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Evaluating storytelling activities for early literacy development

Irena Y. Maureen ^{a,b}, Hans van der Meij^a and Ton de Jong^a

^aDepartment of Instructional Technology, Faculty of Behavioral Management and Sciences, University of Twente, Enschede, The Netherlands; ^bDepartment of Educational Technology, Faculty of Educational Sciences, Universitas Negeri Surabaya, Indonesia

ABSTRACT

This study reports on the effectiveness of an organised set of storytelling activities that aimed to enhance early literacy development. There were three conditions in the study. In the control condition, regular literacy development activities took place. In one experimental condition, the set of activities included oral storytelling. In the other experimental condition, the activities included digital storytelling. Participants were 59 four- to five-year-old children from three kindergarten classrooms, and the intervention lasted 6 weeks. Children were assessed before and after the intervention for their early literacy skills development using two standardised tests and one non-standardised test. The results on the standardised tests showed that there was equally strong literacy development in all conditions. On the non-standardised post-test, the children in the experimental conditions did better than the control group. The discussion draws attention to the specific qualities of the intervention for early literacy development, and the benefits of testing this development with a mixture of standardised and dedicated tests.

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Introduction

The development of early literacy skills is critical for children's learning and later school achievement (Bennett 2002). Early childhood studies have drawn attention to various categories of early literacy skills. Generally, foundational early literacy skills consist of oral language comprehension, print awareness and phonological skills (Rohde 2015). In kindergarten, the development of early literacy skills is generally addressed in the form of teacher-led delivery of literacy instruction followed by drill-and-practice exercises (Zettler-Greeley et al. 2018). A number of longitudinal studies have found that these practices significantly contribute to children's literacy skills development (Piasta, Purpura, and Wagner 2010).

CONTACT Irena Y. Maureen  irenamaureen@unesa.ac.id  Department of Educational Technology, Faculty of Educational Sciences, Universitas Negeri Surabaya, Kampus UNESA Lidah Wetan, Surabaya 60213, Indonesia

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However, notwithstanding these positive findings, there are divergent views about the appropriate structuring of such instruction within early childhood education. That is, other research has argued that in this context, teachers should not rely on conventional instructional approaches that are too formalised, because such approaches do not always ensure long-term achievement (Bodrova 2008). Instead, an instructional design approach that fits with children's natural way of learning should be adopted, along with well-planned systematic guidance for early literacy skills development (Hirsh-Pasek et al. 2009).

The present study tested the effectiveness of a set of activities for early literacy skills development that followed the second approach. These activities involved a structured storytelling approach presented in a 6-week intervention, in which storytelling activities were embedded in Gagné's nine events of instruction. Earlier research (Maureen, van der Meij, and de Jong 2020, 2018) has already shown the effectiveness of this approach for literacy skills development as measured by non-standardised tests. In the present study, standardised tests were also administered to benchmark the progress made with the storytelling approach as compared to conventional literacy instruction.

Storytelling and digital storytelling

The activity of storytelling is a social and cultural practice oriented around the act of telling and sharing stories (Roig, Pires de Sá, and Cornelio 2018). Throughout history, sharing stories has been one of the most common means of knowledge transmission from generation to generation. Storytelling is probably one of the oldest forms of teaching. In early childhood classrooms, a storytelling session, where a teacher tells a story to the children, can capture the children's interest and motivation, and by connecting the story to their everyday life and prior experience, it can support sense-making (Bietti, Tilston, and Bangertner 2019).

However, in kindergarten, storytelling is mostly carried out independently from other instructional activities. Instead, it is predominantly used as a moment of relaxation in-between main tasks, or as an attention-getter at the beginning of the day. It is mostly employed as a complementary activity in early education classrooms (Roslan 2008; Wells 1986). While storytelling can indeed be relaxing and entertaining, it also has the advantage of communicating narrative structures. These involve the elements of setting, theme, characters, plot and conflict that allow storytelling to provide a model of speech, a context for learning and a way to expand imagination, which all contribute to literacy development (Sintonen, Kumpulainen, and Vartiainen 2018).

There is a considerable body of research on the effects of storytelling interventions on children's story-related abilities, including story comprehension and the acquisition of story structures such as diction, grammatical structure and content (Wessel-Powell, Kargin, and Wohlwend 2016). Research has also investigated its effects on general or second language development (Abasi and Soori 2014; Flynn 2016) and social-emotional development (Cekaite and Björk-Willén 2018; Sunday 2018). However, the contribution of a storytelling approach to early literacy skills development has hardly ever been investigated.

One prominent exception is Vivian Paley's research (Cooper 2005). Paley designed a storytelling curriculum that has children tell stories and act them out. The holistic nature

of the storytelling curriculum is evident in the learning goals that it promotes in many areas of development, from language development to social-emotional development (Cooper 2005), including some literacy skills (Nicolopoulou et al. 2015). Two critical aspects in Paley's storytelling curriculum are prior knowledge and group size. For the curriculum to be effectively employed, the children need to have a basic understanding of the narrative structure, and teaching should be done with a relatively small number of children in a group (Flewitt, Cremin, and Mardell 2016). The latter can especially be an obstacle when kindergarten classrooms may consist of more number of children. This study proposed to test the effectiveness of storytelling activities that are appropriate to children at the beginning of the school year (without any prerequisite knowledge on narrative structure) and applicable to a relatively large group.

Assuming that children have an innate love of stories, it is also worth noting that today's children are increasingly involved in storytelling interactions across multiple media platforms (Sintonen, Kumpulainen, and Vartiainen 2018). Introducing storytelling activities in early childhood education may therefore benefit from bringing in not only property-related story features such as pictures and puppets, but also digital technology, yielding a form of digital storytelling. Digital storytelling combines the art of telling stories with a mixture of digital media, including pictures and narration (Robin 2016).

Regular stories can be adapted to the digital field with the same benefits, and possibly even more advantages, because digital stories have different elements (Ryan 2004). Digital storytelling adopts a specific point of view, contains a dramatic question, and has emotional content to personalise the content of the story. Moreover, in digital storytelling, the gift of voice, power of soundtrack, economy and pacing can be attended to in the design to personalise the delivery of the story (Robin 2016). Most digital stories are short and between 2 and 10 min long. There are many different kinds of digital stories, but one major type is the personal narrative (Robin 2008). This type fits the common themes at the beginning of the academic year in kindergarten; therefore, it was employed in the present study.

There is growing interest in digital storytelling for young learners. Most research on this issue has concentrated on its use by kindergarten teachers (Yuksel-Arslan, Yildirim, and Robin 2016) or older children (Sadik 2008). The use of digital storytelling by children to enhance literacy development in early childhood education is, to our knowledge, yet to be explored.

Early literacy skills measurement

Literacy has been broadly defined as the capability related to reading, writing, communication and oral language, both in print and digital-based (Kennedy et al. 2012). Literacy development begins early in life and is a continuous and developmental process (Banerjee, Alsaman, and Alqafari 2016). Therefore, its foundations must be addressed in early childhood education. Early literacy development should focus on the skills that are the precursors to conventional forms of reading and writing (Missall et al. 2008).

Early literacy includes constrained and unconstrained components (Paris 2005). The constrained components are also known as technical or decoding skills. These include knowledge of letters, phonics and concepts of print. These skills are necessary, but not

sufficient, for literacy development. They are best taught and measured systematically as part of a comprehensive language and literacy programme. The unconstrained components are meaning-based skills that include competency in oral language, vocabulary and comprehension. These skills are developed across a person's lifetime and require meaningful routines and opportunities for practice.

Children's literacy skills, especially the constrained ones, are expected to meet normative levels for their age group. Assessing these benchmarks allows one to ascertain where a child needs additional literacy training. Considerable attention has been given to instrument development for measuring constrained skills. An example of a popular standardised test is the dynamic indicators of basic early literacy (DIBELS; Kamii and Manning 2005). DIBELS focuses on decoding skills such as phonological awareness, alphabet knowledge and early reading. It uses formal, standardised strategies in its measurements, meaning that the test is administered under controlled circumstances in highly structured environments. Standardisation allows control over factors that can influence the findings, such as how directions are given, how teachers should respond to children's questions and how teachers score children's responses. However, an important drawback of such assessment situations is that young children may have difficulty meeting the demands of the situation (National Research Council 2000).

To help fill the need for a reliable, research-based screening measure for use with 3- to 5-year-old children, Whitehurst and Lonigan developed the Get Ready to Read! (GRTR) screening tool, in conjunction with the National Center for Learning Disabilities (NCLD; Whitehurst 2001). The goal was to create a brief, user-friendly measure that had strong concurrent relations with more comprehensive measures of early literacy skills including print knowledge, letter knowledge and phonological awareness.

Both DIBELS and GRTR are assessment methods that use formal strategies. There has been some critique of these approaches to evaluating young children's skills (Langford 2010). One argument that has been raised is young children's limited test-taking abilities. Another concern is the possible distractions that interfere with the accurate measurement of capabilities. This critique has led to support for the use of informal strategies for measuring early literacy skills. These are flexible forms of assessment in which the measurement can be adjusted according to a particular context or the child who is assessed. For instance, when the measurement involves a checklist or portfolio, the teacher may have considerable freedom in how to interpret the data. This is also an important weakness of informal assessment strategies, since the teacher may be prejudiced, or hold certain stereotypes that can influence judgement (Brown and Rolfe 2005). Accordingly, this study has adapted content from standardised tests to the local curriculum, language and culture, and conducted the assessments in settings that are comfortable, familiar, non-threatening and of interest to the child. There is evidence that assessments in such settings better enable children to show what they know, what they can do and what they are experiencing (National Research Council 2000).

The current study

The research design was quasi-experimental with three conditions. In the control condition (C), the children engaged in regular literacy development activities that revolved

mainly around drill and practice activities in reading and writing. In the two experimental conditions, the children engaged in structured oral storytelling (S) or digital storytelling (DS) activities. To obtain the data for the current study, we used two standardised tests and one dedicated early literacy test.

The main research question is: 'How well does the organised set of literacy activities involving storytelling support early literacy skills development in kindergarten classrooms?' The tested prediction is that the experimental conditions yield greater skills development than the control. There are two sub-questions. The first asks how well the three conditions contribute to higher scores on standardised literacy tests. The second asks how well the three conditions contribute to higher scores on a dedicated early literacy test.

Method

Participants

The study was conducted in three classrooms from two public kindergartens. Both schools are situated within the same district; and the social background of the children in the schools are similar. The 59 participants (28 girls and 31 boys) in this study were 4- and 5-year-old children, with a mean age of 5.12 years ($SD = 0.34$). The study used intact classrooms that were randomly assigned to conditions. This led to the following groups: Control ($n = 15$), Storytelling ($n = 18$) and Digital Storytelling ($n = 26$).

Instructional materials

The materials used in the experimental conditions were six units of storytelling activities: 'My Name', 'My Body', 'My Hobby', 'My Friends', 'My Birthday' and 'My Senses'. The units revolved around common themes in the schools' curriculum that are addressed in the beginning of the academic year, when the experiments took place.

In the experimental conditions, the construction of the activities in the units was based on Gagné's events of instruction (Smith and Ragan 2005). Each unit had two or three objectives that aimed to contribute to literacy skills development. These objectives become the main ideas in each storyline in the experimental conditions. A unit consisted of a four-part structure: circle time opening (30 min), (digital) storytelling (30 min), follow-up activities (60 min) and circle time closure (30 min). Within each unit, there was preparation for an oral storytelling or a digital storytelling event. The main storyline was similar for both experimental conditions, but the delivery methods were different. The detailed set-up of a unit is illustrated for the theme of 'My Hobby'. Table 1 shows how (digital) storytelling and Gagné's events of instruction were blended in the unit. The objectives of this unit were recognising daily words related to their hobby in written form and having a conversation about their hobby.

In the control condition, the children had the regular, weekly literacy-oriented programme covering similar themes and objectives. Just as in the experimental conditions, each unit had a four-part structure: circle time opening (30 min), reading practice (40 min), writing practice (50 min) and circle time closure (30 min) the reading practice consists of two activities, small-group reading and pretend reading. During small-group

Table 1. 'My Hobby' lesson plan: an illustration of the blend between (digital) storytelling and Gagné's events of instruction.

Gagné's events of instruction	Classroom sessions
Circle time – opening (30 min)	
1 Gain attention	Engagement in morning routine
2 Inform learners of the objectives	Teacher tells the children about the theme and the objectives of the day
3 Stimulate recall of prior learning	– Make a booklet of children's activities – Arrange conversation rules poster
(Digital) storytelling (30 min)	
4 Present the content	Teacher tells the rules for the session and some identification of the story Teacher tells the story or plays the digital story via a projection device
5 Provide learning guidance	Teacher leads a discussion about how the story begin and end, the different parts of the story, and how it relates to the activities at the rest of the day
Follow-up activities (60 min)	
6 Elicit performance	– Matching game: hobby and equipment (game with rules)
7 Provide feedback	– 'What's your hobby?' (dramatic play)
Circle time – closure (30 min)	
8 Assess performance	Review the hobby survey results
9 Enhance retention and transfer	Teacher reviews the story and summarises activities of the day

reading, the teacher assisted one group of children to practice reading a group of words. The teacher spelt each letter and the children repeated after the teacher. In pretend reading, the children could select a book and then 'read' or play with the book in the corner of the classroom. When the teacher engaged in small-group reading, the other children were encouraged to engage in pretend reading. In writing practice, the children practiced writing by tracing and writing letters and words on worksheets prepared by the

Table 2. The general lesson plan of the control condition.

Gagné's events of instruction	Classroom sessions
Circle time – opening (30 min)	
1 Gain attention	Engagement in morning routines
2 Inform learners of the objectives	Teacher tells the children about the topic and objective of the lesson
3 Stimulate recall of prior learning	Teacher asks about the letters that the children know
Main activity – reading and writing (90 min)	
4 Present the content	Teacher shows the 2–3 words written on the board and reads them. (R) Teacher shows the 2–3 words written on the board, reads and spells them. (W)
5 Provide learning guidance	Teacher spells the letters of each word. (R) Teacher models how to write each letter under the words. (W)
6 Elicit performance	Children repeat after the teacher while reading the words one by one. (R) Given the writing worksheet, children trace the words a few times. (W)
7 Provide feedback	Teacher emphasises the correct pronunciation for each letter. (R) Teacher checks and grades the children's worksheets and provides feedback for each child. (W)
Circle time – closure (30 min)	
8 Assess performance	Children asked to copy the words without tracing/ clues
9 Enhance retention and transfer	Closing routines in the afternoon

teacher. Just as in the experimental conditions, Gagné's events of instruction were blended in the unit (see Table 2).

Assessment instruments

Standardised test – LNF – DIBELS

The DIBELS letter naming fluency (LNF) instrument (6th edition) was used to measure alphabet knowledge. Children were presented with a page of 120 upper- and lower-case letters arranged in a random order and were asked to name as many letters as they could within 1 m. As it also has a standardised administration procedure, this test was conducted following the directions for administration and for scoring (Good and Kaminski 2002).

The administration of this test was as follows: there were two sheets prepared for this test, one for the child and another for the experimenter (as the scoring sheet). The child was shown the page, and then the experimenter gave the standardised instructions:

Here are some letters (point). Tell me the names of as many letters as you can. When I say 'begin', start here (point to first letter), and go across the page (point). Point to each letter and tell me the name of that letter. If you come to a letter you don't know I'll tell it to you. Put your finger on the first letter. Ready, begin.

The experimenter started the stopwatch, then at the end of 1 min, placed a bracket (]) after the last letter named and said, 'Stop'. If the child did not get any letter names correct within the first 10 letters (1 row), the task was discontinued. The correlation (Spearman's ρ) between the pretest and post-test was strongly positive, $\rho = 0.83$, showing that the test has strong internal validity.

Standardised test – get ready to read (GRTR)

The GRTR includes 20 multiple-choice items in which the child is shown four visual clues and is asked to respond to a question about them by the experimenter. The items are intended to assess the domains of print knowledge (13 items covering print concepts, letter knowledge and early writing) and phonological awareness (7 items). Print knowledge items require the child either to identify letters and sounds or to identify which of four pictures contains a word or letters. For example, item 4 requires the child to find the picture that shows a particular word among four different pictures of objects. Phonological awareness items require the child either to manipulate sounds in a way that forms a word and then to identify the picture represented by the word, or to identify which of four pictures rhymes with or begins with the same sound as a stimulus word. For example, item 18 requires the child to blend together 'pen' and 'guin' and choose which of four pictures depicts a penguin.

In this study, the GRTR was translated into the local language and adapted culturally to suit the condition of the children. Six items in this test were changed, either involved textual translation (e.g. 'SOUP' became 'SUP'), or replacement of pictures for culturally appropriate pictures (e.g. a 'figure skating' picture was replaced by a 'shoes' picture). The changes never concerned the correct answer. All changes were made without any change in the concept being assessed.

The administration of the GRTR followed the standardised administration procedure and was as follows: First, a sample item was administered to make sure that the child understood the instructions. Next, the child was presented a page with four pictures. The experimenter asked the question, and the child answered by pointing to one of the four pictures. For example, for the first item, children were presented with illustrations of a book positioned in four different ways, and the experimenter asked, ‘These are pictures of a book. Find the one that shows the back of the book.’ For this measure, correct answers received 1 point, and scores for items were summed over all items for the total score. The pretest–post-test correlation coefficient for this test was $r = 0.87$. This demonstrates the stability of the test scores between two-time points (Cole et al. 2011).

The early literacy assessment (ELA)

The self-developed early literacy assessment tested four key skills of early reading and writing: name writing, alphabet knowledge, phonological awareness and print awareness. These skills can be found in various other early childhood literacy measures (e.g. Bowles et al. 2014; Fielding-Barnsley 1997; Puranik, Petscher, and Lonigan 2013). The ELA itself consisted of six tasks assessing the following key skills: name writing, alphabet knowledge (upper-case and lower-case letter recognition), phonological awareness and print awareness (name and daily word recognition). The responses to the test were scored with a rubric; scores could vary between 0 and 4 points (see Table 3); scores were averaged over all tasks to yield the total score.

The ELA was the same assessment used in the previous study evaluating this intervention (see Appendix 1; Maureen, van der Meij, and de Jong 2020). In the previous study, good reliability (Cronbach’s α) scores were obtained for both pretest ($\alpha = 0.91$) and post-test ($\alpha = 0.84$). In the present study, the ELA was also administered before and after the intervention. Reliability analyses showed good scores for both the pretest ($\alpha = 0.77$) and post-test ($\alpha = 0.86$).

Procedure

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study has been approved by the Ethical Committee of University of Twente.

The study consisted of three phases: pretest (weeks 1–3), intervention (weeks 3–8) and post-test (weeks 9–11). Informed consent was obtained from the parents/guardians of all individual participants included in the study. The pretest phase consisted of two parts. The first was the standardised tests, where the tests were done individually (one-on-one). Administration of the standardised tests took 13 min total for each child. Administration of the early literacy assessment (also done one-on-one) took 10–15 min for each child. During the intervention phase, the children in the control condition engaged in their regular literacy-oriented programme led by the experimenter, while their classroom teacher was present. The children in the two experimental conditions participated in one unit of oral storytelling or digital storytelling activities each week, for a total of 6 weeks. These sessions were led by the experimenter with the teacher present. The post-tests were administered after the intervention. The administration of these tests was the same as in pretesting.

Table 3. Scoring rubric for early literacy assessment.

Key skill	Description	0 point	1 point	2 points	3 points	4 points
1 Name writing	Write first name (/nickname)	Needs help to write first name	Writes first name with a model with some errors	Writes correctly first name with a model	Writes first name correctly without a model	Writes first name correctly without a model, capitalising first letter
2 Alphabet knowledge 1	Recognise capital letters	Needs help to recognise any letters	1–5 letters recognised	6–15 letters recognised	16–25 letters recognised	26 letters recognised
3 Alphabet knowledge 2	Recognise lower-case letters	Needs help to recognise any letters	1–5 letters recognised	6–15 letters recognised	16–25 letters recognised	26 letters recognised
4 Phonological awareness	Identify the initial sound of words	Needs help to identify the initial sound of a word	1–6 words identified	7–12 words identified	13–18 words identified	19 words identified
5 Print awareness 1	Recognise names in written form	Needs help to recognise any friend's name on the children's attendance list	1 name recognised	2–3 names recognised	4–5 names recognised	6 names recognised
6 Print awareness 2	Recognise daily words	Needs help to recognise any word	1–5 words recognised	6–12 words recognised	13–19 words recognised	20 words recognised

Data analysis

The programme started with 59 children. In the course of the programme, nine children had an incomplete dataset due to missing data for one or more of the pretests, post-tests or attendance of fewer than five units. This left us with 50 children with a complete dataset. We have computed the outcomes of the data for the entire group of children, as well as for the subset of 50 children. The findings were similar and therefore we will report the results for the children with a complete data set. For the literacy tests, tests of the assumptions of normality of distribution and homogeneity of variance revealed violations for the pretest and post-test scores. Therefore, we report the findings from non-parametric tests (i.e. Kruskal–Wallis H -test). Significant findings were followed by post hoc tests (i.e. Mann–Whitney U -test). For the gain scores, ANCOVAs could be computed, using the pretest score as a covariate.

Results

DIBELS – letter naming fluency

Table 4 presents the results for the letter naming fluency (LNF) test from the DIBELS. These mean scores show that the overall scores of the children in all three conditions at pretest and post-test were below 25% of the maximum score. To descriptively compare the growth between conditions, the learning gain and effect size for each condition are included in the table.

The scores on the DIBELS-LNF did not differ between conditions at pretest, $H(50) = 2.934$, $p = .231$, or post-test, $H(50) = 1.672$, $p = .434$. The boxplots for the DIBELS-LNF results (Figure 1) provide a visual presentation of the learning gains in all conditions. The shaded areas in each box represent the mid-50% of the scores. The shaded boxes overlap each other across conditions, indicating that there was no significant difference in the learning gains, $F(49) = 2.87$, $p = .067$. The horizontal line in the box is the median score for each condition. The figure shows that the median score for the control condition was slightly higher than those for the experimental conditions. Nevertheless, the DS condition showed the largest effect size among all conditions (see Table 4).

Get ready to read (GRTR)

Table 5 displays the mean scores, standard deviations, learning gains and effect sizes for the GRTR test. The mean scores show that the pretest scores of participants in all three conditions already reached 50% of the maximum score. In addition, there were moderate levels of variance in the scores. The scores on the GRTR did not differ between conditions

Table 4. Pretest and post-test mean scores (SDs), effect sizes and mean learning gains (SDs) for DIBELS-LNF results, by condition.

Condition	Pretest mean (SD)	Post mean (SD)	Learning gains (SD)	Effect size (d)
Control ($n = 14$)	8.85 (7.66)	42.42 (32.13)	33.57 (24.93)	1.40
Storytelling ($n = 14$)	5.42 (5.14)	30.21 (24.86)	22.64 (19.91)	1.38
Digital storytelling ($n = 22$)	4.90 (6.41)	38.45 (28.03)	33.55 (23.79)	1.65

Note: Scores are on a 0–120 point scale, 120 indicates best performance.

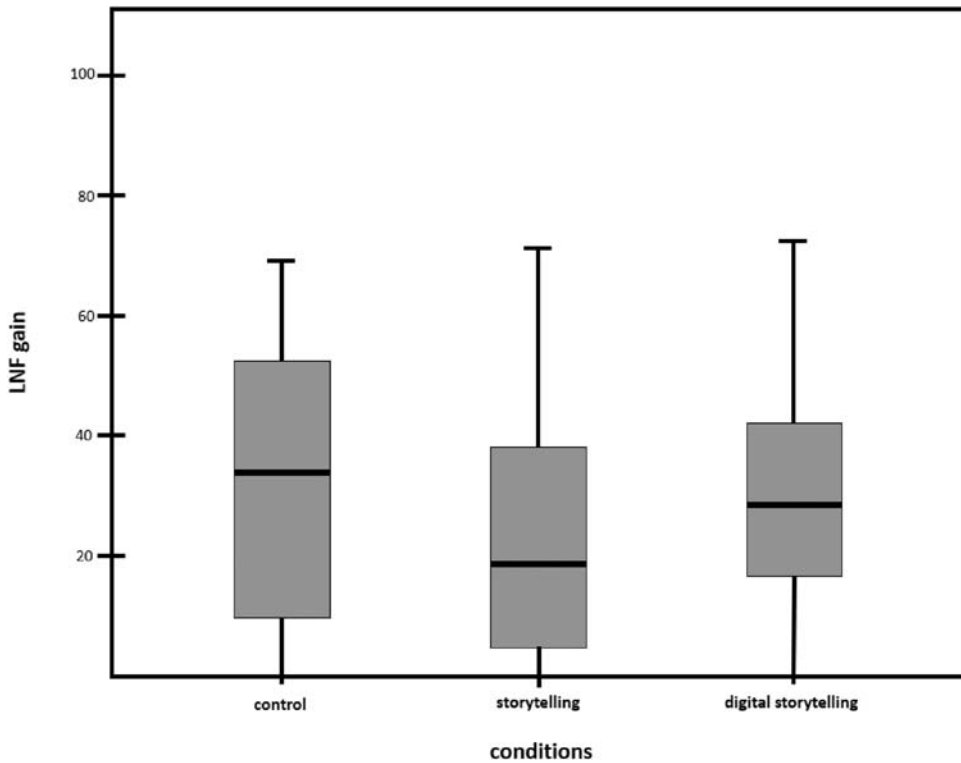


Figure 1. Boxplot for the LNF learning gains for each condition.

at pretest, $H(50) = 1.75$, $p = .417$, or post-test, $H(50) = 0.316$, $p = .854$. However, the DS condition showed the largest effect size among all conditions.

There was also no significant difference in learning gains on the GRTR by condition, $F(49) = 2.02$, $p = .144$. The boxplots in Figure 2 provide a visual representation of GRTR learning gains in all conditions. The shaded boxes overlap each other, indicating that there was no significance difference between the learning gains. The parallel sizes of the S and DS boxes, despite the slightly different medians, indicate that the distribution of the scores was similar in the two experimental conditions. The whiskers, top or bottom, represent scores outside the middle 50% (i.e. the lower 25% and the upper 25% of scores). No upper whisker visible for the boxplots for the control condition means that the upper quartile, the maximum score, is equal to the median. The boxplots for the DS condition has a higher median and longer top whisker, which indicates that more children had higher learning gains than had lower learning gains.

Table 5. Pretest and post-test mean scores (SDs), effect sizes and mean learning gains (SDs) for GRTR results, by condition.

Condition	Pretest mean (SD)	Post mean (SD)	Learning gains (SD)	Effect size (d)
Control ($n = 14$)	11.14 (3.08)	13.64 (3.49)	2.50 (0.76)	0.76
Storytelling ($n = 14$)	10.14 (3.59)	13.64 (2.80)	3.50 (19.91)	1.08
Digital storytelling ($n = 22$)	9.59 (3.77)	13.63 (2.36)	4.04 (2)	1.28

Note: Scores are on a 0–20 point scale, 20 indicates best performance.

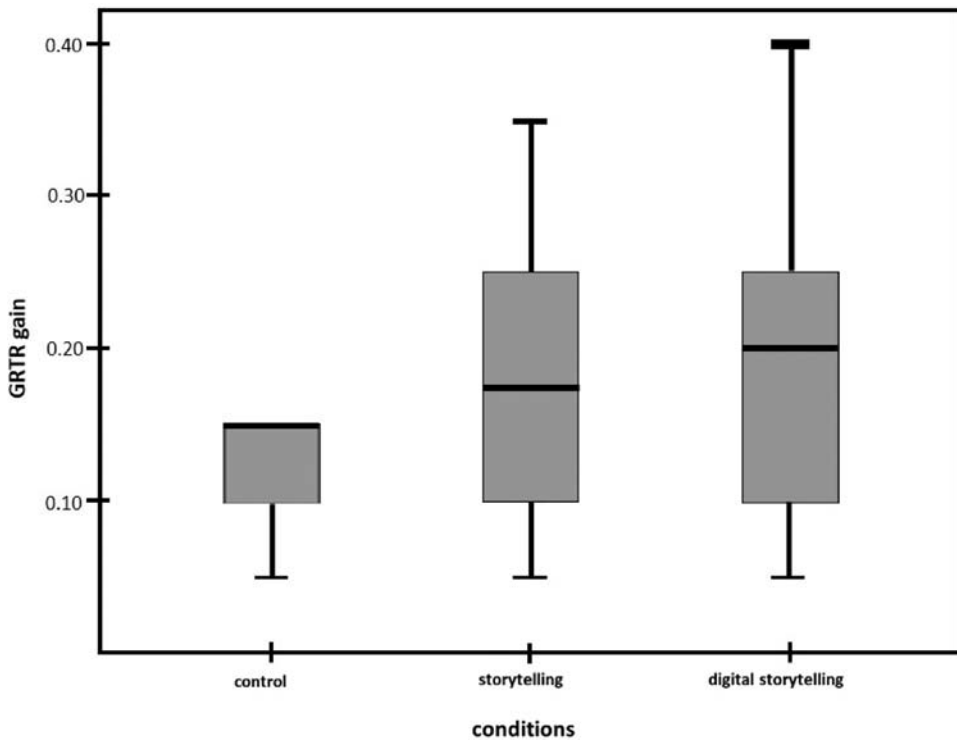


Figure 2. Boxplot for the GRTR learning gains for each condition.

Early literacy assessment

Table 6 displays the mean scores, standard deviations and learning gains for the self-developed ELA. These mean scores show that the pretest scores were below the mid-scale value of 2. In addition, there were moderate levels of variance in both pretest and post-test scores.

The scores on the pretest did not differ between conditions, $H(50) = 0.119$, $p = .942$. In contrast, there was a statistically significant difference on the post-test, $H(50) = 13.275$, $p = .001$. Post hoc tests showed that there were statistically significant and large differences for the comparisons between the Control and Storytelling conditions and between the Control and Digital Storytelling conditions, $U(28) = 33$, $z = 3.016$, $p = .003$, $r = 0.56$, and $U(36) = 55.5$, $z = 3.211$, $p = .001$, $r = 0.53$, respectively. There was no difference between the two experimental conditions, $U(36) = 118.50$, $z = 1.164$, $p = .244$.

Table 6. Pretest and post-test mean scores (SDs), effect sizes and mean learning gains (SDs) for ELA results, by condition.

Condition	Pretest mean (SD)	Post mean (SD)	Learning gains (SD)
Control ($n = 14$)	1.32 (0.70)	2.55 (0.43)	1.23 (0.52)
Storytelling ($n = 14$)	1.32 (0.54)	3.18 (0.43)	1.86 (0.62)
Digital storytelling ($n = 22$)	1.35 (0.68)	3.26 (0.66)	1.91 (0.59)

Note: Scores are on a 0–4 point scale, 4 indicates best performance.

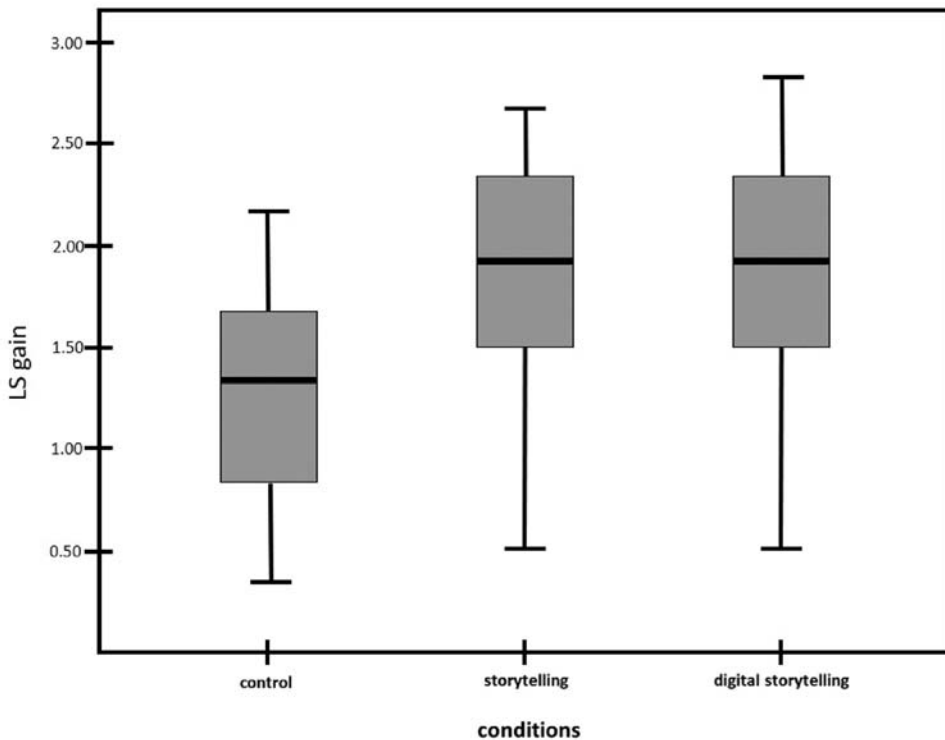


Figure 3. Boxplot for the ELA learning gains for each condition.

The boxplots for the learning gains on the ELA, shown in [Figure 3](#), show that the shaded boxes for the control and experimental conditions overlap slightly. There was a significant difference in learning gain on the ELA, $F(49) = 10.09$, $p < .001$, $r = 0.51$. Both experimental conditions scored significantly higher than the control condition, resp. $p = .001$ and $p < .001$.

Conclusion and discussion

In order to support literacy development in early childhood education in a way that is appropriate for the children, a set of activities were designed that combined a storytelling approach and the framework of Gagné's events of instruction. The storytelling activities were designed to provide an appropriate structure for literacy instruction in the early childhood classroom. The story connected the instruction and play-based activities, serving as a common thread that conveyed the main aim of the activities and kept the children's interest. The present study aimed to determine how well the storytelling activities could support early literacy skills development as assessed by three different tests.

The LNF Dibels results showed no significant differences between conditions in pretest and post-test scores. In addition, the analyses showed that the children in the control condition achieved a slightly higher learning gain than in the experimental conditions. A possible explanation for this might be that the children in the control condition were given direct instruction on memorising and practicing the alphabet, while the

children in the experimental conditions spent less time on this and engaged differently with issues concerning learning the alphabet. This finding seems to be consistent with other research that has found that explicitly teaching letter names, sounds and written symbols will support children's mastery of alphabet knowledge (Bedard et al. 2018; Jones, Clark, and Reutzler 2013). Nevertheless, the fact that there was no significant difference between conditions, and the finding that the effect sizes were strong in all conditions also showed that the storytelling activities, either digital or oral, assisted the children in acquiring alphabet knowledge as well as the regular programme did.

The GRTR test results showed no significant difference between conditions at pretest and post-test. However, the experimental conditions had higher learning gains and stronger effect sizes on this standardised test, compared to the control condition. As an early literacy screening tool, GRTR measures not only alphabet knowledge, but also other constructs relevant to early literacy skills, such as print knowledge, phonological awareness and early writing (Phillips, Lonigan, and Wyatt 2009). It can, therefore, be safely concluded that the storytelling activities supported the development of these early literacy skills, although they were perhaps not specifically strong on alphabet knowledge. It may be that the children benefited from the story that systematically linked instruction and follow-up activities (both the storytelling and the play-based activities). This corroborates the ideas of Lisenbee and Ford (2018), who mentioned that storytelling, as a powerful literacy tool, easily integrates activities by engaging the children in experience with the objectives and the real world. The storylines chosen for each week's topic seemed to hold the children effectively engaged in their literacy activities throughout the day, and perhaps even throughout the week.

The ELA test results showed better post-test scores in the two experimental conditions than in the control condition. The difference was statistically significant, and the effect size for the learning gain showed the change to be strong. This finding replicates the outcome of two earlier studies, one involving a shorter (3-week) intervention (Maureen, van der Meij, and de Jong 2018) and the other involving slightly older participants who engaged in the same intervention as the present study (Maureen, van der Meij, and de Jong 2020). In other words, the finding is a stable result across studies and supports the effectiveness of a structured storytelling approach to early literacy development.

A speculative account as to why digital storytelling showed a slightly higher gain compared to oral storytelling shown by the boxplots is that the use of digital elements can contribute to motivating young children throughout their daily activities. There is little evidence that young children receive positive or informed exposure to computer interactions at home, or in school (Paciga and Donohue 2017). Bringing digital storytelling into the early childhood classroom could be a good start that offers an example of a good practice for utilising digital media for learning, for both the students and their teachers. Apart from the concerns about the role of digital media in young children's lives, utilising digital media in well-planned activities can increase children's motivation and concentration, thus offering rich opportunities for early literacy development (Flewitt, Messer, and Kucirkova 2015). The findings from the present study suggest that more effort is needed to mobilise the motivating qualities of digital media and hence enhance learning.

The findings from the present study support the choice of a design approach that is both explicit and systematic and involves storytelling as well. Explicit means that teachers

directly teach and model key letter-sound relationships and decoding skills, since one should not assume that children acquire these skills simply from exposure to words or from incidental learning opportunities. Systematic means that the instruction is carefully planned and organised, so that children learn prerequisite skills before they engage with more complex skills. Storytelling ensures that there is a clear connection between instruction and follow-up activities and that both moments present a meaningful experience for the children. Both the storytelling and follow-up phase could establish a suitable pedagogical framework in early classroom activities that enables a high degree of engagement and interactivity proposed (Sproule, Walsh, and McGuinness 2019).

The content of the designed units introduced the children to both constrained and unconstrained components of early literacy skills, but the assessments involved only the former. One limitation of the present study is, therefore, that there was no measurement of unconstrained early literacy skills. Another limitation is that the set of activities concentrated on cognitive development. Thus, the study bypassed the value of storytelling for its own sake. Maintaining the children's interest and motivation while engaging in literacy activities is an important factor in the development of early literacy skills (Baroody and Diamond 2016). Future research should therefore examine the effectiveness of the intervention for student motivation and interest. The present study showed that the structured storytelling and digital storytelling activities effectively enhanced basic early literacy skills development. The approach thus provides a sound basis for further improvements.

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ORCID

Irena Y. Maureen  <http://orcid.org/0000-0003-0438-2811>

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