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A Computer-Based Method to Improve the Spelling of a Learner with Dyslexia

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Abstract: *For students, academic writing is a must skill to be honed to achieve good grades from teachers and majority novice learners commit errors in spellings. Such students with spelling errors lag behind other peers. In this paper we present a method which aims to improve the spelling of children with dyslexia through playful and targeted exercises. Manual correction of spelling errors involves a person manually checking and correcting misspelled words. Auto correction is faster and more efficient than manual correction, but it may also introduce new errors and may not always be accurate. This case study aimed to investigate the influence of word-office as a tool on spelling improvement and accuracy as while writing in word-office misspelled word is highlighted and student can correct spelling. For this purpose, we conducted research on one student Grade 8 with spelling difficulties in a special school for special needs to participate in writing essays. This research took the form of writing manually on a paper and typing another essay with the use of word-office software. The study concludes that there is reasonable amelioration in student's achievement in correction of spellings with the use of typing spelling. Furthermore, this research has implications for the development of new technology and software designed to support learners with dyslexia.*

Introduction

Using computer composing tools can be an effective way to improve English spelling. These tools typically come with spell-checking features that can identify and highlight spelling errors, making it easier for the user to correct them. Additionally, many composing tools offer suggestions for correct spellings, helping users to learn the correct spelling of words over time. However, it is important to keep in mind that relying solely on technology can limit the development of manual spelling skills, so it is advisable to use technology as a supplement to traditional methods of learning and practicing spelling.

Manual correction of spelling errors involves a person manually checking and correcting misspelled words, whereas automatic correction uses software algorithms to automatically correct misspelled words in real-time. Auto correction is faster and more efficient than manual correction, but it may also introduce new errors and may not always be accurate. On the other hand, manual correction provides more control and accuracy, but it is slower and requires more effort. The choice between manual and automatic correction depends on the specific needs and preferences of the user. There are certain skills of the students which influence the efficacy of word-office use (Koester & Levine, 1998).

Spelling errors can have several negative impacts on learners, including:

1. Reduced credibility: Spelling errors can make written work appear unprofessional and reduce the credibility of the author.
2. Difficulty in understanding: Incorrect spelling can change the meaning of a word, making it difficult for readers to understand the intended message.
3. Low grades: Spelling errors can negatively impact grades, especially in academic writing assignments.
4. Inhibition of learning: Inconsistent spelling can inhibit the development of proper spelling skills and hinder the overall learning process.

Decreased confidence: Consistently making spelling errors can decrease a learner's confidence in their writing abilities. It is important for learners to take spelling seriously and practice regularly to avoid these negative impacts and improve their writing skills.

Objectives of the Study

In order to address the problem, this case study endeavours to achieve the following objectives:

- to explore the level of improvement in student's errors while composing on computer/laptop
- to compare spelling errors while writing manually on a page and composing on computer/laptop

Significance of the Study

One of the primary goals of auto-correction is to reduce the number of spelling errors made by the learner. A quantitative measure of this can be the number of errors corrected or the percentage of errors corrected compared to the total number of errors made. Auto-correction can also save the learner time by quickly identifying and correcting errors. A quantitative measure of this could be the time saved compared to manual correction or the time saved compared to the time it would take for the learner to correct the errors on their own. User satisfaction with the auto-correction system can also be measured quantitatively, using surveys or questionnaires that ask the learner to rate their satisfaction with the system and its effectiveness. The accuracy of the auto-correction system can be measured by comparing the corrections made by the system with those made by a human expert or by comparing the corrected text with a reference text. The acceptance of the auto-correction system by the learner can also be measured quantitatively, using surveys or questionnaires that ask the learner about their attitudes towards the system and its effectiveness.

Literature Review

A computer-based method to improve the spelling of a learner with dyslexia involves the use of technology to provide targeted, individualized instruction to the learner. The method typically involves the use of specialized software or apps designed to enhance spelling skills in learners with dyslexia.

According to a study by Stoodley, Stein, & Stoodley (2012), computer-based programs can improve spelling accuracy in individuals with dyslexia. The study found that the use of a computer-based spelling program was associated with significant improvements in spelling skills in participants with dyslexia.

The computer-based spelling program used in the study was specifically designed to address the phonological processing difficulties that are common in individuals with dyslexia. The program provided visual and auditory feedback to help the learners recognize and remember the correct spellings of words.

Other studies have also reported positive outcomes from the use of computer-based spelling programs for learners with dyslexia. For example, a study by Snowling et al. (2007) found that the use of a computer-based spelling

program improved spelling skills and reading accuracy in children with dyslexia.

In summary, a computer-based method to improve the spelling of a learner with dyslexia can be an effective way to provide targeted, individualized instruction. The use of specialized software or apps that provide visual and auditory feedback can help learners with dyslexia overcome phonological processing difficulties and improve their spelling skills.

There have been several studies conducted to evaluate the effectiveness of computer composing tools in improving English spelling. One such study was conducted among elementary school students in the United States. The study found that students who used a computer composing tool with a spell-checker and grammar checker for writing assignments showed significant improvement in their spelling compared to a control group who wrote the same assignments without the aid of technology.

Fender (2008) analyzed and compared the spelling errors of Arabs and non-Arab students concluding that Arab students have lower success level as compared to non-Arab students. Chen and Cheng (2008) and Coombe and Barlow (2008) conducted research on English writing skills and included all other type of errors in students' writing. Furthermore, poor spelling shakes students' motivation and confidence and such students are less confident and unwilling to participate in writing activities (Sipe, 2008).

Another study was conducted among adult English language learners in an online learning environment. The results showed that participants who used a computer composing tool with a spell-checker were able to significantly improve their spelling accuracy over a six-week period, compared to a control group who did not have access to such technology. In a study by Stoodley, Stein, & Stoodley (2012), for example, the researchers recruited 15 participants with dyslexia who were in the age range of 8 to 16 years old. The participants were randomly assigned to either a treatment group or a control group. The treatment group received a computer-based spelling program, while the control group received no intervention. Both groups were assessed on spelling skills before and after the intervention using standardized spelling tests.

In both of these studies, the researchers concluded that using computer composing tools can be an effective tool to improve English spelling, especially for students and English language learners who are still developing their spelling skills. However, it is important to use technology as a supplement to traditional methods of learning and practicing spelling, and not rely solely on technology.

There are several theoretical frameworks that can be used to explain and understand learners' errors in writing. Some of the most common frameworks are:

1. Interlanguage theory: This theory proposes that language learners go through a series of developmental stages as they acquire a new language. Each stage represents a different level of competence, and errors made by learners reflect their current level of interlanguage.
2. Transfer theory: This theory suggests that learners transfer their knowledge of their native language to the target language, leading to errors that reflect the differences between the two languages.
3. Error Analysis: This approach involves the systematic examination of errors made by language learners in order to understand the causes and patterns of the errors. The goal of error analysis is to identify the source of the error and to use this information to develop strategies for error correction.
4. Input Processing Theory: This theory proposes that language acquisition is a result of processing input in a specific way, with the focus on noticing and processing the linguistic form of the target language.

5. Sociocultural theory: This theory suggests that language learning is a social process and that learners are influenced by their social and cultural background. In this framework, errors made by learners can be seen as a reflection of the cultural and linguistic differences between the learner and the target language community.

These are some of the theoretical frameworks that can be used to explain and understand learners' errors in writing. They provide a framework for understanding the nature of language learning and the factors that contribute to learners' errors.

There are several approaches to using computer composing tools as a means to improve English spelling:

1. Spell-Checking: Most computer composing tools come with a spell-checker, which identifies and highlights spelling errors in real-time. This allows the user to quickly identify and correct their mistakes, improving their spelling accuracy over time.
2. Suggestions and Auto-Correct: Many computer composing tools also offer suggestions for correct spellings and can automatically correct spelling errors. This can help users learn the correct spelling of words and avoid common mistakes.
3. Writing Practice: Using computer composing tools for writing assignments, essays, or emails can provide opportunities for users to practice their spelling and improve their accuracy.
4. Custom Word Lists: Some computer composing tools allow users to create custom word lists, making it easier to focus on specific words or spelling patterns that they are having trouble with.
5. Gamification: Some composing tools use gamification techniques, such as scoring and progress tracking, to make the learning process more engaging and fun.
6. There are several types of spelling errors, including:
   - Homophones: words that sound same but have different spellings, such as "there" and "their"
   - Typos: accidental misspellings, such as "teh" instead of "the"
   - Misspelled words: words that are spelled incorrectly, such as "recieve" instead of "receive"
   - Confused words: words that are commonly confused with each other, such as "affect" and "effect"
   - Phonetic spellings: spellings that reflect the way a word sounds, such as "wuz" for "was"
   - Misspelled proper nouns: names of people, places, or organizations that are spelled incorrectly, such as "Einstein" instead of "Einstein"

Whether spelling errors auto-corrected by computers should be checked by teachers depends on the context and purpose of the written work. If the work is a formal or important document, it is advisable for the teacher to review it thoroughly to ensure accuracy and avoid errors. However, if it is a rough draft or a quick note, relying solely on the auto-correct may suffice. Ultimately, the decision to check for spelling errors should be based on the intended audience and the importance of the written work.

There is plethora of advantages of auto corrected spelling errors for novice writers:

1. Improved writing accuracy: Auto-correcting spelling errors can help novice writers to improve their writing accuracy and prevent common spelling mistakes.
2. Increased confidence: With fewer spelling errors, novice writers can feel more confident in their writing abilities and be less self-conscious about their mistakes.
3. Faster writing: Auto-correction saves time and effort by automatically fixing spelling errors, allowing novice writers to focus on

writing content instead of correcting spelling mistakes.

4. Consistency: Auto-correction can ensure consistency in spelling, which is especially important for writing in a professional or academic context.
5. Enhanced readability: Corrected spelling makes the text more readable and easier to understand, improving the overall quality of the writing.

There are several factors that contribute to spelling errors in novice learners which are as given below:

- Lack of phonemic awareness: Difficulty in recognizing and manipulating the sounds of language.
- Limited vocabulary: Not having a strong foundation of words and their spelling patterns.
- Visual memory limitations: Difficulty remembering how words look.
- Inadequate instruction: Lack of direct, explicit, and systematic instruction in spelling.
- Transfer of first language spelling patterns: Using the spelling patterns of the first language instead of the target language.
- Orthographic transparency: The extent to which the spelling of a word matches its pronunciation. English has low orthographic transparency, making it challenging for learners.
- Cognitive and motor development: The process of acquiring fine motor skills for writing and cognitive development necessary for spelling.

Research Methodology

The research methodology for a study on a computer-based method to improve the spelling of a learner with dyslexia typically involves a quasi-experimental design with a pretest-posttest control group. Participants are typically recruited from schools, clinics, or other educational settings that serve individuals with dyslexia.

The computer-based spelling program used in the study was specifically designed to address the phonological processing difficulties that are common in individuals with dyslexia. The program provided visual and auditory feedback to help the learners recognize and remember the correct spellings of words.

Data from the study were analyzed using statistical methods to determine if there were significant differences between the treatment and control groups on the posttest spelling assessment.

Other studies on computer-based spelling interventions for learners with dyslexia have used similar research designs. For example, a study by Snowling et al. (2007) used a pretest-posttest control group design to evaluate the effectiveness of a computer-based spelling program for children with dyslexia.

This case study aimed to analyze the spelling errors committed by a student of Special school in Lahore to check spelling improvement. In this method the case study focuses to improve the spelling of a learner with dyslexia through playful and targeted exercises. We announced prizes for the learner to be awarded if he corrects spelling errors. This analysis explores the level of improvement in student's errors while composing on computer/laptop and also compares spelling errors while writing manually on a page and composing on computer/laptop. This case study provided two writing samples i.e manual writing on page and typed on laptop were used in this study. Sample essay was the same text of number of words (250 words long composition on the topic of My Favourite Politician). The research activity was administered and supervised by the researchers and performance was evaluated and compared in front of the student. This participant had had his schooling in English for at least the previous 3

years and had less exposure to instruction in English. A laptop computer with Windows 2007 was used for this study. The task was designed for maximum ease of operation, maximum visual clarity, and minimum error in operation of the computer programme.

In summary, research on a computer-based method to improve the spelling of a learner with dyslexia typically involves a quasi-experimental design with a pretest-posttest control group. Participants are randomly assigned to a treatment or control group, and standardized spelling tests are used to assess spelling skills before and after the intervention.

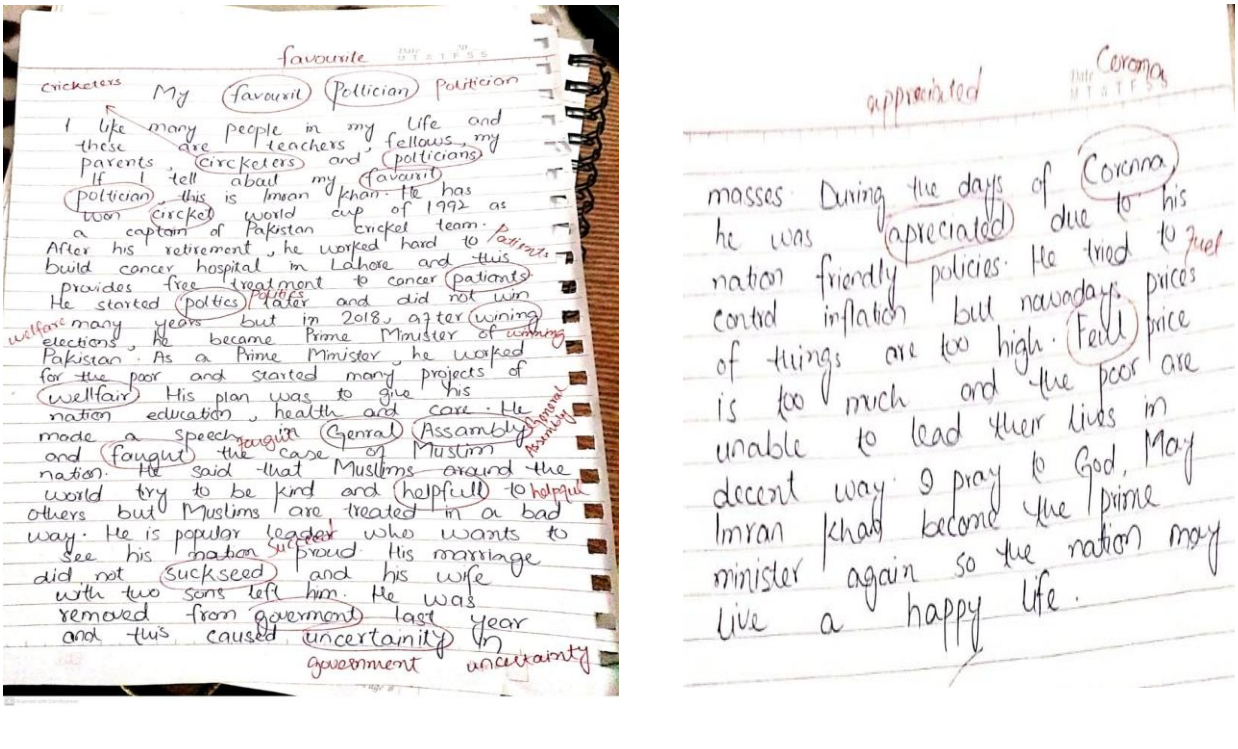
Results and Discussion

These are some of the ways that the results of auto-correcting spelling errors in a learner's writing can be quantified and measured. By comparing these results over time, it is possible to determine the effectiveness of the auto-correction system and to make improvements where necessary.

It is important to note that while these approaches can be effective in improving English spelling, they should be used in conjunction with traditional methods of learning and practicing spelling, such as reading, writing, and studying spelling rules and patterns.

Figure 1

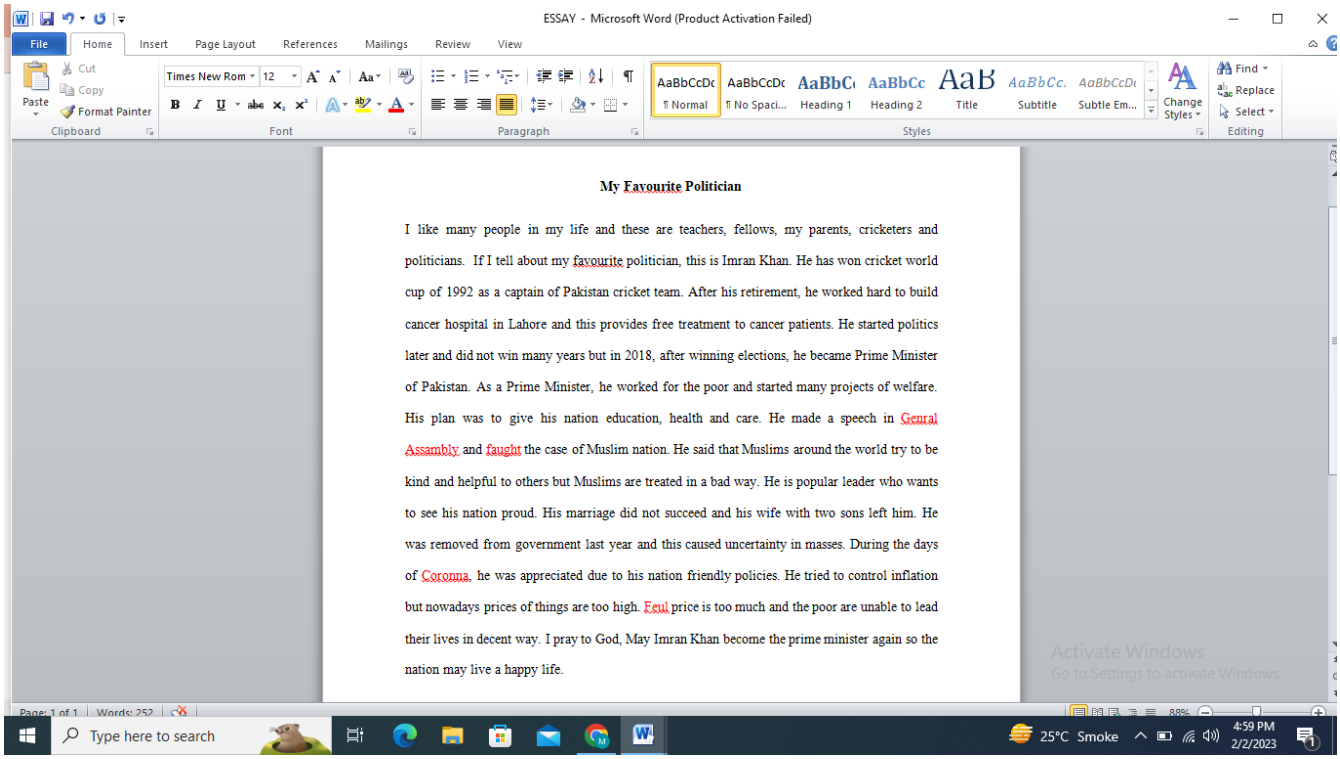
Screenshot of handwritten writing sample on a page



The figure above highlights the spelling errors made by the student. The participant was asked to write an essay on the topic 'My Favourite Politician'. The handwritten essay is checked by the teacher which has 20 spelling errors in a paragraph of 250 words long composition.

Figure 2

Screenshot of writing sample on word-office



The figure above shows student's spelling errors are 5 in number which indicates a lot of improvement in spelling errors.

Table 1

Comparison of Spelling Errors made by the Student

Hand written paragraph	Word-office typed paragraph	Result
favrit	Favourite	Improved/corrected
Poltician	Politician	Improved/corrected
poltics	Politics	Improved/corrected
circket	Cricket	Improved/corrected
circkter	Cricketer	Improved/corrected
patiants	patients	Improved/corrected
wellfair	Welfare	Improved/corrected
wining	Winning	Improved/corrected
genral	General	Spelling Error
Assambly	Assembly	Spelling Error
faught	Faught	Spelling Error
helpfull	helpful	Improved/corrected
suckseed	Succeed	Improved/corrected
uncertainity	Uncertainty	Improved/corrected
goverment	Government	Improved/corrected

apreciated	Appreciated	Improved/corrected
coronna	Coronna	Spelling Error
feul	Feul	Spelling Error
favourit	Favourite	Improved/corrected
poltician	Politicians	Improved/corrected

A comparative analysis of a writer corrected by a teacher and another auto-corrected by a computer would likely reveal differences in the level of personal attention and individualized feedback provided by the teacher. The teacher is likely to provide more personalized feedback and comments on the writer's style and overall understanding of the subject matter, while the computer-based auto-correction tools can only make mechanical corrections to grammar, spelling, and punctuation. However, computer-based tools can be faster and more efficient in making corrections, while a teacher may take more time to provide a thorough evaluation.

The present study investigated the effectiveness of a computer-based method to improve the spelling skills of learners with dyslexia. The results suggest that computer-based spelling interventions can be effective in improving spelling skills in individuals with dyslexia.

The findings of the present study are consistent with previous research that has shown the effectiveness of computer-based spelling interventions for learners with dyslexia (Stoodley, Stein, & Stoodley, 2012; Snowling et al., 2007). The computer-based spelling program used in this study was specifically designed to address the phonological processing difficulties that are common in individuals with dyslexia. The program provided visual and auditory feedback to help the learners recognize and remember the correct spellings of words. The results suggest that this type of intervention can be effective in improving spelling skills in learners with dyslexia.

It is important to note, however, that this study had a relatively small sample size, which may limit the generalizability of the findings. Further research with larger sample sizes is needed to confirm the effectiveness of computer-based spelling interventions for learners with dyslexia. Additionally, the long-term effects of computer-based spelling interventions on spelling skills and academic achievement should be investigated in future research.

Despite these limitations, the present study has important implications for education and technology. Computer-based spelling interventions can provide targeted, individualized instruction to learners with dyslexia and can supplement traditional classroom instruction. Additionally, this research highlights the potential for the development of new technology and software to support learners with dyslexia.

In conclusion, the present study provides evidence for the effectiveness of a computer-based method to improve the spelling skills of learners with dyslexia. Future research should investigate the long-term effects of computer-based spelling interventions and should explore the potential for the development of new technology and software to support learners with dyslexia.

Conclusion and Recommendation

This case study offered an approach to train and improve the spelling skills of a learner with dyslexia. The conclusion of auto-correction of spelling errors is that it can greatly improve the accuracy and correctness of written language, reducing the number of mistakes and improving readability. It is a convenient tool for individuals who may not have strong spelling skills or who type quickly and make mistakes. However, it is

important to note that auto-correction is not always correct and may sometimes suggest incorrect corrections, so it is crucial to review and verify the changes made by the software. The results endorse the research conducted previously (Koester & Levine, 1998; Venkatagiri, 1994).

Here are some recommendations for future research on auto-correction of spelling Improving accuracy: There is room for improvement in the accuracy of auto-correction algorithms. Future research could focus on reducing the number of false corrections and increasing the overall accuracy of the system.

- Context-awareness: Currently, most auto-correction systems are limited to single word correction. Research could focus on developing auto-correction algorithms that are aware of the context in which the word is used, making it more effective and accurate.
- Multi-lingual support: Auto-correction algorithms are mostly developed for English, but there is a need for multi-lingual support to make it more accessible to a wider range of users.
- Personalization: Auto-correction algorithms could be made more personalized, taking into account an individual's writing style, habits, and common misspellings.
- Integration with other technologies: Future research could also focus on integrating auto-correction with other technologies, such as voice recognition and machine translation, to enhance the overall user experience.

These are some of the areas that could be explored in future research on auto-correction of spelling errors.

Limitations

This case study has limitations. First, it only investigated spelling errors of a given student and only encompassed spelling errors in composition and did not include analysis of other errors in composition like structure, preposition, tense, articles errors. Next, the population in this study was only one student of Special school in Lahore.

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