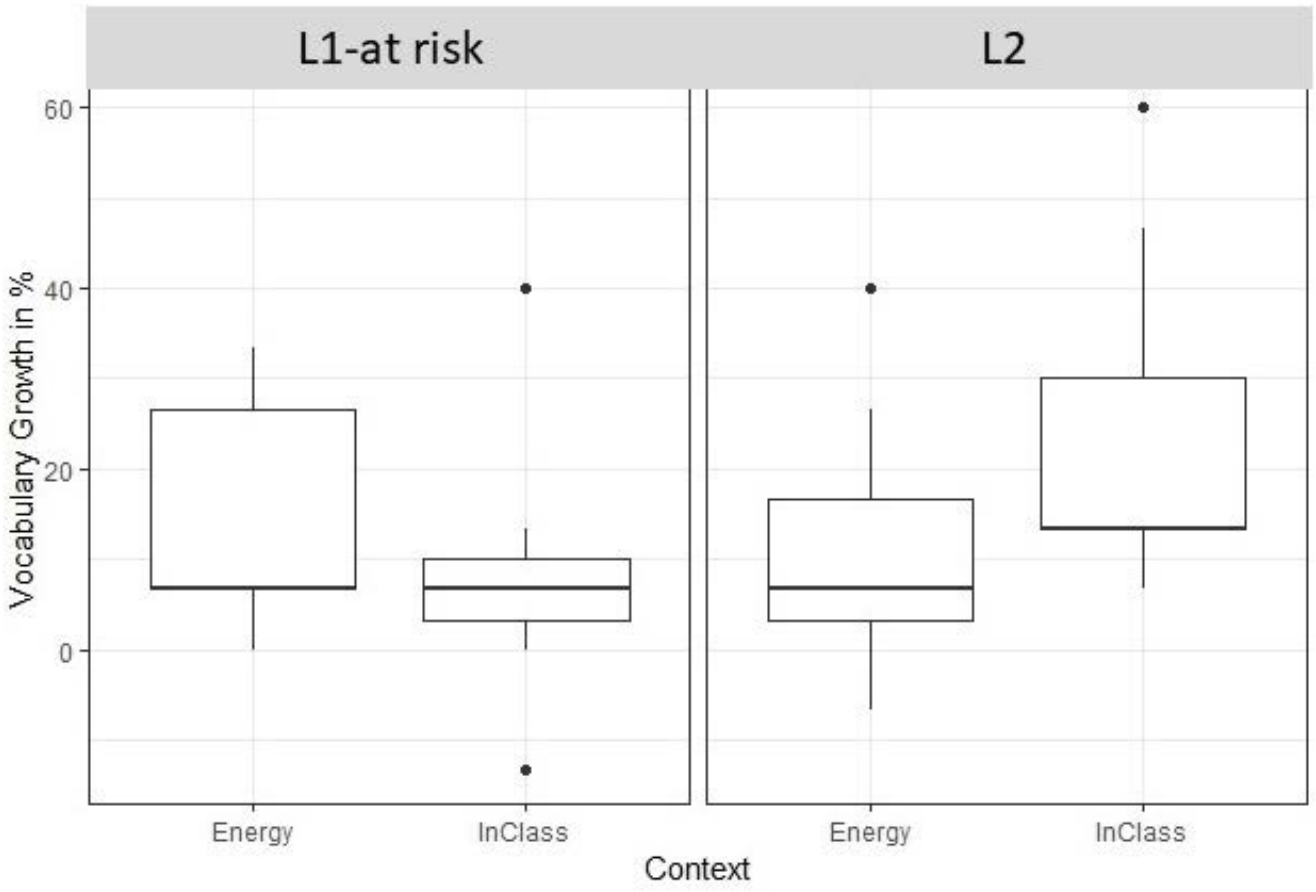

Figure 2: Boxplots of vocabulary growth (post-test percentage correct minus pre-test percentage correct) for the two language groups and learning contexts. Thick lines = group medians, boxes = 1st and 3rd quartile, whiskers = 1.5 interquartile range, single points = outliers.

A repeated-measures mixed 2 x 2 x 2 ANOVA on the factors Language Status (L1, L2), Learning Context (EnergyCenter, InClass) and Time (Pre, Post) was performed. Percentages correct were higher in the post- than the pretest for both language groups (main effect of time, $F(1,12) = 11.48$, $p = .005$). A main effect of Learning Context ($F(1,12) = 18.45$, $p = .001$) was due to overall higher scores for the Energy Center items (also for the pre-test), showing the experimental lists were not completely balanced in difficulty/familiarity. L1 children numerically scored higher than L2 children, but there was no significant main effect of Language Status ($F(1,12) = 2.50$, $p = .1$). Importantly, there was a significant three-way interaction ($F1,12) = 16.45$, $p = .002$): the two language groups differed in the degree of vocabulary growth between Pre-and Post-test in the two Learning Contexts.

We therefore run separate ANOVAs for the two Language Groups with the factors Learning Context and Time of Testing. In the L1 Group, there was no interaction between Learning Context and Time ($F(1,6) = 3.50$, $p = .1$), while in the L2 group there was ($F(1,6) = 16.35$, $p = .007$). The Vocabulary Growth (post minus pre-test percentage correct) for the L2 group was larger for the InClass-words ($t(6) = -3.0467$, $p = .03$) than for the Energy Center ($t(6) = -1.87$, $p = .1$).

Taken together, our results show that children benefitted from playing in the Energy Center, as they knew more words during the Post-test, than during the Pre-test. For the L2 children this benefit was increased by additional exposure to a subset of the Energy Center songs in class. For the Energy Center to be successfully integrated into educational practice, the language background of the target group has to be taken into account.

The current study has two important limitations: one is the lack of a baseline condition. Preferably, another group of children would have been tested that did not have access to the Energy Center at all. This would have allowed us to compare the baseline growth in vocabulary of this second group of children with the children that did play in the Energy Center. Second, follow-up studies should aim at balancing the baseline familiarity of the target words between the two learning contexts.

Study 2: Lab study with Dutch preschoolers acquiring English vocabulary

Method

Thirty-four Dutch monolingual preschoolers (17 females, 15 children excluded, mean age: 3.79 years,) were tested on their English vocabulary with a picture-word-matching task after having played once in the Energy Center (English version). Children did not know each other prior to their visit to the lab. Before playing in the Energy Center, children went through a picture-word matching phase (in English) on a tablet PC: 18 pictures were shown consecutively on screen. Each picture was either named ("Look! A bike! Touch it!", "Look! A chair! Touch it!") or not named at all ("Look! Touch it!"). After this Matching Phase, children played in the Energy Center for as long as they wanted. The Energy Center featured two sets of three songs each (Version A (12 children tested) and B (24 children tested)). The songs contained a subset of the words from the matching phase (e.g. bike). During the Test Phase, children saw a set of three pictures on the tablet PCs and were asked to touch the correct picture. The pictures were distributed across three conditions: Novel = not named during the Matching Phase, Matching = named only during the Matching phase of the experiment (e.g. chair) and Energy Center = named during the Matching Phase and in the Energy Center Songs (e.g. bike).

Results

Children performed around chance level regardless of the experimental condition (see Figure 3).

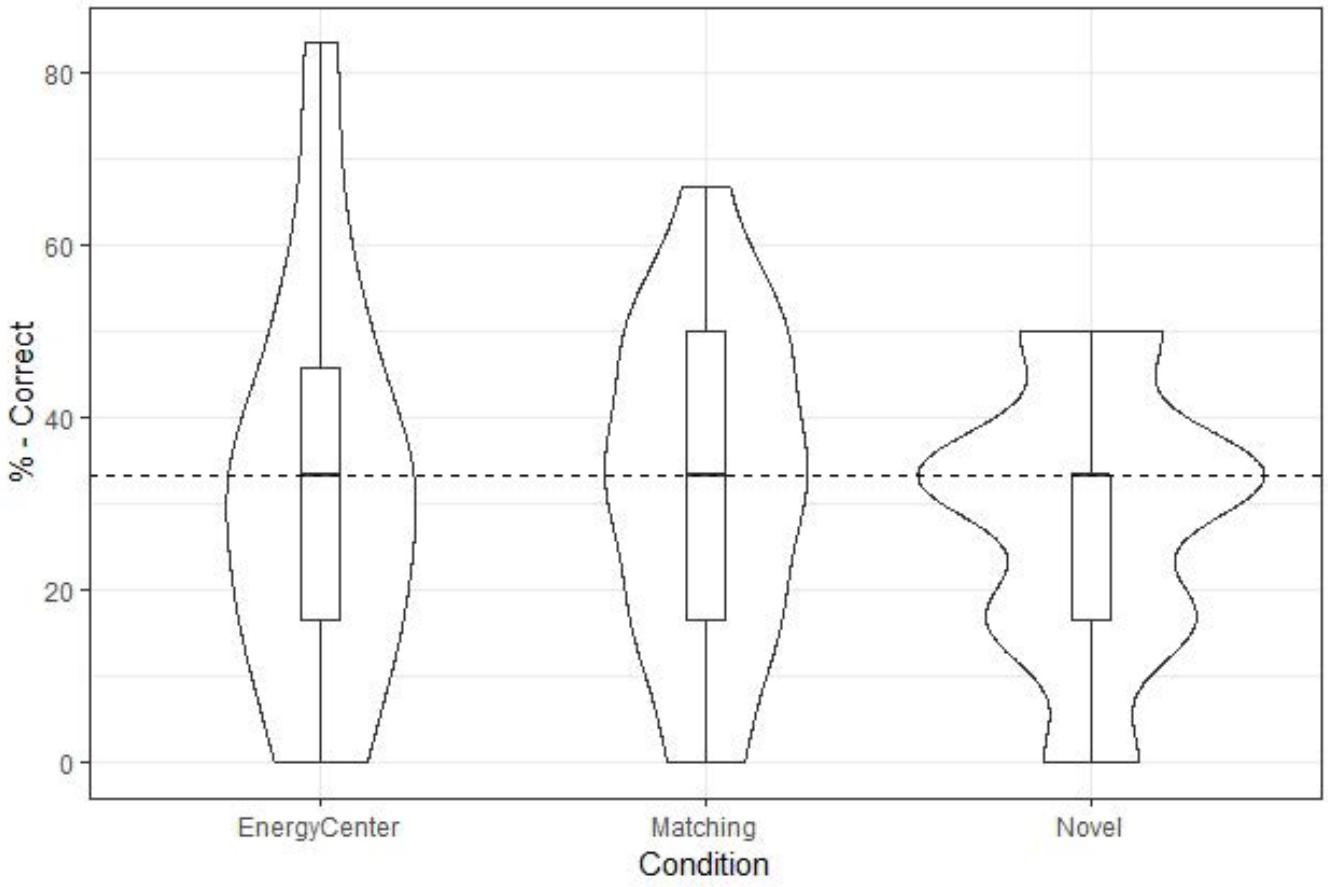

Figure 3: Percentage of correct responses in the three experimental conditions of study 2, dashed line = chance level. Boxplots: thick lines = group medians, boxes = 1st and 3rd quartile, whiskers = 1.5 interquartile range. Underlying violin plots: distribution of the single data points.

A one-way repeated-measures ANOVA indicated no significant differences between the three Experimental Conditions (Novel, Matching, Energy Center) ($F < 1$).

Study 3: Field study with preschoolers in India acquiring English vocabulary

Method

Sixteen children (7 female, mean age: 4.0) were recruited at the campus of Snehalaya Foundation in Ahmednagar, India. Children either had Hindi or Marathi as their first language and did not have English language lessons in the past. However, they were used to overhearing English from volunteers visiting the campus and some children did know a couple of English terms (e.g. "tree", "selfie"). Children were tested on two-consecutive days. On day 1, children executed the Peabody Picture Vocabulary Test (PPVT) (Dunn & Dunn, 1997) to assess individual differences in English vocabulary. On day 2, children were tested in groups of three children and first listened to three songs from the Energy Center (English version). Each song was played three times, meaning that children heard nine songs in total. Children were sitting in a circle together with the researcher and a teaching assistant. They were instructed to move and clap along to the songs. After exposure to the songs, the Matching Phase began: the

teaching assistant introduced the English vocabulary of the songs by showing the group of children pictures of the target words. Like in study 2 above, target words were distributed across three conditions: Energy Center Songs (words being named in the songs from the Energy Center and during the Matching Phase), Matching (words only being named during the Matching Phase but not in the songs) and Novel (words not named at all). For the words from the Song and Matching condition, the teaching assistant would name the target word several times (e.g. "Look! A bike! Bike! Bike!"). For the Novel words, the teaching assistant held up the picture of the target word and only said "Look!, How nice!". During the test phase, children were tested individually. Like in study 2, children now saw pictures of three target words at the same time and were asked to point at the right picture ("Show me the bike!").

Results

Children performed better in the Matching and Energy Center condition than in the Novel condition (Figure 4).

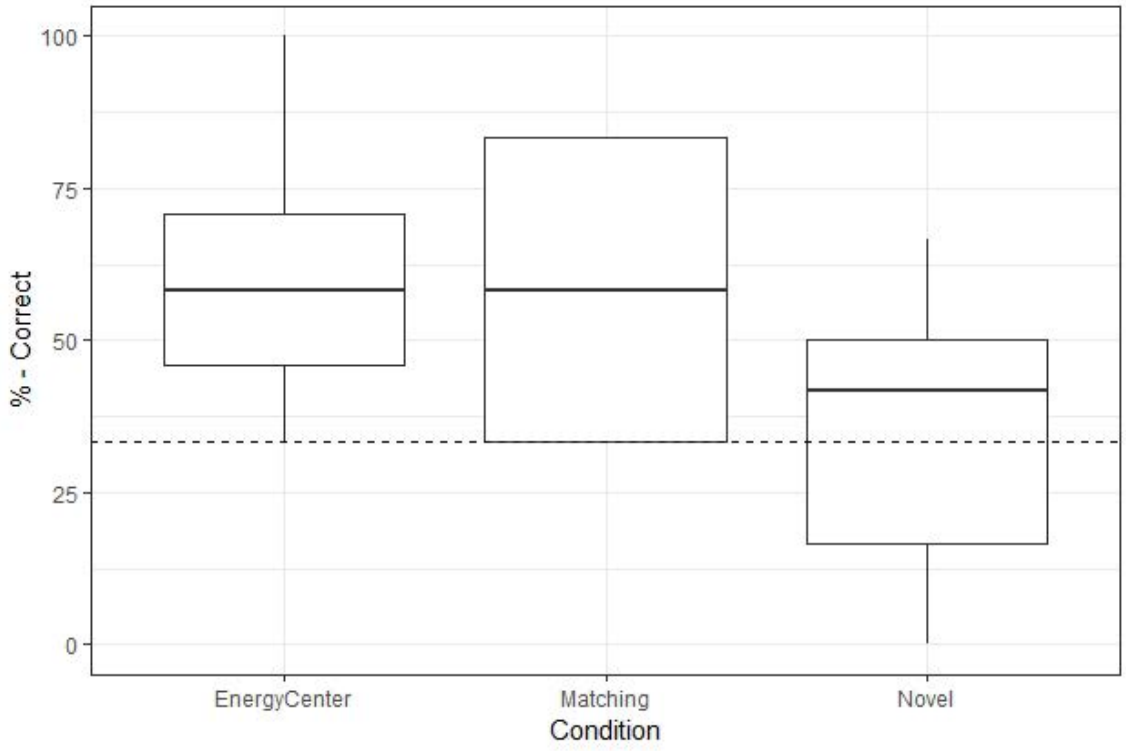

Figure 4: Percentage of correct responses in the three experimental conditions of study 3, dashed line = chance level. Boxplots: thick lines = group medians, boxes = 1st and 3rd quartile, whiskers = 1.5 interquartile range.

A one-way repeated-measures ANOVA indicated a significant main effect of experimental Condition ($F(2,30) = 4.50$, $p = 0.01$). Follow-up t-tests revealed that performance was significantly better for the Energy Center Songs ($t(15) = 2.91$, $p = .01$) and Matching condition ($t(15) = 2.60$, $p = .02$) compared to the Novel condition. Children performed equally well in the Matching and the Energy Center condition ($t(15) = 0.13$, $p = .9$).

General Discussion

Taken together, the results of our studies are inconclusive. Only in the first study a general benefit of using the Energy Center could be observed. However, study 1 misses a baseline condition with another group of children that did not have access to the Energy Center. In study 3, performance was good on the words used in the Energy Center songs, however, this performance was not better than for the words that only occurred during the Matching phase. We were thus not able to prove an additional benefit of hearing the songs from the Energy Center. In study 2, performance was around chance level in all three experimental conditions. Crucially, participants in this study had the least prior exposure to the language that was featured in the Energy Center songs and were only playing for a rather short amount of time. Moreover, the lab environment was admittedly detrimental for the effect of the Energy Center. Unlike in study 1 and 3, in our lab study children were recruited from different day cares. Therefore, they did not know each other prior to the start of the experiment and where therefore rather shy during playing. In addition to this social component that was missing from the experimental context, children in study 2 also only had rather short exposure time to the songs of the Energy Center. During this short time, children had to actively cycle to listen to the songs. In study 3, the Energy Center songs were played for a fixed time and children were sitting in a circle instead of having to move the hand bikes. This rather active listening context together with the more relaxed test environment might have improved children's performance for both the Matching and Energy Center condition.
A general shortcoming of all our studies are the relatively small sample sizes. For the results to be reliable, a replication with more children accompanied by a power analysis seems warranted.

Conclusion

The Noplica Energy Center provides a promising means to stimulate vocabulary acquisition in illiterate pre-school children. For the Energy Center to work best, it seems crucial for it to be integrated within the daily activities of children (e.g. within a day care) so that children can access the Energy Center over the course of at least a month. Moreover, children should have some prior experience with the language that is featured in the Energy Center. Once children can play the game regularly and together with their peers, successful learning seems possible. However, more well-powered studies are necessary before firm conclusions can be drawn.

Acknowledgments

This work was supported by a grant from the Centre for Language Studies, Radboud University, Nijmegen. We would like to thank our assistants at Snehalaya Campus, Maharashtra, India and Pino, a KION day-care centre in Nijmegen, for their enthusiastic support. We also would like to thank Julia Merkus, Demi Lamers, Anna Bolhuis and Katharina Menn who supported us during preparation and testing of the study and Peter Withers who programmed the picture-word-matching task for a tablet PC.

References

Aarts, M.-J., Wendel-Vos, W., van Oers, H. A. M., van de Goor, I. A. M., & Schuit, A. J. (2010). Environmental Determinants of Outdoor Play in Children: A Large-Scale Cross-Sectional Study. American Journal of Preventive Medicine, 39(3), 212–219. https://doi.org/10.1016/J.AMEPRE.2010.05.008

Acar, H. (2014). Learning Environments for Children in Outdoor Spaces. Procedia - Social and Behavioral Sciences, 141, 846–853. https://doi.org/10.1016/j.sbspro.2014.05.147

Albaladejo, S. A., Coyle, Y., & Larios, J. R. De. (2018). Songs, stories, and vocabulary acquisition in preschool learners of English as a foreign language. System, 76, 116–128. https://doi.org/10.1016/j.system.2018.05.002

Chou, M. hsuan. (2014). Assessing English vocabulary and enhancing young English as a Foreign Language (EFL) learners' motivation through games, songs, and stories. Education 3-13, 42(3), 284–297. https://doi.org/10.1080/03004279.2012.680899

Davis, G. M. (2017). Songs in the young learner classroom : a critical review of evidence. ELT Journal, 71(July 2018), 445–455. https://doi.org/10.1093/elt/ccw097

Dunn, L. M., & Dunn, L. M. (1997). PPVT-III: Peabody picture vocabulary test. American Guidance Service.

Gingold, H., & Abravanel, E. (1987). Music as a mnemonic: The effects of good- and bad-music settings on verbatim recall of short passages by young children. Psychomusicology: A Journal of Research in Music Cognition, 7(1), 25–39. https://doi.org/10.1037/h0094188

Lindstromberg, S., & Boers, F. (2008). Phonemic repetition and the learning of lexical chunks: The power of assonance. System, 36(3), 423–436. https://doi.org/10.1016/j.system.2008.01.002

Purnell-Webb, P., & Speelman, C. (2008). Effects of music on memory for text. Perceptual and Motor Skills, 927–957. Retrieved from http://www.amsciepub.com/doi/abs/10.2466/pms.106.3.927-957