The Journal of Asia TEFL

A Case Study of EFL Teacher Scaffolding of an ASD Learner's Shared Reading with a Storybook App

Syaadiah Arifin
Universitas Muhammadiyah Prof. Dr. Hamka, Indonesia

Yudhi Arifani
Universitas Muhammadiyah Gresik, Indonesia

Nirwanto Maruf
Universitas Muhammadiyah Gresik, Indonesia

Adimawati Helingo
Institut Agama Islam Negeri Sultan Amai Gorontalo, Indonesia

Research conducted into scaffolding variations has widely investigated first/second language teachers and learners who do not have communication constraints. However, little is understood about how an EFL teacher scaffolds a young autism spectrum disorder (ASD) learner's shared reading experiences with a storybook app. This study aims to draw an EFL teacher's cognitive, affective, and technical scaffolding and investigate to what extent Vygotsky's theory accounts for the three types of scaffolding during shared reading activities with a storybook app. This case study design involved an EFL teacher and an ASD learner (aged 12, with an IQ of 110). The ASD learner only learned English from his teacher and a storybook app for more than one year. The EFL teacher's frequency of utterances was transcribed, coded, and interpreted into three scaffoldings behavior. The results indicate that the three types of cognitive behavior frequently emerged during shared story activities to support learners' interactive communication. This study offers a robust framework of how the three scaffolding categories are applied concurrently during interactive story sharing with the storybook app. It recommends that future researchers examine teacher's scaffolding behavior using a specific micro-analytical approach.

Keywords: cognitive, affective, technical scaffolding, shared reading, storybook apps

Introduction

As traditional printed storybooks have been replaced by digital technology, many educational industries have developed new interactive storybook applications, such as tablet-based e-books, book apps, and digital picture storybooks for commercial and non-commercial purposes (Reich et al., 2016). The multi-modal elements of storybook applications, such as an easy touch screen, interactive and immediate feedback, sounds, voices, and animations, make them different from the traditional printed storybooks, which have limited modality (Kucirkova et al., 2015; Neumann, 2020; Neumann & Neumann, 2017; Siegle, 2013). Story bird app, Our Story app, Amazon kindle, Cinderella app, Toontastic app, Webtoon, Mangatoon, and Wattpad are famous examples of interactive storybook apps where users can

read, create, comment, and write different types of stories. Due to the popularity of the storybook apps, this medium is now widely applied for both non-educational and educational purposes. For non-educational purposes, it is usually employed for pleasure during parent-child story-sharing before bedtime. For educational purposes, these multi-modal platforms have mainly been studied in the field of science (Hirsh-Pasek et al., 2015; Paek & Fulton, 2021), psychology (Chou et al., 2020; Liu et al., 2021), mathematics (Hojnoski et al., 2014; Zainudin & Ismail, 2020), arts (Öztürk & Tunç, 2017), medicine (Lal et al., 2015) and sport sciences (Laurell & Söderman, 2018) to examine the effectiveness, merits, and demerits of the storybook applications in fostering the learning process of the learners involved. In the field of English as a Foreign Language (EFL), researchers have also explored the potential of storybook applications for different goals. The goals are to address relevant issues in foreign/second language acquisition starting from word recognition, literacy, vocabulary learning, and comprehension (Flewitt, 2008; Gonzalez et al., 2014; Kim & Kim, 2022; Lin et al., 2020; Proctor et al., 2007; van Dijk & Lazonder, 2016; Zucker et al., 2010) to the learners' attitude, motivation, and theory building from psychological perspectives (Chou et al., 2020; Kucirkova et al., 2015; Neumann, 2020; Such, 2021).

The use of storybooks in education is based on the notion that different story formats, ranging from printed to electronic-based stories, may potentially transform the learning process through meaning construction, creation, and communication between a teacher and learner during story sharing activities (Kucirkova et al., 2015; Sakr, 2012; Wohlwend, 2009). Therefore, it is essential to examine how changes in these story formats may affect the scaffolding process between teacher and parent during shared reading activities (Flewitt, 2008; Kucirkova et al., 2015).

Emerging findings indicate that interactive story applications involving teachers, parents, and learners accessible through learners' mobile phones, iPad, or other gadgets are still inconclusive. For example, Kucirkova et al. (2015) elaborated scaffolding themes during parent-child story sharing with the Our Story application in the Midlands, England. The results revealed three scaffolding themes from the case study: dual representation, zone of proximal development (ZPD), and double stimulation. Neumann (2020) has conducted an experimental study comparing how the teacher-children share reading using storybook apps and printed storybooks in the same country. The results indicate that two to four-year-old children who learn using digital storybook apps perform better in their affective and technical scaffolding but not in their cognitive dimension. Next, an older study conducted by Chiong et al. (2012) using a similar design to Neumann's indicated the same results. Children demonstrate better comprehension with printed storybooks than by using interactive storybook media.

Although observational and comparison studies between traditional printed storybooks involve parent-child, teacher-child, and different types of traditional and electronic-based storybooks, the lack of theorized understanding of the learning potential afforded by the storybook application makes it difficult to draw the learning potential of this kind of story-sharing activities between the teacher and the child with ASD. This study seeks to gain insights into the frequency of an EFL teacher's cognitive, affective, and technical scaffolding and how they affect ASD learners in the EFL environment.

Literature Review

Theoretical Framework: Scaffolding Theory

Scaffolding refers to supporting behavior to guide the learning potential of the learners. The scaffolding process commonly occurs when teachers, parents, or more knowledgeable elder peers interact and collaborate to facilitate this potential. Stemming from the social interaction theory developed by Vygotsky (1980), this theory is often applied to understand the learning potential involving teacher, parent, peer, child, and learning media, such as printed or e-story books. The scaffolding theory has been popular since its establishment in 1928. Previously, it had been applied to analyze children's language

learning potential from their Zone of Proximal Development as a significant role of language acquisition afforded by parent-child traditional/printed storybooks.

Recently, this theory has been applied in education, including EFL teaching and learning contexts using more interactive story media. In this case, Vygotsky (1980) developed an experimental study for a group of children who learn together using a set of wooden blocks of different shapes and colors. In the study, he investigates children's learning potential after interacting with an adult. The result of the study provides a shred of tangible evidence that children can develop their reasoning skills and conceptual understanding. With the rapid shift of digital technology, numerous researchers are still interested in exploring children's learning potential using the same scaffolding theory but with a different scaffolding focus. A study conducted by Kucirkova et al. (2015) theorized three critical concepts of scaffolding: ZPD, dual representations, and double stimulation resulting from parent-child interaction during iPad story sharing in the Midlands, England. The results suggest three emerging scaffolding themes: realistic fiction, variations, and active play during story-sharing talks. Grounding from the same Vygotskian perspective, another type of scaffolding theory emerges from a different perspective to enrich the scaffolding horizons in psychology. This type of scaffolding is commonly used to investigate scaffolding potential from the perspective of psychology, and it is now applied widely to assess teacher-child cognitive, affective, and technical scaffolding (CATs) processes during their interaction with storybook applications (Neumann, 2020; Roskos & Burstein, 2012; Woloshyn et al., 2017; Yelland, 1998; Yelland & Masters, 2007). In a technologically rich environment, new concepts of scaffolding are needed to gain better insights into the teaching and learning process because, in the traditional scaffolding concepts, the scaffolding is commonly viewed from the perspectives of experts/teachers/parents, who cannot accommodate the child's perspectives (Yelland & Masters, 2007).

Responding to scaffolding needs within technological contexts, the above-mentioned three categories of scaffolding: cognitive, affective, and technical scaffolding (CATs), have become popular devices to investigate the scaffolding process involving teacher-child and computer media during story sharing activities. Cognitive scaffolding denotes learners' conceptual and procedural understandings through questioning, modelling, drawing, collaborating, and problem-solving with peers. It also involves social cognitive behavior as part of the learners' higher-order thinking development. Technical scaffolding relates to learners' interaction with computers (e.g., storybook applications) as mediators for learning and problem-solving. Finally, affective scaffolding encourages learners to use their higher-order thinking abilities when engaging with interactive learning technologies. Those three theoretical frameworks are then applied to theorize the learning potential derived from teacher-child interaction during story sharing using the storybook application.

Shared Reading and Storybook Apps

Shared reading and storybook apps have been identified as one of the active methods of reading applications that engage learners with a story through 'story-making' conversations, such as the teacher giving instruction, asking questions, or making comments (Kucirkova et al., 2015; Neumann, 2020; Neumann & Neumann, 2017; Siegle, 2013). Storybook apps are a regular reading activity in the classroom and have many advantages for learners' language learning books (Arifani et al., 2021; Kucirkova et al., 2015; Neumann, 2020; Wohlwend, 2009). Shared reading experiences and interactions through the use of storybook apps provide a positive influence on learners' vocabulary and comprehension (Arifani et al., 2021; Kucirkova et al., 2015; Neumann, 2020). The shared reading and storybook apps experiences also foster the vocabulary and comprehension abilities of learners with ASD and language difficulties (Arifani et al., 2021; Barianty et al., (2022).

In addition, shared reading and storybook apps can enhance learners' interaction and conversation qualities where the language is used to support the co-construction of meaning. These benefits are also stated in socio-cultural theory (Vygotsky, 1980). This theory informs the present study, whereby learning occurs when learners engage in social interactions such as printed books, e-books, or storybook apps

(Arifani et al., 2021; Kucirkova et al., 2015; Neumann, 2020). However, as reading printed books and multi-modal sources are different, the present case study attempts to inform how multi-modal reading (e.g., visual texts, animations, sounds, and graphics) is used as an avenue of interaction between EFL parent and an ASD learner (Arifani et al., 2021; Kucirkova et al., 2015).

Previous Research on ASD, CATs Scaffolding and Shared Reading

The current prevalence of ASD estimate indicates that as many as 110 per 10,000 individuals, or more than 114 million are special needs children, and 1 per 86 children in Indonesia might be affected by autism disorders, which amounts to 2.4 million ASD children (Sandra & Kurniawati, 2021; Sidjaja et al., 2017). Autism spectrum disorder (ASD) learners have a complex developmental disorder in the cognitive, affective, and behavioral domains characterized by severe impairments in social communication and conversational interaction. The cognitive domain covers difficulty in comprehension, conversational repair, and delayed language and cognition (Chang et al., 2021). The affective domain involves difficulty in proper turn-taking and interrupting a speaker improperly. Behavioral disorders involve ASD learners' difficulty in communication, social interaction, restricted interest, and repetitive behavior (American Psychological Association, 2013; Chang et al., 2021). Learners with ASD also perform repetitive behaviors and restricted interests in their learning activities.

These unique ASD characteristics might be good for public discussion in psychology and health as they have the relevant educational background to address any issues regarding behavior, cognitive, affective, and physical health. In psychology, the issues mostly deal with affective factors such emotion and motivation. In health, the discussion concerns with how to recover physical aspects. However, they might become multi-disciplinary issues for foreign or second language learning. In foreign or second language learning pedagogy, the challenges of ASD instructional practices are more problematic due to the increasing number of ASD students and the educational backgrounds of parents and teachers which are different from ASD scholarship, with those unique ASD characteristics.

Traditionally, both normal and ASD learners learn their foreign/second language reading using collections of either printed books at their schools or story books at home. Their interactions with traditional reading platforms have contributed to their cognitive development and scaffolding, which are limited to reading comprehension and fluency because of limited modality in the printed books (Arifani et al., 2021; Kucirkova et al., 2015; Neumann, 2020; Wohlwend, 2009). The rapid development of technology-based reading has transformed all categories of printed books into electronic platforms. The emergence of reading applications, such as story reading, shared reading, and Our Story applications with their interactivity and modalities (creating stories, adding pictures, editing text, and adding audio) deliver other forms of scaffolding, namely cognitive, affective and technical ones that are inseparable.

Meanwhile, previous studies have widely examined the scaffolding process involving learners, teachers, parents, printed reading, and reading applications from the perspective of cognitive scaffolding involving non-ASD participants which is unhampered by communication barriers during shared-reading activities. This inquiry aims to unfold three types of scaffolding (cognitive, affective, and technical) involving an ASD learner in a foreign language context.

A literature review of the published articles over the last fifteen years examining the connection between parent-child and teacher-child scaffolding involving non-ASD participants (non-ASD participants are more predominant than the ASD participants because of limited research reports of ASD participants and foreign language reading) using traditional printed storybook and storybook applications has revealed four main categories: (a) participants; (b) contexts; (c) theoretical frameworks; and (d) findings.

Participants in scaffolding research involving parents, teachers, and children might be classified as the first language (L1) (Bus et al., 2015; Chiong et al., 2012; Christ et al., 2018; Dickinson & Smith, 1994; Kucirkova et al., 2015; Neumann, 2020; Wohlwend, 2009) or second language (L2) and English as a Foreign Language (EFL) (Attarzadeh, 2011; Cheng, 2008; Fan & Cheng, 2021; Guillén, 2018; Laksmi,

2006; Li & Zhang, 2020). Recent work in L1 tends to examine the scaffolding processes involving parent or teacher and child both at home and school settings using varieties of treatments and designs that have been conducted within the first language contexts in England and the USA (Kucirkova et al., 2015; Neumann, 2020; Wohlwend, 2009). Those studies are conducted in the native English environment, where they have no communication barriers during story sharing and communication activities since English is their daily communication medium. Conversely, most scaffolding studies in L2 and EFL contexts involve adult learners in the classroom setting conducted between a teacher and learner during formal classroom settings. The implementation of scaffolding in this setting commonly examines English reading, writing, listening skills, and cognitive and motivational aspects of learning (Cheng, 2008; Laksmi, 2006; Li & Zhang, 2020). The study participants involve learners with various English proficiency levels, but again there have been no studies conducted involving the ASD learner within the EFL context.

The underlying theory of the scaffolding practices varies in previous studies. For example, previous studies applied the social interaction theory developed by Vygotsky (1980) to theorize and test learning potential involving teacher, parent, peer, child, and learning media, such as printed or e-story books. Scaffolding variations are classified into two kinds: (a) scaffolder's perspectives and (b) learners' perspectives. The former denotes three dimensions of scaffolding, namely the zone of proximal development (ZPD), dual representation, and double stimulation (Kucirkova et al., 2015). The followers of this theory believe that learning acquisition is mediated by a teacher or parent or more knowledgeable peers and others. The latter (scaffolding from the learner's perspectives) refers to technological scaffolding, commonly applied to describe learning potential from cognitive, affective, and technical dimensions (Neumann, 2020; Yelland & Masters, 2007). This novel scaffolding theory emerges to criticize the previous traditional scaffolding, which cannot accommodate the learner or child's perspectives during their interaction with the teacher or parent and traditional or technology-based media (Neumann, 2020; Yelland & Masters, 2007). Furthermore, the followers of this concept believe that teachers' or experts' assistance during the scaffolding process should be gradually reduced to optimize learners' learning (Bouwer et al., 2018; De Smedt & Van Keer, 2018; Do, 2020).

Research findings from previous studies indicated that the scaffolding potential has been well-theorized and documented in terms of the scaffolders' perspective using the traditional scaffolding theories of dual representation, proximal zone development (ZPD), and double stimulation (Kucirkova et al., 2015). Moreover, two study findings by Chiong et al. (2012) and Neumann (2020) using mixed quantitative and qualitative designs indicated the same results where the children perform better in their affective and technical scaffolding but not in their cognitive dimension. The initial findings highlight that more evidence is needed to theorize the scaffolding potential involving teacher-ASD children, especially in an EFL Indonesian context where the ASD learner does not have rich English exposure like previous study participants. The ASD learner only learns English from the teacher (Arifani et al., 2021).

Redefined participant, context, and study designs are likely to transform the teacher-ASD child's learning potential and story-sharing activities. However, the extent to which specific storybook applications might support the ASD child's agency concerning story-creating is currently undocumented. This new theory of scaffolding stemming from Vygotsky's theory on learning is subsequently applied as a theoretical framework in this study to examine the scaffolding process from the perspective of ASD learners during teacher-ASD story-sharing activities in the EFL setting.

The following questions guide this research:

1. What is an EFL teacher's cognitive, affective, and technical scaffolding frequency during shared reading with an ASD learner using a storybook app?
2. To what extent can the cognitive, affective, and technical scaffoldings be implemented for teacher-ASD child story sharing meditated by the storybook app?

Method(s)

Study Participants

An EFL teacher and an ASD learner took part in the exploratory case study. The two participants were selected from our university database and were specifically targeted because the teacher and ASD child had reported regular engagement in literacy-promoting activities using a storybook app (Arifani et al., 2021). The ASD at the university center enrolled in private courses intended for ASD learners, where the students were treated individually based on their learning interests. The ASD learner was 12 years old and the only child of the family. The Intelligent Quotient (IQ) test was also conducted by the Psychology Department of the same university, and the IQ test score amounted to 110. It indicated that the learners had language and communication barriers since he often imitated teacher utterances, had a short concentration span, sometimes did not respond to the teacher during class sessions, and spoke unintentionally. However, he was still able to respond to the teacher's questions and statements. The family lived in a small town in East Java, Indonesia. The family can be classified as middle-income. The teacher was educated to a university degree and was pursuing her master's degree in the English Education Department. She has been teaching ASD children for over two years as part of the university ASD center. The parents sent their ASD child to the university ASD center to learn literacies such as, music, mathematics, and English language programs.

Study Procedures

Consistent with case study procedure (Yin, 2018), data from interviews, documents, and observations were collected at different points during the teacher's and ASD learner's story-sharing interactions with shared reading apps. The researcher regularly visited the teacher and ASD learner during their classroom session for one semester (16 weeks). In this phase, observations were conducted to gather the implementation of scaffolding activities. The researcher observed the teacher's and student's utterances, words, and expressions during story-sharing activities. Interviews with the teacher were also conducted to verify the implementation of cognitive, affective, and technical scaffolding. The name of the storybook app used during shared reading was the story bird application (https://storybird.com/read-comic). The storybook app contained fifty different stories in the following genres: comic, long-form story, picture book, flash fiction, poetry, and blog. Every week, the teacher discussed one story with the ASD learner. Then, shared reading using the teacher's tablet was conducted in interactive ways by retelling the unfinished stories, eliciting, reading aloud, asking questions for story comprehension, retelling stories, recasting learners' pronunciation errors, and giving an appraisal. The teacher regularly used mixed Indonesian and English during the shared reading session for the whole semester. During story-sharing activities with the storybook app, the teacher and learner sat side-by-side on a low comfortable chair around a small table in a playset. The learner held the teacher's tablet, and sometimes he put it on the table in front of them. The tripod video camera was positioned in front of the table. The researcher remained behind the camera during each shared reading activity.

The teacher and ASD were free to use the storybook app as they wished and were told that the researcher would like to visit every week during their shared story activities using the storybook app. The author did not give specific instructions concerning the actual use of the storybook app. The researcher aimed simply to observe and record the teacher's and ASD learner's natural activities with the storybook app. The researcher observed how the teacher and learner shared reading activities using storybook apps and brought knowledge of cognitive, affective, and technical scaffoldings in each visit. All sessions were videotaped and later transcribed carefully. Permission and approval to conduct this research were obtained from the university ASD center. Parent approval and consent letters were also gained for the

participating ASD learners. These research approaches and steps are in line with the British Educational Research Association (BERA, 2004).

Data Analysis

Each shared reading session using the storybook reading app was transcribed to obtain the relevant textual utterances made by the teacher. In this case, teacher utterance was defined as a stretch of speech resulting during shared reading interaction between the teacher and ASD learner with a pause, silence, or change, question, statement, and command (Neumann, 2020). Scaffolding categories of cognitive, affective, and technical dimensions (CATs) initiated by (Neumann, 2020; Neumann & Neumann, 2017; Yelland & Masters, 2007) were used to code teacher scaffolding during each shared reading session using the storybook app between the teacher and ASD learner. First, the teacher scored one count to obtain the frequency of each cognitive, affective, and technical scaffolding provided by the teacher during the shared reading session. Subsequently, the frequency of scaffolding from the teacher's utterances was calculated as counts per minute for each session. Each shared story session using the storybook app was counted from the beginning to the end of the class activities, which took approximately one and half hours for the whole semester or sixteen meetings. The descriptive statistics for the three types of the teacher's cognitive, affective, and technical scaffolding were employed to analyze the frequency of utterances made by the teacher.

The operational definitions for the three categories were applied to avoid biased interpretations. Cognitive scaffolding was defined as the EFL teacher's activity that helps students carry out a task, discuss a key vocabulary item, or solve a problem, such as "Can you tell me what happened to the bird while it was asleep?". Affective scaffolding referred to the teacher, positive encouragement, appraisal, and feedback, such as "Have another try!" and "Excellent!"). Technical scaffolding was closely related to teacher-supported children and helped the learner navigate successfully through the storybook app, such as "scroll it down," "scroll it up," and "Drag it." Any additional utterances provided by the teacher beyond the shared reading contexts were not coded in this study.

Coding reliability was conducted using member cross-checking and discussion with the co-authors of this study. Two researchers worked collaboratively to arrive at the final thematic analysis and interpretations through discussion with the fourth author of the study (Kucirkova et al., 2015; Neumann, 2020).

Results

Frequency of EFL Teacher's Scaffolding

To address the first research question, descriptive statistics were applied to analyze the frequency of utterances made by the teacher regarding cognitive, affective, and technical scaffolding. The descriptive statistics for frequency of EFL teacher scaffoldings were estimated by analyzing the number of utterances per minute (count/min). Consequently, the mean scores of cognitive, affective and technical scaffoldings were estimated by comparing the number of utterances for the three types of scaffolding with the total utterances produced per minute. The results of the statistical calculation using mean and standard deviation are described below.

Table 1 illustrates the teacher's frequency of cognitive, affective, and cognitive scaffolding utterances using mean and standard deviations. The results indicate that the mean frequency of teacher's cognitive, affective, and technical scaffolding was quite similar. In the cognitive scaffolding, for example, the mean was 5.49. This score indicated that EFL teacher's utterances per minute produced approximately five expressions of cognitive scaffoldings. Similarly, other types of scaffoldings revealed similar frequency of utterance per minute. It also means that the teacher mostly used the three types of scaffolding

concurrently during shared story activities with the ASD learner using the storybook app. The teacher applied these at all times during shared story interactions with the ASD learner.

TABLE 1
Frequency of Teacher's Cognitive, Affective, and Technical Scaffolding

Teacher scaffolding	Mean	SD
Cognitive scaffolding	5.49	1.35
Affective scaffolding	5.26	1.42
Technical scaffolding	5.38	1.38
Total utterances	14.36	2.82

Implementation of EFL Teacher's Scaffolding

The transcripts taken from the ASD teacher's utterances were further analyzed to explain how the ASD teacher implemented the three different categories of scaffolding (cognitive, affective, and technical scaffolding) during a shared reading with the storybook app with the ASD learner. The excerpts described how the ASD teacher scaffolded ASD learners through their shared reading activities with a storybook app. The participants' emotional expressions, such as smiling, laughing, and sadness were also observed during the shared story sessions to support the interpretations. Within the example extracts, the three types of scaffolding were written in square brackets, such as [cognitive scaffolding], [affective scaffolding], and [technical scaffolding].

Cognitive, Affective and Technical Scaffolding

Cognitive scaffolding

Across the storybook application, the EFL teacher provided a cognitive type of scaffolding to help the ASD learners understand and create the story content, pictures, and words by asking questions, repeating words and phrases, responding to the answer, guiding to create the story, translating the unfamiliar words, and reinforcing learners' ideas as derived from the first story entitled "A Watermelon Boy". This story tells how tropical fruits grow through realistic fiction. The teacher prepared a random pictured story in the story app picture gallery. In this study, the writer used a pseudonym for the ASD learner's name. In this case, the ASL learner could freely create an exciting story from the jumbled pictures. The teacher's cognitive scaffolding involved the activities of question-and-answer sessions, guiding to story construction, and follow-up comments about the content of the story during shared reading sessions; for example, the teacher said, "Look at the picture, what was the boy doing?" and asked, "What happened to the seed?", "Did you think that the seed would grow?", "What would happen with the boy, then?" and "Finally, the boy became a … boy". The types of teacher's questions were tailored for the ASD learner's specific needs and interests, as seen in the following scripts:

Teacher :	Okay, now please take some pictures that you like! [technical]. Suddenly, Kevin dragged several pictures and put them in order. The teacher helped him put the pictures in the story app by pointing them out to the story box. [technical]
Teacher :	What was the boy doing? [cognitive]
Kevin :	Eating semangka (he responded in mixed Bahasa and English) [Cognitive]
Teacher :	Excellent, Kevin. What is semangka in English? The teacher continued to give him the clue "water …?" [cognitive]
Kevin :	He imitated his teacher and went on to say watermelon (after thinking for a moment. [cognitive]
Teacher :	That is good, Kevin. [affective]. He was eating watermelon. (The teacher

	said the word watermelon slowly). [cognitive]
Teacher :	Pointing at the stomach picture, the teacher said, "What happened with the watermelon seeds in his stomach, then? [cognitive] Would it grow or not? [cognitive]
Kevin :	Jatuh ke (fell into) his stomach and grew in his body. [cognitive]
Teacher :	Nice, Kevin (holding his ASD learner's shoulder). Finally, he became a…boy? [cognitive]
Kevin :	I am a watermelon boy, yes (shouting and laughing as he was proud to be a watermelon boy) [cognitive]

The second cognitive scaffolding was derived from a different story entitled "My Holiday". It told the ASD learner's experience of spending his holiday with his family. The teacher's cognitive scaffolding was similar to previous forms where most question types were directed for helping learners' comprehension and story construction, emphasising translation and clues.

Teacher :	When did you spend your last holiday? [cognitive] (the teacher opened and showed him all holiday pictures from the story app picture gallery), [technical]and said, "Please, take some pictures to create your holiday experience!" [technical]
Kevin :	He took four holiday pictures from the story app galley [technical]
Teacher :	That is good, dear [affective]. Move it here one by one (the teacher pointed at the story box app one by one like your story before [cognitive]. That is good. Look at this picture! [cognitive] What were they doing? [cognitive]
Kevin :	Holiday. (He responded in short words) [cognitive]
Teacher :	Yes, exactly. [affective] The teacher continued to help him with a guiding question and said, "Where was the holiday? [cognitive] The teacher pointed at the beach picture [technical].
Kevin :	Pantai. (He answered in Bahasa) [cognitive].
Teacher :	Good. They were on a beach. [cognitive] Yes, [affective] Pantai is a beach [cognitive]. (She said the word beach several times) Moreover, I asked him again, "Where were they?" [cognitive]
Kevin :	Beach, playing football [cognitive] (while pointing to another picture as he likes football)

Affective scaffolding

The EFL teacher also used affective scaffolding to praise and encourage ASD learners' engagement with the story construction and content during shared reading sessions from the story sharing activities using the story app. To help the ASD learner complete his story tasks, such as giving clues, making a sentence, and answering questions, the teacher gave him affective scaffolding, such as very good, good, pleasant, and excellent words. This type of affective scaffolding commonly occurred alongside the learner completion of interactive story tasks. The types of teacher's affective scaffolding during shared reading activities are illustrated below:

Teacher :	What was the boy doing? [cognitive]
Kevin :	Eating semangka (he responded in mixed Bahasa and English) [cognitive]
Teacher :	Excellent, Kevin. [affective] What is semangka in English? [cognitive] The teacher continued to give him the clue" water …?" [cognitive]
Teacher :	Nice, Kevin (holding his ASD learner's shoulder). [technical]. Finally, he became a…boy? [cognitive].

Kevin :	I am a watermelon boy, yes [affective](shouting and laughing as he was proud to be a watermelon boy) [cognitive]
Teacher :	Could you take some pictures from the holiday picture gallery? [cognitive]
Kevin :	He took four holiday pictures from the story gallery [technical] and put them in the story box apps pointed by the teacher[technical]
Teacher :	That is good, dear. [affective] Move it one by one to its box! [technical]
Kevin :	Put all the pictures in their boxes. [technical]
Teacher :	That is good. You did it well, Kevin. [affective]

Technical scaffolding

During the EFL teacher's technical scaffolding, the story app afforded more opportunities for interacting with the screen and helping the ASD learner with technical activities, such as selecting the pictures, moving the objects, and putting the pictures in their appropriate boxes. The teacher also scaffolded the learner through English instruction and relevant gestures for the instruction comprehension and story-making process of the learners during technical activities with the story app prepared by the teacher. The following excerpts illustrate the learner's engagement and conversation during technical activities with the story app:

Teacher :	Now, please take four pictures that you like! [technical]. You could use your finger to drag [Technical]
Kevin :	He took four holiday pictures from the story gallery and put them in the story box apps indicated by the teacher by pointing at them [technical]
Teacher :	That is good, dear. Move it one by one to its box [technical]! Again, rearrange the picture to make a good story! [technical]
Kevin :	Put all the pictures in their boxes [technical].
Teacher :	That is good. You did it well, Kevin. [affective]

Discussion

Regarding the frequency of EFL teacher's cognitive, affective, and technical scaffolding during the shared reading session with the ASD learner using story app, it was found that the co-occurrences of those three scaffolding types showed a high frequency similar to shared reading activities. These findings differ from the two previous studies conducted by Neumann (2020) and Woloshyn et al. (2017). Observing the ASD learner, cognitive, affective, and technical frequency simultaneously emerged during shared story activities with the storybook app. Neumann (2020) compared the English-speaking teacher's scaffolding frequency during the shared reading session using a story app and printed storybook with the young learners in England. The results show that the teacher's affective, cognitive, and technical scaffolding utterances with the storybook app were more remarkable than those made with a printed book. It was also found that cognitive and affective scaffolding was more dominant than technical. This probably occurred because the subject did not have any communication problems since young learners did not have a communication problem. Therefore, the technical use of the story app did not frequently appear during shared story sessions.

Similarly, Woloshyn et al. (2017) found that teachers used more cognitive and affective scaffolding types since the study participants were similar to Neumann's study made in 2020. Other studies have also reported similar benefits of parent-child communication during shared story experiences with study book apps (Bus et al., 2015; Chou et al., 2020; Christ et al., 2018; Kucirkova et al., 2015). However, this present study brings a novelty in terms of the frequency of simultaneous occurrences among the three different types of scaffolding since the subject of this study was an ASD learner who needed specific and

repeated instruction during shared story sessions (Arifani et al., 2021). Therefore, the three cognitive, affective, and technical types came out concurrently in each shared story activity.

The subsequent discussion dealt with teacher utterances with repeated instructions, examples, and clues during shared reading experiences with the ASD learner. One explanation for this could be the learner's IQ and his ASD characteristics. Those two crucial variables were predicted to be the leading causes of these issues. An ASD learner with an IQ of 110 was reported to have a communication problem, and it also proved quite challenging to make the ASD learner become involved in the story shared with story apps (Arifani et al., 2021). Consequently, the teacher often gave similar examples to stimulate the learner to follow the teacher's instructions. Arifani et al. (2021) conducted a comparative case study with two ASD learners with different IQ levels. They compared their young EFL learners' cognitive processes during the PISA reading comprehension section. The results showed that both of them had communicative problems which influenced their reading comprehension process.

Furthermore, the ASD learner with an IQ of 110 showed a longer comprehension process through translation from his mother tongue (Indonesian) into English. These findings echoed similar cognitive processes. During shared stories with study book apps, the teacher also often provided clues, guidance, examples, and translation from the learner's mother tongue to English. These findings become crucial steps for the EFL teacher who does not have an adequate ASD background knowledge to teach foreign language reading using a shared-reading application.

The specific types of cognitive scaffolding during an interactive conversation between the teacher and ASD learner mostly belonged to literal questions. In this case, the teacher often repeated her instruction to engage in the shared story activities. Afterwards, the ASD learner responded to teacher's question using one or two words. Therefore, it seems that the ASD learner's cognitive process is too minimal to comprehend and produce a longer story, even in a short sentence. Regarding this issue, Arifani et al. (2021) compared two ASD learners' cognitive processes during reading PISA texts. The results indicate that the two-study participants with different IQ levels produced only two to three words to answer the EFL teacher's reading questions. Concerning affective scaffolding, the results were similar to other previous studies. The results indicate that the teacher's affective scaffolding using expressions, such as "excellent", "good", and gestures such as "holding learner's shoulder" could encourage the ASD learner's interaction and engagement during shared story activities.

These results were similar to previous studies and indicate that the teacher's affective scaffolding could encourage English native speaking learners' shared reading during shared story experiences using a storybook app (Arifani et al., 2021; Kucirkova et al., 2015; Neumann, 2020; Walsh & Hodge, 2018; Yelland & Masters, 2007). This study also echoes different findings regarding the teacher's technical scaffolding implemented to the ASL learner. The teacher's cognitive scaffolding was implemented using direct assistance by holding the learner's finger to select and drag the picture from the picture gallery app to the story box. Based on previous findings involving EFL/ESL learners with no communication constraints, through the teacher's technical scaffolding, the learners could follow the teacher's verbal instructions to drag or press specific procedures from the storybook app.

Previous studies have highlighted the need for more research to probe teacher scaffolding during the shared reading experience and cognitive demand during shared reading sessions (Arifani et al., 2021; Kucirkova et al., 2015; Neumann, 2020; Walsh & Hodge, 2018). This study provides a new perspective in supporting young ASD learners' oral language development using the storybook app with the EFL teacher. Shared reading with the storybook app has the benefit of engaging the ASL learner in conversations using English, especially for ASD children who have limited access to English exposures and resources person/peers from EFL contexts.

Conclusion

The present study explored the frequency of the EFL teacher's cognitive, affective, and technical scaffolding and how she scaffolded the young ASD learner's interaction with a storybook app during shared reading and story construction activities. The EFL teacher provided a similar amount of scaffolding among the three kinds of cognitive, affective, and technical scaffolding during shared reading activities with the story app. The EFL teacher was also observed to use the three types of scaffolding (cognitive, affective, and technical) to support the ASD learner during shared reading sessions with the storybook app. The three types of scaffolding were applied to engage the ASD learner with the story's content, encourage learner participation, and provide technical assistance with the story app.

Teachers play a crucial role in supporting shared reading experiences with the storybook app for ASD learners, especially in the EFL setting where the learner only obtains English from the teacher. Classifying EFL teacher scaffolding activities and utterances can offer a fruitful platform for analyzing interactive activities between a teacher and ASD learner during the shared story with storybook app sessions. This present study reveals that the EFL teacher uses cognitive, affective, and technical scaffolding to support and engage the ASD learner during interactive conversation and shared story activities using electronic devices. The present study also provides an initial understanding of how an EFL teacher who does not have an ASD background in terms of training or experience teaches foreign language reading to an ASD learner during shared-reading activities. The factors that determine the immersion of the three types of scaffolding during shared story activities using a storybook app require further examination; however, the ASD learner's IQ level and the level of the autism spectrum disorder (ASD) may influence the learner's understanding and the teacher's frequency of cognitive, affective, and technical scaffolding during the shared story with the storybook app. This study does not examine the three types of teachers cognitive, affective, and technical scaffolding using micro-analysis approaches - for example, the types of teacher's cognitive question whether she applies literal, inferential, or critical questions have not been scrutinised yet. Therefore, a micro-analytical investigation of those specific cognitive types during shared reading experiences is required as well.

Acknowledgments

The Authors

Syaadiah Arifin (corresponding author) is an associate professor at Universitas Muhammadiyah Prof. Dr. Hamka, Indonesia. Her research interests involve scaffolding, writing assessment, and technology-enhanced language and content learning.

English Teaching and Education Department
Universitas Muhammadiyah Prof. Dr. Hamka
12130-Jl. Limau II No.2, RT.3/RW.3, Daerah Khusus Ibukota Jakarta, Indonesia
Mobile: +62-813-1143-60233
Email: syaadiah.arifin@uhamka.ac.id

Yudhi Arifani is an associate professor at Universitas Muhammadiyah Gresik, Indonesia. His research interests involve EFL teacher professional development, socio-cultural theory, and CALL teaching and learning.

English Teaching and Education Department
Universitas Muhammadiyah Gresik
61121-JL. Sumatera 101 GKB Randuangung Gresik, Indonesia
Mobile: +62-813-274-18413
Email: yudhi_arif@umg.ac.id

Nirwanto Maruf is an assistant professor at Universitas Muhammadiyah Gresik, Indonesia. His research interests involve second language acquisition and socio-cultural theory.

English Teaching and Education Department
Universitas Muhammadiyah Gresik
61121-JL. Sumatera 101 GKB Randuangung Gresik, Indonesia
Mobile: +62-821-9350-7414
Email: nirwanto.maruf@umg.ac.id

Adimawati Helingo is an assistant professor at Institut Agama Islam Negeri Sultan Amai Gorontalo, Indonesia. Her research interests lie in socio-cultural theory, CALL instruction, and EYL.

English Teaching and Education Department
Institut Agama Islam Negeri Sultan Amai Gorontalo
Jl. Sultan Amay, Pone, Limboto Bar. Kabupaten Gorontalo, Indonesia
Phone: (+62) 435-827242
Email: adimawati@iaingorontalo.ac.id

References

American Psychiatric Association (APA). (2013). *Depressive disorders. In Diagnostic and statistical manual of mental disorders*. American Psychiatric Association Publishing.

Arifani, Y., Barianty, T. N., & Paulina. (2021). EFL learners' cognition process: A case study of two ASD learners with different IQ levels. *The Journal of Asia TEFL*, *18*(2), 657-665. http://dx.doi.org/10.18823/asiatefl.2021.18.2.20.657

Attarzadeh, M. (2011). The effect of scaffolding on reading comprehension of various text modes on Iranian EFL learners with different proficiency levels. *Social Sciences and Humanities*, *2*(4), 1-28. ijtm/ijcee page templatev2 (psu.edu)

Barianty, T. N., Arifani, Y., Ma'ruf, N., & Setiawan, S. (2022). L2 ASD learners' scaffolding development after long interaction with the mobile story-sharing application. *Language Related Research.* 13(3),87-110. https://doi.org/10.29252/LRR.13.3.4

BERA. (2004). *Revised ethical guidelines for educational research*. British Educational Research Association.

Bouwer, R., Koster, M., & Van den Bergh, H. (2018). Effects of a strategy-focused instructional program on the writing quality of upper elementary students in the Netherlands. *Journal of Educational Psychology*, *110*(1), 58-71. https://doi.org/doi:10.1037/edu0000206

Bus, A. G., Takacs, Z. K., & Kegel, C. A. T. (2015). Affordances and limitations of electronic storybooks for young children's emergent literacy. *Developmental Review*, *35*(1), 79-97. https://doi.org/10.1016/j.dr.2014.12.004

Chang, Y. C., Menzies, H. M., & Osipova, A. (2020). Reading comprehension instruction for students with autism spectrum disorder. *Reading Teacher*, *74*(3), 255-264. https://doi.org/10.1002/trtr.1929

Cheng, F.-W. (2008). Scaffolding language, scaffolding writing: A genre approach to teaching narrative writing. *The Asian EFL Journal*, *10*(2), 167-191.

Chiong, C., Ree, J., Takeuchi, L., & Erickson, I. (2012). *Print books vs e-books: Comparing parent-child cop-reading on print, basic, and enhanced e-book platforms.* The Joan Ganz Cooney Center.

Chou, Y.-J., Hu, B.-Y., & Roberts, S. K. (2020). Features of Taiwanese parents' moral discourse in shared storybook reading: Exploring associations related to preschoolers' cognitive and affective moral attribution. *Early Childhood Education Journal*, *49*(3)1-13. https://doi.org/10.1007/s10643-020-01110-z

Christ, T., Wang, X. C., & Erdemir, E. (2018). Young children's buddy reading with multimodal app books: Reading patterns and characteristics of readers, texts, and contexts. *Early Child Development and Care*, *188*(8), 1012-1030. https://doi.org/10.1080/03004430.2016.1241776

Dickinson, D. K., & Smith, M. W. (1994). Long-term effects of preschool teachers' book readings on low-income children's vocabulary and story comprehension. *Reading Research Quarterly*, *29*(2), 105-122. https://doi.org/10.2307/747807

Dijk, A. M. van, & Lazonder, A. W. (2016). Scaffolding students' use of learner-generated content in a technology-enhanced inquiry learning environment. *Interactive Learning Environments*, *24*(1), 194-204. https://doi.org/10.1080/ 10494820.2013.834828

Do, T. B. T. (2020). Effects of scaffolded peer review training on the quality of texts produced by students of French as a foreign language. *Electronic Journal of Foreign Language Teaching*, *17*(1), 318-330. https://e-flt.nus.edu.sg/wp-content/uploads/2020/do.pdf

Fan, C. Y., & Chen, G. D. (2021). A scaffolding tool to assist learners in argumentative writing. *Computer Assisted Language Learning*, *34*(1-2), 159-183. https://doi.org/10.1080/09588221.2019.1660685

Flewitt, R. (2008). Multimodal literacies. In J. Marsh & E. Hallet (Eds.), *Desirable literacies: Approaches to language and literacy in the early years* (pp. 122-139). Sage.

Gonzalez, J. E., Pollard-Durodola, S., Simmons, D. C., Taylor, A. B., Davis, M. J., Fogarty, M., & Simmons, L. (2014). Enhancing preschool children's vocabulary: Effects of teacher talk before, during and after shared reading. *Early Childhood Research Quarterly*, *29*(2), 214-226. https://doi.org/10.1016/j.ecresq.2013.11.001

Guillén, M. T. F. (2018). Scaffolding discourse skills in pre-primary L2 classrooms. In M. Schwartz (Ed.), *Preschool bilingual education* (pp. 283-309). Springer. https://doi.org/10.1007/978-3-319-77228-8_10

Hirsh-Pasek, K., Zosh, J. M., Golinkoff, R. M., Gray, J. H., Robb, M. B., & Kaufman, J. (2015). Putting education in "educational" apps: Lessons from the science of learning. *Psychological Science in the Public Interest*, *16*(1), 3-34. https://doi.org/10.1177/1529100615569721

Hojnoski, R. L., Columba, H. L., & Polignano, J. (2014). Embedding mathematical dialogue in parent-child shared book reading: A preliminary investigation. *Early Education and Development*, *25*(4), 469-492. https://doi.org/10.1080/10409289. 2013.810481

Kim, V., & Kim, J. (2022). Facilitative effects of feedback delivered via a social Q&A platform in the English-medium instruction context. *The Journal of ASIA TEFL, 19*(3), 852-870. http://dx.doi.org/10.18823/asiatefl.2022.19.3.7.852

Kucirkova, N., Sheehy, K., & Messer, D. (2015). A Vygotskian perspective on parent-child talks during iPad story sharing. *Journal of Research in Reading*, *38*(4), 428-441. https://doi.org/10.1111/1467-9817.12030

Laksmi, E. D. (2006). "Scaffolding" students' writing in EFL class: Implementing process approach. *TEFLIN Journal*, *17*(2), 144-156. http://dx.doi.org/10.15639/teflinjournal.v17i2/152-165

Lal, S., Donnelly, C., & Shin, J. (2015). Digital storytelling: an innovative tool for practice, education, and research. *Occupational Therapy in Health Care*, *29*(1), 54-62. https://doi.org/10.3109/07380577.2014.958888

Laurell, C., & Söderman, S. (2018). Sports, storytelling and social media: A review and conceptualization. *International Journal of Sports Marketing and Sponsorship*, *19*(3), 338-349. https://doi.org/10.1108/IJSMS-11-2016-0084

Li, D., & Zhang, L. (2020). Exploring teacher scaffolding in a CLIL-framed EFL intensive reading class: A classroom discourse analysis approach. *Language Teaching Research*, *36*(3), 1-28. https://doi.org/10.1177/1362168820903340

Lin, P. C., Hou, H. T., & Chang, K. E. (2020). The development of a collaborative problem-solving environment that integrates a scaffolding mind tool and simulation-based learning: an analysis of learners' performance and their cognitive process in a discussion. *30*(7), 1-18. *Interactive Learning Environments*. https://doi.org/10.1080/10494820. 2020.1719163

Liu, W., Tan, L., Huang, D., Chen, N., & Liu, F. (2021). When preschoolers use tablets: The effect of educational serious games on children's attention development. *International Journal of Human-Computer Interaction*, *37*(3), 234-248. https://doi.org/10.1080/10447318.2020.1818999

Neumann, M. M. (2020). Teacher scaffolding of preschoolers' shared reading with a storybook app and a printed book. *Journal of Research in Childhood Education*, *34*(3), 367-384. https://doi.org/10.1080/02568543.2019.1705447

Neumann, M. M., & Neumann, D. L. (2017). The use of touch-screen tablets at home and pre-school to foster emergent literacy. *Journal of Early Childhood Literacy*, *17*(2), 203-220. https://doi.org/10.1177/1468798415619773

Öztürk, A., & Tunç, Ö. A. (2017). The effect of digital storytelling project on fine arts high school students' teamwork skills. *Journal of Educational & Instructional Studies in the World*, *7*(4), 46-56. 07.ahsen_ozturk-with-cover-page-v2.pdf (d1wqtxts1xzle7.cloudfront.net)

Paek, S., & Fulton, L. (2021). Digital science notebooks: A tool for supporting scientific literacy at the elementary level. *TechTrends*, *65*(3), 359-370. https://doi.org/10.1007/s11528-020-00579-0

Proctor, C. P., Dalton, B., & Grisham, D. L. (2007). Scaffolding English language learners and struggling readers in a universal literacy environment with embedded strategy instruction and vocabulary support. *Journal of Literacy Research*, *39*(1), 71-93. https://doi.org/10.1080/10862960709336758

Reich, S. M., Yau, J. C., & Warschauer, M. (2016). Tablet-based ebooks for young children: What does the research say? *Journal of Developmental & Behavioral Pediatrics*, *37*(7), 585-591. https://doi.org/10.1097/DBP.0000000000000335

Roskos, K., & Burstein, K. (2012). Descriptive observations of e-book shared reading at preschool. *Journal of Literacy and Technology*, *13*(3), 27-57. jlt_volume_13_3.pdf (literacyandtechnology.org)

Sakr, M. (2012). 'Wrighting' the self: New technologies and textual subjectivities. *Learning, Media and Technology*, *37*(1), 119-123. https://doi.org/10.1080/ 17439884.2012.636366.

Sandra, L. A., & Kurniawati, L. A. (2021). Differentiated instruction for ASD students in an EFL class. *NOBEL: Journal of Literature and Language Teaching*, 12(2), 240-256. https://doi.org/10.15642/NOBEL.2021.12.2.243-259

Sidjaja, F. F., Newcombe, P. A., Irwanto, & Sofronoff, K. (2017). The diagnosis of autism spectrum disorder in urban Indonesia: A brief report. International Journal of Disability, *Development and Education*, 64(1), 33-44. https://doi.org/10.1080/1034912X.2016.1162768

Siegle, D. (2013). iPads: Intuitive technology for 21st-century students. *Gifted Child Today*, *36*(2), 146-150. https://doi.org/10.1177/1076217512474983

Smedt, F. de, & Van Keer, H. (2018). Fostering writing in upper primary grades: A study into the distinct and combined impact of explicit instruction and peer assistance. *Reading and Writing*, *31*(2), 325-354. https://doi.org/10.1007/s11145-017-9787-4.

Such, B. (2021). Scaffolding English language learners for online collaborative writing activities. *Interactive Learning Environments*, *29*(3), 473-481. https://doi.org/10. 1080/10494820.2019.1579233

Vygotsky, L. S. (1980). *Mind in society: The development of higher psychological processes*. Harvard University press.

Walsh, R. L., & Hodge, K. A. (2018). Are we asking the right questions? An analysis of research on the effect of teachers' questioning on children's language during shared book reading with young

children. *Journal of Early Childhood Literacy*, *18*(2), 264-294. https://doi.org/18, 264-294. doi:10.1177/1468798416659124

Wohlwend, K. E. (2009). Early adopters: Playing new literacies and pretending new technologies in print-centric classrooms. *Journal of Early Childhood Literacy*, *9*(2), 117-140. https://doi.org/10.1177/1468798409105583.

Woloshyn, V. E., Bajovic, M., & Worden, M. M. (2017). Promoting student-centered learning using iPads in a grade 1 classroom: Using the digital didactic framework to deconstruct instruction. *Computers in the Schools*, *34*(3), 152-167. https://doi.org/10.1080/07380569.2017.1346456

Yelland, N. (1998). Empowerment and control with technology in the early childhood years. *Educational Practice and Theory*, *20*(2), 45-55. https://doi.org/10.7459/ept/20.2.05

Yelland, N., & Masters, J. (2007). Rethinking scaffolding in the information age. *Computers & Education*, *48*(3), 362-382. https://doi.org/10.1016/j.compedu.2005.01.010

Yin, R. (2018). Case study research and applications: Design and methods (6th ed.). SAGE.

Zainudin, N., & Ismail, A. (2020). Designing storylines for children's mathematics digital Interactive storybook using software engineering approach. *Journal of ICT in Education*, *7*(1), 43-51. https://doi.org/10.37134/jictie.vol7.1.5.2020

Zucker, T. A., Justice, L. M., Piasta, S. B., & Kaderavek, J. N. (2010). Preschool teachers' literal and inferential questions and children's responses during whole-class shared reading. *Early Childhood Research Quarterly*, *25*(1), 65-83. https://doi.org/10.1016/j.ecresq.2009.07.001