



EFFICIENCY OF COMPUTER ASSISTED READING MATERIALS FOR IMPROVING PAKISTANI DYSLEXIC STUDENTS' READING SKILLS

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ABSTRACT

The purpose of the study is to gauge the efficiency of indigenously developed computer assisted reading materials for improving Pakistani dyslexic students' reading skills. For this purpose, the Learning Disabilities Checklist was administered for dyslexia screening to all the grade VI students of the mainstream school. The study sample comprised fifteen purposively selected students whose screening score on the checklist ranged from 70% - 100%. Cognitive Theory of Multimedia Learning served as the theoretical framework for the current study. This study employed one group pre-post research design where the students were administered a six week treatment. Pretest and post-test scores of the students helped in collecting quantitative data. Different statistical tests were administered using SPSS for the analysis of the quantitative data. Findings of the current study revealed that the developed materials were efficient for improving reading skills of Pakistani mainstream school's dyslexic students.

Keywords: English language teaching, computer assisted language learning, computer assisted reading materials, reading skills

Introduction

Learning disability or learning difficulty is normally aligned with the faulty psychological mechanism which plays an important role in child's learning process (Mammarella, Caviola, Giofrè & Szűcs, 2017); that's why, the children with learning disabilities have problems in active processing of the information to be taken as input which often results in poor performance in output (Wagner et al., 2020). Out of the different types of learning disabilities, the commonly found and the most significant one is named as dyslexia which refers to issues among children in identifying speech sounds and establishing their relationships with letters (Snowling, Hulme & Nation, 2020). Normally, it's more prevalent in boys as compared to girls (Arnett et al., 2017). The management of dyslexia needs immediate attention of all the concerned stakeholders; otherwise, remaining ignorant and impartial to dyslexia may lead to total academic failure of the child (Stagg, Eaton & Sjoblom, 2018). There exist many definitions of dyslexia and every researcher has defined dyslexia differently according to his / her viewpoint (Drigas & Elektra, 2016, Kilpatrick, 2015; Roitsch & Watson, 2019) but the most accepted definition of dyslexia among researchers states that it is a specific kind of neurobiological learning disorder with problems in spelling and decoding skills (Erbeli, Hart, Wagner & Taylor, 2018). Dyslexia has often been considered to be the cause of phonological deficit (Bachmann & Mengheri, 2018) which is normally believed to be responsible for reading comprehension and background knowledge of the child (Share, 2021). Normally, there are two major divisions of dyslexia named as acquired dyslexia and developmental dyslexia where the former is commonly found in people who are exposed to any kind of trauma whereas the latter is the most generic form of dyslexia which is neurobiological in origin where the children have issues with accurate or fluent word recognition, decoding and spelling abilities (Cabbage, Farquharson, Iuzzini-Seigel, Zuk & Hogan, 2018). Importantly, developmental dyslexia, from now onwards dyslexia, (Li, Hu & Liang, 2022) does not stem from any kind of disability, impairment or poor instruction (Parrila, Dudley, Song & Georgiou, 2019) and may affect the child's academic performance in school settings with implicit or explicit emotional or attitudinal problems (Protopapas & Parrila, 2018). Therefore, it is very imperative to understand that any kind of disability in general and reading disability in particular may significantly affect the reading skills which, in turn, may hamper the academic progress of the child.

The development of reading skills in the young children includes their exposure of sounds, symbols and sound-symbol relationship (Snowling, Thomas, Nash & Hulme, 2019). Therefore, the interventions should primarily center on sounds. The design of intervention strategies for dyslexic students is normally divided into two types (Trautmann, 2014) named as cognitive intervention strategies which are often related to phonological awareness and symptomatic intervention strategies which are related to reading and spelling skills. However, a few researchers (Galuschka et al., 2020, Castles, Rastle & Nation, 2018) have suggested using both strategies collectively for achieving better and highly promising outcomes. Mostly, the intervention strategies for dyslexic children are based on exploring the effect of different types of reading interventions on their performance in academic achievement tests (Drigas & Ioannidou, 2013). It has been found that the efficiency rate of these interventions significantly differs among dyslexic students, as a few students need just a little support for academic improvement while the other students may continue with their life time efforts for achieving success in their academic career. For the design and implementation of reading intervention programs for teaching dyslexic students, research has revealed that it's not only the presentation of the content important (Buckingham, Beaman, & Wheldall, 2013) but also the way it's presented is very important too (Litt, Wang, Sailah, Badcock & Castles, 2018). There is abundance of commercially available computer assisted materials in the market but the scarcity of appropriate assessment knowledge of learning disabilities makes the task even more difficult for many researchers while generalizing the findings of their study, as there have been reported clashes when the findings of clinical settings are compared with the findings of educational settings (Montgomery, 2020). So, it's far better to administer intervention in the early stages in order to avoid any issues on the part of the children, their parents and their English language teachers (Drigas & Elektra, 2016). For the management of dyslexia, the success rate of early intervention has been found much higher as compared to the success rate of later stage of intervention (Kochva, 2016). However, some children often require lifelong reading support to ensure their academic success. English language teachers have always been trying to address the diverse learning needs of their learners either by trying new strategies or by developing new teaching materials which are sometimes in the form of computer assisted materials. Modern educational marketplace is full of the computer materials, mostly available in the form of software, developed by computer/software engineers who have no language background (Tomlinson, 2012). That's why, these materials were found misfit by English language teachers where the focus was mostly on teacher not on the learner (Kiliçkaya & Seferoğlu, 2013). These developed materials have numerous modes of learning to offer to its users for providing them with different alternatives to accomplish the given task (Dawson, Antonenko, Lane & Zhu, 2018).

The most promising branch of technology integration in English language teaching among researchers and ESL practitioners is Computer Assisted Language Learning (CALL) which deals with the application of computer and its tools in the process of English language teaching and learning. From the different branches of CALL, the most important one among ESL teachers is Computer Assisted Reading Materials Development which may either be in the form of mobile application or in the form of computer software. Reading recovery programs, computer software, offer solutions to facilitate English language teachers who have always been found very concerned for helping their dyslexic children succeed in their academic achievement tests (Serniclaes, Collet & Sprenger-Charolles, 2015). For example, Björn and Leppänen (2013) used EngLexia for improving the decoding related skills among EFL dyslexic students and the results indicated a comparable performance difference among the students of both groups. Similarly, Franceschini et al. (2013) used action video games for enhancing the reading skills of dyslexic children and there was found a marked change in their scores. In the same way, Kochva (2016) conducted a study while using a software for enhancing reading skills of dyslexic children and it was revealed through findings that the intervention was successful in achieving the set goals. Pakistan is a diverse country with more than seventy spoken languages where Urdu holds the status of national language (Seifi, 2015) and English language enjoys supremacy over all the languages. According to Ahmad (2016), English language proficiency guarantees a successful, prosperous and a highly prestigious future. English must be introduced as a compulsory subject to the Pakistani students from grade one onwards (MFEPT, 2017).

Proficiency in reading skill often guarantees success in all the academic assessments (Linder, Mueller, Gibbs, Alper & Freeman, 2017). However, according to Teevno and Raisani (2017), the situation of English language teaching especially teaching of reading skill in Pakistani mainstream schools is very pathetic due to consistent use of traditional strategies. The most common strategy used for reading among students in mainstream schools is the read aloud strategy where one student reads the English text aloud for the class and the English language teacher translates the text in Urdu language (Muhammad, 2013). This strategy may prove useful for normal, non-dyslexic, students but for dyslexic students, it's very difficult to manage with such a strategy and

ultimately it affects their academic performance (Knight, 2018) and they are often found passive during classroom sessions which has been reported in many research studies (Galuschka et al., 2020 & Jamshidifarsania, Garbayab, Limc, Blazevisa & Ritchie, 2019).

In the Pakistani perspective, a few studies have not only revealed the existence but also the administration of techniques for the management of dyslexia. For example, the findings of the study conducted by Ashraf and Majeed (2011) showed that there is the severe scarcity of dyslexia screening facilities in mainstream schools and the class teachers especially teachers of English language are totally unaware of the particular learning needs of these dyslexic students. Moreover, these teachers have been often found labeling these students as slow learners. According to Khaliq, Ramzan and Aslam (2017), the primary reason behind this ignorance is the lack of attention at governmental and institutional level. In the same way Malik, Mufti, and Akhtar (2013)'s study had similar findings which revealed that there was found a significant number of dyslexic students in schools which demands an immediate attention of the concerned authorities. In the same way Naeem, Mahmood, and Saleem (2014) conducted a study and the findings of the study revealed that various factors are the primary reason for this drastic situation prevalent in Pakistan. Likewise, Farukh and Vulchanova (2014) conducted an experimental study to screen students for dyslexia and the findings revealed that RAN and NWR tasks were found authentic for screening dyslexia in Urdu language among mainstream school students at primary level. In the same way, another study was conducted by Jaka (2015) where the findings of the study revealed the complete ignorance of the basic knowledge about screening and dyslexia among Pakistani mainstream school's English language teachers. To combat this drastic situation, Ashraf and Najam (2017) suggested early screening of students for dyslexia among Pakistani mainstream English language teachers as mandatory so that the concerned administrative authorities may develop a close liaison with educational as well as clinical psychologists in order to effectively devise early interventions.

According to Hashmi (2016), CALL offers a lot to choose from the wide range of options so that English language researchers may adopt different pedagogical approaches for the accomplishment of their target task. In order to address the different learning requirements of the Pakistani ESL learners, Pakistani government constituted a CALL subcommittee in 2005 working under the English Language Teaching Reforms Project (ELTR) with the expected outcome for empowering Pakistani in-service English language teachers with the advanced hi-tech abilities (HEC, 2007). A few of these teachers tried to use commercially available computer materials for in their classrooms but failed to achieve the desired results because of the different learning needs (Irshad & Ghani, 2017) of normal students in general and dyslexic students in particular.

To address this issue, a few Pakistani researchers developed computer materials for improving the English language skills of students. For example, Irshad (2008) designed computer materials for improving reading skills of Pakistani students of higher secondary level, and the findings revealed that the developed materials were found efficient in accomplishing the designed task while Anjum (2012) designed computer materials for Pakistani ESL learners of intermediate level for improving their English language comprehension skills and it was found that there was a statistically significant difference in the performance of the students of both groups. In another study, Waheed (2012) developed computer materials for improving the writing skills of Pakistani graduate level ESL learners and the results of the study showed that the developed materials had impacted significantly which was clear from their performance in posttest. In the same way, Hussain (2016) designed computer materials for improving speaking skills of Pakistani higher secondary level students and the findings ensured the success of the materials in achieving the desired goals. Moreover, Tariq and Latif (2015, 2016) developed mobile application for improving writing skills of Pakistani dyslexic students and the results of the study showed that the designed application was successful in achieving the expected outcomes and there was found improvement in the writing skills of Pakistani dyslexic students. Likewise, Tariq and Naz (2017) explored the effectiveness of the Pakistan Early Learning System among dyslexic children and comparable differences were reported in the performance of both groups' students.

Apart from all these studies, there can be seen a clear gap regarding the development of computer materials for improving reading skills of dyslexic students which is still an unexplored area among Pakistani researchers.

Research Question

Are the indigenously developed computer assisted reading materials efficient for improving dyslexic students' reading skills?

Research Methodology

The present study employed quasi-experimental research design, as such research designs have been found popular among social scientists particularly whenever a new approach is to be treated as intervention (White & Sabarwal, 2016). The practical intervention phase of the current study was carried out in computer lab of the mainstream school. For the selection of the sample, screening for dyslexia of all the enrolled students of grade VI of the school was executed by English language teachers through the Learning Disabilities Checklist (Asharf & Najam, 2014) where sample of the study included only those fifteen students whose screening score on the checklist ranged from 70%-100%. Mayer's (2005) Cognitive Theory of Multimedia Learning guided the development of computer assisted reading materials. Three theoretical assumptions serve as the pillars of the said theory. The first assumption deals with dual coding theory (Paivio, 1991) which relies on both channels (visual and auditory) for the processing of information. According to the second assumption, every channel has its limitations for holding and processing items at a single point of time. The third assumption proclaims learning as the process of selection and integration of data. According to Duff and Clarke (2011), dyslexic students have problems with active information processing and the multimodal presentation of the information may be considered accommodating by dyslexic students.

The development of the computer materials was based on the contents of the four chapters of class VI English textbook of Punjab Textbook board. The selection of these four chapters was based purely on the collective opinion of English language teachers who found these chapters difficult among students. The intervention period lasted for six weeks. Microsoft PowerPoint was used for the development of the materials, as it has been found equally accommodating among dyslexic students (MacCullagh, Bosanquet, Badcock, 2017) and enhances the working memory skills of dyslexic students (Naik, 2017). Before administering the formal intervention, all the purposively selected fifteen students appeared in pretest which consisted of a reading passage with five short questions worth five marks. Then, these students had to go through the intervention phase of six weeks in the computer laboratory for learning English language through the developed materials in a day for forty minutes for six days in a week. Now, all the students could learn the textbook content through the multiple modes of presentation. After their six weeks intervention, all the fifteen students took posttest. Pretest and Posttest scores of the students were the main source of data collection for the present study.

Ethical Considerations

Before the start of the study, Informed consent of all the concerned administrative authorities was sought. Parental consent was also sought, as the research students were minor where they were ensured about the confidentiality of the identity of their child and moreover, their child can withdraw anytime from the study without any prior approval and there will be no penalty imposed on the child. They were also assured that the study was purely academic in nature and there would be complete anonymity observed for the collected data.

Data Analysis

The quantitatively collected data of the current study were analyzed using SPSS by applying different statistical tests where 5% probability level was kept as standard. The change in students' performance before and after the treatment period was calculated through paired sample t-test. Descriptive statistics were used to compute average mean value along with standard deviation of students' scores as given below in table 1.

Table 1: Mean and Standard Deviation of Pretest Scores

Mean	SD
3.13	1.30

Table 1 presents the average mean score 3.13 with standard deviation 1.30 of all the fifteen students. Afterwards, these students were exposed to the developed materials for six weeks in the computer lab for forty minutes per lecture per day for six days a week. Once this intervention phase was over, all the students had to appear in the posttest to gauge differences in their scores as presented below in table 2.

Table 2: Mean and Standard Deviation of Posttest Scores

Mean	SD
4.00	0.84

Table 2 shows the average mean score 4.00 with standard deviation 0.84 for all the fifteen students in posttest which shows a clearly and statistically marked difference in the performance of the participants, as the development of computer materials was guided by the suggestions of their English language teachers as well as their learning needs. Moreover, another statistical test, paired sample t-test, was also administered for computing the statistically marked change, if any, in the scores of the students as shown in table 3.

Table 3: Paired sample t test

Mean	SD	95% Confidence Interval of the difference		t	df	Sig. (2-tailed)
		Lower	Upper			
-8.67	0.915	-1.374	-.360	-3.666	14	0.003

The marked change in the students’ mean scores, as shown in table 3, reveals that the indigenously developed materials are efficient in improving the reading skills of the students as revealed in table 3 with $t(14) = -3.666$, $p = .003$, $\alpha = 0.05$. Therefore, it can be said that the Pakistani dyslexic students had multiple modes to learn from: multimodal presentation, English narration of the content in researcher’s voice and the Urdu translation of the same content in researcher’s voice. These modes were there to ensure the efficiency of the developed materials for dyslexic students.

Conclusion

The findings of the pretest score of the students mark the poor performance of the Pakistani ESL dyslexic students which support the findings of the already conducted research studies on dyslexia existence in Pakistan (Ashraf and Majeed, 2011; Malik, Mufti, & Akhtar, 2013; Naeem, Mahmood & Saleem, 2014) and the poor awareness knowledge of dyslexia among Pakistani English language teachers. Their indifferent and hostile attitude towards dyslexic students further aggravates the already drastic situation these students are facing with. The mere presence of computer laboratory in every mainstream high school in Pakistan doesn’t empower Pakistani ESL mainstream teachers for using technology in their regular teaching. Dyslexic students’ six weeks exposure with the developed materials might have been fruitful for enhancing the reading performance of students which can be seen in the posttest scores and these findings also support other research studies conducted in Pakistan (Tariq & Latif, 2016; Tariq & Naz, 2017). The findings of the study revealed an increase in the overall performance of the students only due to their exposure to the developed materials. The results of the present study showed that computer environment is highly beneficial for English language teaching and learning in Pakistan. The findings also revealed that the developed computer materials were found efficient for improving Pakistani ESL dyslexic students’ reading skills and these findings support the findings of the study conducted in Pakistan (Irshad & Ghani, 2017). From these results, it can be deduced that English language can be better taught to Pakistani dyslexic students through computer assisted materials as compared to traditional strategies in practice and these findings support the findings of several research studies (Björn & Leppänenb, 2013; Franceschini et al., 2013; Kochva, 2016).

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