Reading Fluency Training with Amazon Alexa

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Abstract: This paper presents the conception, development and evaluation of an Amazon Alexa application (*Skill*) for the training of reading fluency. This *Skill* takes on different roles in a multilingual Reader's Theatre, a reading out loud method to train reading fluency. In this approach, children may choose and practice one or more roles in a script by reading out loud their dialogues with the reading partner Amazon Alexa. The student and Alexa take turns in reading. Alexa gives feedback to the student, acts as a reading model, and has the role of a cooperative reading partner. In an iterative process, the development of the prototype was continuously evaluated and adapted. The *Skill* was evaluated with three students who tried out the *Skill* and were interviewed about the acceptance, the fun factor and their future use. The evaluation focused on the functionality and usability of a possible technical implementation. Despite various technical limitations, a final evaluation showed that the *Skill* can be suitable as a co-partner for a Reader's Theatre.

1 INTRODUCTION

Digitalization has advanced mobile devices such as tablets or smartphones to an indispensable part of our private and professional lives. 98% of German households today own mobile devices, and 97% of them have Internet access (Feierabend, Plankenhorn & Rathgeb, 2016), which means that Children and teenagers come into contact with digital media starting from a very young age. Smart speakers, such as Amazon Alexa, are increasingly a part of today's family lives. A total of 86.2 million smart speakers were sold in 2018. During the fourth quarter of 2018 there were more smart speakers sold worldwide than in the entire year of 2017. (Strategy Analytics, 2018). One of the most popular smart speakers is Amazon's Alexa, a device used in many fields, such as Utilities, Health & Fitness, News, Kids, Communication, Smart Home, and Education (Amazon.com, Inc. & its affiliates, 1998-2019). With the progressive development of technological innovation, digitization offers new possibilities for the use of media in the context of teaching and learning. Alexa's interaction features, her lively voice and the Amazon's personalized programming possibilities, offer great potential in educational contexts. In this project, we investigated to what extent smart speakers are suitable as reading partners for students as a means to improve their reading abilities.

2 PROBLEM, APPROACH AND OBJECTIVES

A significant deficit in reading competence is a phenomenon observable not only in countries with less developed educational systems, but also among students in primary and secondary level school in many first-world countries (OECD, 2015). Such inadequate reading competence may not only impair the learning of other school subjects, it may also negatively impact the future and professional life of such students (Grabe, 20009; Grotlüschen & Riekmann, 2011). Reading fluency is considered a fundamental basis for higher reading competence (Grabe, 20009). Hence, students should be able to

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assign word meanings reliably and quickly at the level of letters, words, sentences, and text passages. In addition, texts should be read at a certain speed and with the right intonation. Repeated reading aloud may improve accuracy, fluency and understanding of reading (NICHD, 2000). There are a number of instructional approaches linked to reading aloud, such as the Reader's Theatre method (Nix, 2006). However, all of these methods require a reading partner and intensive practice to improve reading competence. Finding an adequate reading partner outside of class is often a problem due to a number of reasons. For example, if a student's family has a migration background, parents frequently lack the required language skills to assist their children, or if family members are unavailable due to their work schedules.

In this paper, an approach aimed at addressing this problem by means of commercial speech technology, namely Amazon Alexa, is presented and evaluated. The contribution of this paper is first, the presentation of novel technology-based, self-directed learning activities that integrate (commercial) language technologies, and smart speakers. And second, this paper provides an evaluation of Amazon Alexa's ability to provide sufficient quality when applied in such scenarios. Furthermore, first results with respect to the acceptance of such technology by learners are presented.

3 STATE OF THE ART

This work focuses on the conception, implementation and evaluation of digital learning media for the method of multilingual Reader's Theatre (MELT) (Kutzelmann, Massler, Klaus, Götz & Ilg, 2017). The MELT method is based on the Reader's Theatre approach (Nix, 2006) which integrates repeated reading aloud in order to increase reading ability (Rosebrock, Nix, Rickmann & Gold, 2011). In the Reader's Theatre, students practice a performance linked to reading texts, which in turn develops their reading fluency "on the side". Students train cooperative dialogical texts, which are divided into speaker and narrator roles (Mraz et al., 2013). The multilingual Reader's Theatre is an extension of the Reader's Theatre taking a bilingual or multilingual approach. In this approach, scripts may integrate not only the national language and foreign languages, but also migration languages. Students not only practice their reading fluency in cooperative groups, they also engage in self-learning phases. Studies have confirmed that learners and teachers value the

multilingual Reader's Theatre as very motivating and instructive (Kutzelmann et al., 2017).

For more than three decades, the use of computers for learning has been investigated. Much of the early research has focused on the potential of training programs to make better and faster learning possible. Computers have the unique ability of offering individualized practice to students who need to improve their reading fluency. Moreover, computers have proven beneficial in developing the ability to decode. (Hasselbring & Goin, 2004). In the digital domain, there is already a multitude of learning software geared to improving text comprehension skills, practicing reading fluency in the mother language or in foreign languages, and training vocabulary.

Parr (2008) developed an approach to using text-to-speech technology that offers the possibility to read out words, sentences and texts fluidly with a computer-generated voice. This technology gives students with reading difficulties the chance to work independently in accordance with class level expectations (Hasselbring & Bausch, 2005/2006). Students are supported in decoding and word identification thus allowing students with limited reading ability to read longer texts (Parr, 2008). Digital technologies are not only useful as a reading model, but also as an application that listens to students read and then give feedback on their performance. For example, the digital application *MyTurnToRead* is designed as a virtual reading partner to practice reading fluency (Madnani et al., 2019). Based on an e-book, *MyTurnToRead* demonstrates how a virtual reading partner is useful for developing reading fluency. With this application, the student and virtual partner take turns reading aloud. The student can follow along while the virtual partner reads aloud. By highlighting the sentence that is being read aloud, the student's focus is maintained. At any time, the student may pause the digital reading out or repeat a part that has already been read aloud. In addition, students have the possibility to record themselves while reading aloud text and then listen to it afterwards. After reading, the student engages in comprehension tasks.

The *reading tutor*, a computer-based tool, with speech recognition (Bernstein & Cheng, 2008) was developed specifically to help students practice their reading skills. The *reading tutor* has been shown to improve not only the reading skills of native English speaking students (Mostow et al., 2008), but also students of English as a Second Language (ESL) (Poulsen, Wiemer-Hastings & Allbritton, 2007). The *reading tutor* displays stories on a screen and records

the student while reading aloud. By means of speech recognition and automatic text analysis, the *reading tutor* can give feedback on the student's performance (Mostow & Aist, 2001).

The *Peabody Literacy Lab (PLL)*, a tutoring system designed for secondary school students, relies on a unique combination of learning theory, pedagogical principles and integrated media technologies (Hasselbring & Goin, 2004). This program teaches word recognition, decoding, spelling and text comprehension. An animated tutor guides the student through the instructional units and provides feedback of the student's performance via a digitized human voice. The program tracks individual student progress and adapts the lessons accordingly.

As stated above, one means for developing reading skills is the Reader's Theatre where students practice reading aloud. To accommodate recent technological advancement, the Reader's Theatre has been expanded to include digital media. However, these are not digital reading partners, rather extensions to the design of the final performance. In the following, two examples are presented for how digital media can be integrated into the Reader's Theatre method.

Vasinda and McLeod (2011) have expanded the traditional Reader's Theatre by using podcasts. In the process, podcast recordings of the performances were made and published. By publishing a podcast recording of the theatre performance, parents unable to attend their child's performance, could listen to the reading. Story Reading Environmental Enrichment (STREEN), an innovative space for reading stories at primary school age, is another example for integrating digital media into the Reader's Theatre method. Depending on the reading performance and story, it uses technical infrastructure in the form of an augmented e-book. STREEN has been shown to elevate the reader's motivation by changing the space in which they read. STREEN is an artificial environment in which technical infrastructure can trigger technical media additions based on reading performance and story. (Ribeiro, Iurgel, Müller & Ressel, 2016). Speech recognition and eye tracking technologies are used to detect events in a reading aloud scenario, or a quiet reading scenario, respectively. Smart speakers such as Amazon Alexa are enablers for combining text-to-speech technology, personalized reading feedback and reading loud out method.

In this project, existing technologies of smart speakers were used and adapted to the context of reading fluency training. The most popular smart speakers are products offered by Apple (Siri), Google

(Google Assistant), Microsoft (Cortana), Samsung (Bixby) and Amazon (Alexa) (Drewer, Massion & Pulitano, 2017). The advantage of Amazon Alexa has is for third parties to develop and deploy custom *Skills*, i.e. software components for extending the assistant with additional voice commands. The voice command 'Alexa' connects Alexa or the Amazon Echo device synchronously with the remote Amazon Voice Service, thus allowing access to the custom *Skill*. By doing so, all additional voice commands become available to the end user. Using them invokes the corresponding action in the customised Alexa *Skill* (Amazon.com, Inc. & its affiliates, 2010-2019a). The number of custom Amazon Alexa *Skills* in the USA more than doubled in 2018. At the beginning of 2018, there were 25,784 Amazon Alexa *Skills* in the USA. By the beginning of 2019, there were already 56,750 *Skills*. This constant increase demonstrates the continuing interest of developers in the Amazon Alexa technology. It is not only the end users who benefit from this growth, but also Amazon. It shows the engagement of the developers, who are of crucial importance for increasing the value of this platform (Kinsella, 2019). Echo Show provides additional interaction possibilities through a touch display.

4 METHODOLOGY: DESIGN-BASED RESEARCH

The objective of our project was to determine the potentials and limitations of Amazon Alexa as an electronic learning tool in the form of a training partner for MELT. The focus of this study was on technological feasibility and acceptance. The following research question is: To what extent is Amazon Alexa suitable as a reading partner for training reading fluency? The project pursued a Design-Based Research (DBR) approach, combining knowledge- and application-oriented research in a continuous cycle of design, implementation, evaluation and re-design (Design-Based Research Collective, 2003). In addition, methods and instruments of User Experience (UX) design and usability engineering (DIN EN ISO 9241-210, 2010) were used. Users were integrated into the product development process at an early stage. They engaged in the study by regularly testing the usability of the product with usability tests during implementation.

5 CONCEPT

The target group in need of reading support were the end of primary school students and early secondary school students with reading fluency deficiencies. The following objectives were pursued:

- supplementing the Reader's Theatre with self-study sessions at home;
- training the reading of selected roles in a dialog;
- implementing Amazon Alexa as a reading partner;

The advantage of combining MELT with Amazon Alexa is that she can be used as a co-partner for reading all of the other theatre roles. In addition, Alexa is able to pronounce and properly emphasize words and sentences. In this way, Alexa serves as a speech model. By using Alexa Echo Show, the display can be used to read the texts. Another advantage is students may also receive feedback concerning errors they make while reading aloud. At the end of the training session, students receive a numerical score based on the errors they make while reading aloud.

Personas and scenarios were created early in the project. The following scenario illustrates the intended use which starts with Miranda coming home from school. That day, her English teacher introduced the reading aloud method MELT in her lessons and plans a joint reading performance at the end of the week. Since in her first attempt Miranda did not perform well when reading her role, she would like to practice at home However, she lacks an appropriate reading partner. Fortunately, her family owns an Alexa Show, and her teacher has already provided her with the necessary *Skill* enhancements, which her father had installed the previous day. She starts her activity with Alexa. Now she is able to read the text and concentrate on her role, while Alexa takes over the roles of her classmates. Whenever she makes an error, Alexa provides feedback.

The concept of this work includes the implementation of a reading text with different reading roles. The student has the opportunity to select each role to read with Alexa. The developed *Skill* can be used with an Amazon Echo device, or a mobile device with the Amazon Alexa App. By using the Echo Show the functionality can be extended so that it shows images and texts on the display, and use of a touch interaction function. The difficulty level of the reading text was adapted to the target group. After the training sessions, the students receive score for their reading performance.

6 IMPLEMENTATION

A prototype for the custom Alexa-*Skill* was developed. The *Skill* was programmed into the Amazon Developer Console and the AWS Lambda Management Console (Amazon.com, Inc. & its affiliates, 2010-2019b). The development of the *Skill* can be organized in the Amazon Developer Console. The *Skill* can be tested without an additional Amazon Echo device (Figure 1 and 2). In this console the *Skill* name is defined. Then, a user-defined interaction model containing the logic of the app and voice interface needed to interact with Alexa are created and configured.
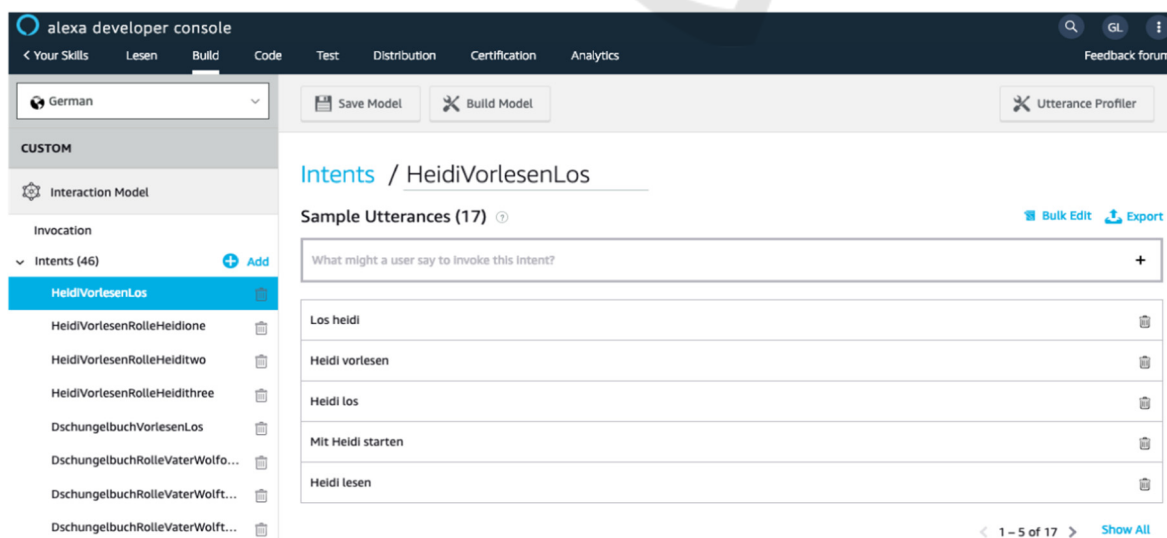

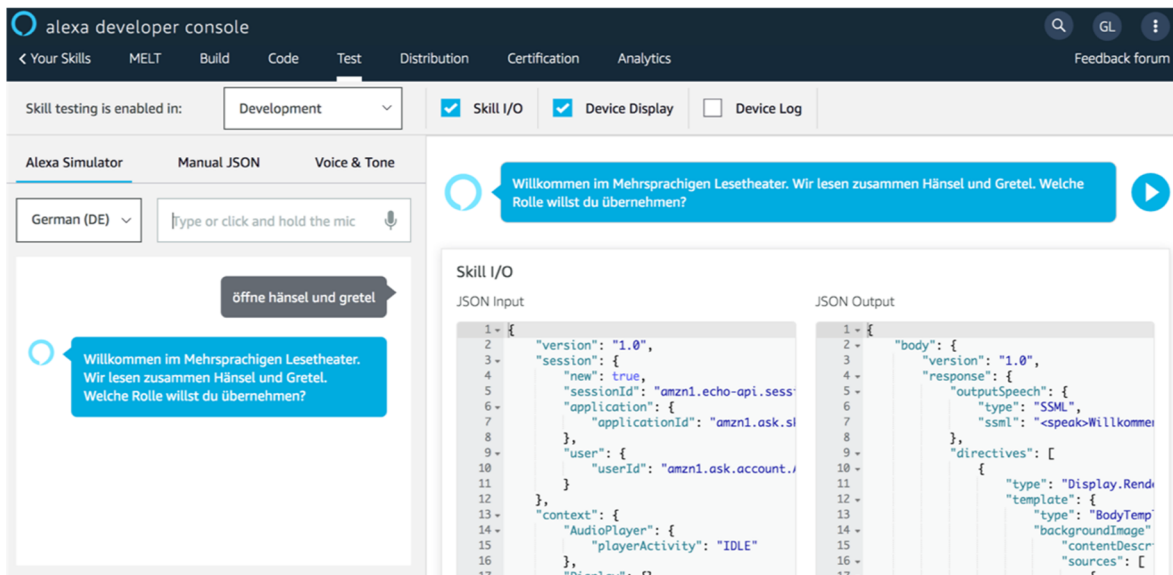Figure 1: Amazon Developer Console to organize the Skill.

Figure 2: Amazon Developer Console to test the Skill.

To define the voice interface, the user's voice input is assigned to so-called intents. This allows the cloud-based service from Amazon to process the voice input. The endpoint or the link to the AWS Lambda Management Console is also entered (Amazon.com, Inc. & its affiliates, 2010-2019c). A Node.js function code was written into the console, which can be executed when an intent is called up by voice commands. The code example shows the template code for the Alexa Show Display and the speech output:

```
'HeidiVorlesenLos': function () {
    if (supportsDisplay.call(this)) {
const bodyTemplate1 = new
Alexa.templateBuilders.BodyTemplate1
Builder();
var template =
bodyTemplate1.setTitle("GameLet
App")
.setTextContent(makePlainText("Es
geht los."))
.build();
speechOutput = "Es geht los.";
this.response.speak(speechOutput);
this.response.renderTemplate(templat
e);
this.response.listen();
this.emit(":responseReady");
    }
```

The following problems and obstacles were encountered during implementation. First, all intents are created in the same way and have equal rights, which means that all of them can be used at any time. This has the advantage that students can start reading at any part of the text, at any time. However, the disadvantage is the possibility that Alexa could begin reading from a different part of the text if the command is not clear. Second, Amazon offers only two or three voices for many of the languages in the program (Amazon Web Services, Inc. or its affiliates, 2006-2019). Consequently, several roles must be assigned to the same voices. Third, Alexa Show stops reading aloud when her display has been touched, which means no interaction is possible while reading aloud. The consequence here is the text cannot be scrolled up. Finally, when changing or re-implementing stories, obstacles can arise because they are complex and require programming knowledge.

7 EVALUATION

The prototype of the Alexa *Skill* was tested and evaluated by means of three representative target group students. Functionality and usability of a possible technical implementation were the focus of the study. Technical optimization was derived from these results. Privacy issues were taken into account to the extent that no student data are saved. Most importantly, Alexa is used solely for educational purposes.

Testing began with a short introduction to MELT and the Alexa *Skill,* the students were asked to read their role in the Reader's Theatre with Alexa. This they carried out on their own (Figure 3). After the students had tried out the *Skill*, a semi-structured

interview was conducted. In this interview, the students were asked questions about acceptance, fun factor and future use. In general, it can be said that all three students used the *Skill* intuitively.

The interview results could be organised in the following five points:

• Alexa's reaction: The students found Alexa's reaction time and waiting time to be too long. However, the reaction sensitivity to the read-out text rarely led to problems.

• Understandability: After a short introduction, the students were able to use the *Skill* intuitively. They quickly understood how the *Skill* works. Moreover, orientation was reported to be easy.

• Functionality of Alexa: Sometimes there were small functional errors, e.g. turning itself off unexpectedly. Another issue is the student wish for a larger portion of reading activities in the Reader's Theatre. Furthermore, the extension of Alexa by Echo Show was rated as very positive: "Reading the text from Alexa Show is much cooler than from paper."

• Pronunciation: The use of three different languages in the *Skill* was confusing for all students because Alexa can speak any given role with different voices and in different languages. Although Alexa is a good speech model for pronunciation, she cannot correct student pronunciation errors. For this reason, she is unable to react to incorrectly modulated sentences, incorrectly pronounced words, and missing words. If she has recognized enough words, she just reads on in the script and may miss some serious errors.

• Fun and acceptance: The students were enthusiastic about reading with Alexa. In the interviews, the following statements were noted in response to the question about willingness to continue using the *Skill* for reading practice in the future: "In a bilingual script I would use the app to learn English", "Yes, when can I download the app for Alexa?", "There should be a lot more books in the app".

Due to clear pronunciation and modulation, Alexa acts as a good speech model. However, the speech recognition varies widely, hence affecting reliability to provide mispronunciation corrections or error feedback.
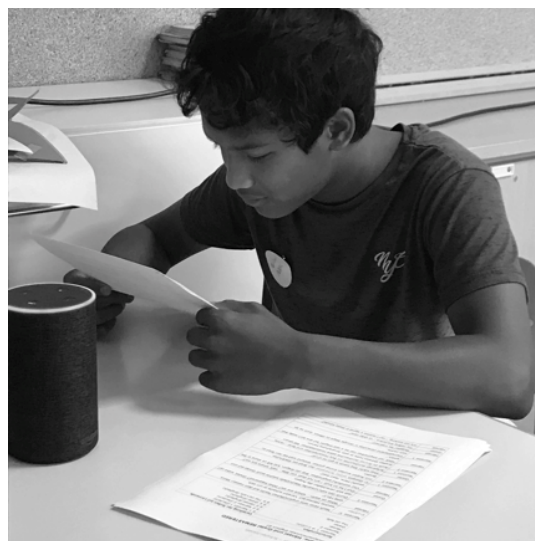

Figure 3: Usability Test with Amazon Alexa.

For example, Alexa is not able to distinguish between pronunciation errors, reading speed or incorrect modulation. Either the keywords defined in the *Skill* match the voice entry and Alexa can continue reading in the script, or there is no match and Alexa asks the student to make the voice entry again. This problem caused confusion among the students. Here, the Alexa software appears to be the source of the problem. Although the commands can be used at any time, making it easier to get started with the Reader's Theatre, this option can also cause confusion and disorientation if Alexa misunderstands the student hence causing her to switch erratically between different parts of the text. On the one hand the gaming character of the built-in error score is an added feature that is found to motivate the students. On the other hand, it may also put students under pressure to perform well. The overall positive student reaction to Alexa as a reading trainer resulted from the intuitive functionality and ease in use. The students expressed their interest in using Alexa to train their reading skills.

According to the Design-Based Research approach, the re-designing of the *Skill* should take place after further analysis of the evaluation results. The prototype should be further developed according to the results of this study.

8 DISCUSSION

Although methods for training reading fluency, such as MELT, require a reading partner, not every student has the opportunity to practice reading with a partner

outside of school lessons. For this reason, a digital tutor can be useful for reading training. According to Aist et. al. (2001) a digital tutor has been shown to be a good alternative for those students who require a partner. The study of Aist et. al. examined the learning of vocabulary with the help of oral reading. Traditional teaching was compared with one-to-one teaching, both with human tutors and with digital tutors. The results of this study showed that third graders who learned with a human and digital tutor demonstrated equally improved word comprehension and passage comprehension.

The results of this study further prove that Alexa can be used for reading practice despite some deficiencies in the quality of speech recognition. Moreover, this study has found that students were better motivated to practice their reading skills in future with Alexa. These findings align with Madnani et. al. (2019) interviews of 25 children who used MyTurnToRead. In that study, the children said they would be interested in using this digital application in the future. The research has thus revealed that students who learn with a tutor, in addition to the traditional classroom lessons, are more likely to improve their reading skills significantly. Moreover, these studies have also demonstrated the overall student acceptance of digital tutors. The findings in this research with Smart Speaker Alexa as a digital tutor has enriched the field with further evidence of its importance for developing reading skills. While the study demonstrated some technical limits, it also revealed opportunities that should be developed in future studies.

9 SUMMARY AND OUTLOOK

In the context of a DBR approach the question was addressed in which way Amazon Alexa could be used as a reading assistant in the context of MELT. A prototype of an Alexa was designed, implemented and evaluated by iterative tests. The technical potentials and limits of Alexa as an exercise partner for MELT were determined. The results are positive despite various limitations. In specific, our first evaluation suggests that commercial language technology could be effectively applied to support students in self-directed learning scenarios, despite the clearly existing deficiencies in speech recognition quality. Furthermore, it appears that the overall positive usability of the system leads to a high level of acceptance by the learners. It should be noted that due to the small number of student participants in this study, the results are limited. However, further

investigation with a larger number of students is required, as is a deeper focus on language teaching methods. In addition, a more detailed analysis of ethical aspects and privacy issues, such as data retention, may be required. Although some effects of digital media has been found to negatively impact student social interaction, here Alexa should be seen solely as a supplemental tool for school work and as a support for learning, and not as an additional social media diversion. The purpose of Alexa is to aid students who lack a reading partner at home and who have a need to practice their Reader's Theatre texts. In future, various teaching scenarios could be developed: for example, the perspective of collaborative learning. Additional functionalities of Amazon Alexa in terms of Alexa Show, e.g., the parallel presentation of word definitions or translations, carry the potential to enhance the presented scenarios. However, in order to use Alexa long-term, the technical infrastructure in the school would have to be adapted. The students require a stable Internet connection and access rights to Alexa Echo devices, or mobile devices. Finally, teachers require media competence and technical instruction to ensure its use in the classroom.

REFERENCES

Aist, G., Mostow, J., Tobin, B., Burkhead, P., Corbett, A., Cuneo, A., Junker, B. & Sklar, M. B. (2001). Computer-assisted oral reading helps third graders learn vocabulary better than a classroom control – about as well as one-on-one human-assisted oral reading, Available at: https://www.researchgate.net/publication/244420809_Computerassisted_oral_reading_helps_third_graders_learn_vocabulary_better_than_a_classroom_control_-_about_as_well_as_one-on-ne_humanassisted_oral_reading, [Accessed 12 March 2020].

Amazon.com, Inc. & its affiliates (1998-2019). *Amazon Alexa Skills.* Available at: https://www.amazon.de/alexaskills/b/ref=sd_allcat_k_a2s_all?ie=UTF8&node=10068460031, [Accessed 12 August 2019].

Amazon.com, Inc. & its affiliates (2010-2019a). *Alexa Voice Service. Create Devices with Alexa Built-in that Customers Can Talk to Directly*, Available at: https://developer.amazon.com/de/alexa-voice-service, [Accessed 12 August 2019].

Amazon.com, Inc. and its affiliates (2010-2019b). *Speech Synthesis Markup Language (SSML) Reference*, Available at: https://developer.amazon.com/de/docs/custom-skills/speech-synthesis-markup-language-ssml-reference.html, [Accessed 12 August 2019].

Amazon.com, Inc. and its affiliates (2010-2019c). *Manage Skills in the Developer Console*, Available at: https://developer.amazon.com/

de/docs/devconsole/about-the-developer-console.html, [Accessed 12 August 2019].

Amazon Web Services, Inc. or its affiliates (2006-2019). AWS Lambda Entwicklerhandbuch, Available at: https://aws.amazon.com/, [Accessed 12 August 2019].

Bernstein, J. & Cheng, J. (2008). Logic and Validation of a Fully Automatic Spoken English Test. In V. M. Holland & F. P. Fisher (eds.), *The Path of Speech Technologies in Computer Assisted Language Learning: From Research Toward Practice,* Routledge. New York, pp. 174-194.

Design-Based Research Collective (2003). Design-Based-Research: An Emerging Paradigm for Educational Inquiry. *Educational Researcher, 32/1,* pp. 5-8, 2003.

DIN EN ISO 9241-210 (2010). *Ergonomics of human-system interaction — Part 210: Human-centred design for interactive systems,* Available at: https://www.iso.org/standard/77520.html, [Accessed 12 August 2019].

Drewer, P., Massion, F. & Pulitano, D. (2017). Was haben Wissensmodellierung, Wissensstrukturierung, künstliche Intelligenz und Terminologie miteinander zu tun? *Deutsches Institut für Terminologie.*

Feierabend, S., Plankenhorn, T. & Rathgeb, T. (2017). *KIM-Studie 2016: Kindheit, Internet, Medien. Basisstudie zum Medienumgang 6- bis 13-Jähriger in Deutschland.* Medienpädagogischer Forschungsverbund Südwest, Stuttgart.

Grabe, W. (2009). *Reading in a second language: Moving from Theory to Practice*. New York: Cambridge University Press.

Grotlüschen, A. & Riekmann, W. (2011). *leo. - Level-One Studie: Literalität von Erwachsenen auf den unteren Kompetenzniveaus.* Available at: https://blogs.epb.uni-hamburg.de/leo/files/2011/12/leo-Presseheft_15_12_2011.pdf, [Accessed 12 August 2019].

Hasselbring, T. S. & Bausch, M. E. (2005/2006). Assistive technology for reading: Text reader programs, word-prediction software, and other aids empower youth with learning disabilities. *Education Leadership, 63(4),* 72–75.

Hasselbring, T. S. & Goin, L. I. (2004). Literacy instruction for older struggling readers: What is the role of technology? *Reading & Writing Quarterly, 20(2),* 123–144.

Kinsella, B. (2019). *Amazon Alexa Skill Counts Rise Rapidly in the U.S., U.K., Germany, France, Japan, Canada, and Australia.* Available at: https://voicebot.ai/2019/01/02/amazon-alexa-skill-counts-rise-rapidly-in-the-u-su-k-germany-france-japan-canada-and-australia/, [Accessed 12 August 2019].

Kutzelmann, S., Massler, U., Klaus, P., Götz, K. & Ilg, A. (2017). *Mehrsprachiges Lesetheater. Handbuch zu Theorie und Praxis*. Leverkusen/Opladen: Budrich.

Madnani, N., Beigman Klebanov, B., Loukina, A., Gyawali, B., Sabatini, J., Lange, P. & Flor, M. (2019). My Turn to Read: *An Interleaved E-book Reading Tool for Developing and Struggling Readers*, Available at:

https://www.aclweb.org/anthology/P19-3024.pdf, [Accessed 12 March 2020].

Mostow, J. & Aist, G. (2001). Evaluating Tutors that Listen: An Overview of Project Listen. In K. D. Rofbus & P. J. Feltovich (eds.), *Smart Machines in Education,* AAAI Press. Cambridge, pp. 169-234.

Mostow, J., Aist, G., Huang, C., Junker, B., Kennedy, R., Lan, H., Latimer, D., O'Connor, R., Tassone, R., Tobin, B. & Wierman, A. (2008). 4-Month Evaluation of a Learner-Controlled Reading Tutor That Listens. In V. M. Holland & F. P. Fisher (eds.), *The Path of Speech Technologies in Computer Assisted Language Learning: From Research Toward Practice*, Routledge. New York, pp. 201-219.

Mraz, M., Nichols, W., Caldwell, S., Beisley, R., Sargent, S. & Rupley, W. (2013). Improving oral reading fluency through reader's theatre. In: *Reading Horizons 52(2)*, pp. 13 – 180.

NICHD – Nat. Inst. of Child Health and Human Development (2000). *Report of the National Reading Panel. Teaching children to read – An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction.* U.S. Government Printing Office, Washington DC.

Nix, D. (2006). *Das Lesetheater: Integrative Leseförderung durch das szenische Vorlesen literarischer Texte. Praxis Deutsch 33/199,* pp. 23–29.

OECD (2015). *PISA 2015: Results in Focus*. Available at: https://www.oecd.org/pisa/pisa-2015-results-in-focus.pdf, [Accessed 12 August 2019].

Parr, M. (2008). *More than Words: Text-to-Speech Technology as a Matter of Self-Efficacy, Self-Advocacy, and Choice.* Available at: http://digitool.library.mcgill.ca/webclient/StreamGate?folder_id=0&dvs=1565529171923~291 [Accessed 12 August 2019].

Poulsen, R., Wiemer-Hastings, P. & Allbritton, D. (2007). Tutoring Bilingual Students with an Automated Reading Tutor That Listens. *Journal of Educational Computing Research, 36(2)*, 191-221.

Ribeiro, P., Iurgel, I., Müller, W. & Ressel, C. (2016). Enrichment of Story Reading with Digital Media. In G. Wallner, S. Kriglstein, H. Hlavacs, R. Malaka, A. Lugmayr & H.-S. Yang (eds.), *Entertainment Computing - ICEC 2016*, Springer. Cham, pp. 281–285.

Rosebrock, C., Nix, D., Rickmann C. & Gold, A. (2011). *Leseflüssigkeit fördern: Lautleseverfahren für die Primar- und Sekundarstufe*. Seelze: Kallmeyer.

Strategy Analytics (2019). *Strategy Analytics: 2018 Global Smart Speaker Sales Reached 86.2 Million Units on Back of Record Q4.* Available at: https://news.strategyanalytics.com/press-release/devices/strategy-analytics-2018-global-smart-speaker-sales-reached-862-million-units, [Accessed 12 August 2019].

Vasinda, S. & McLeod, J. (2011). Extending Readers Theatre: A Powerful and Purposeful Match With Podcasting. *The Reading Teacher, 64(7),* 486-497.