THE ROLE OF MULTISENSORY APPROACHES IN FOSTERING STUDENT WELL-BEING IN ENGLISH LANGUAGE TEACHING FOR YOUNG LEARNERS

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Abstract

This library research study investigates the function of multisensory techniques in promoting student well-being in learning English as a foreign language. This study explores the possible effects of incorporating multisensory in designing the learning strategy by considering the interaction between successful language instruction. By reviewing existing literature and empirical evidence, multisensory techniques can benefit from increasing students' well-being who are going through language anxiety in English language learners. The significant instructions of the multisensory approach are to reduce anxiety, encourage participation, foster good learning experiences, and enhance students' well-being. The focus on well-being that often occurs in young learners who receive English as a foreign language is regarding the language anxiety experienced by students that certainly be very complex and hinders the process and development of young learners' English learning where the multisensory approach in this study is believed to solve the problem of language anxiety in the student. Therefore, the approach will positively impact the learning process and the student's well-being because paying attention to the process of learning English for the students' wellbeing is very important and needs to be considered by teachers so that students can improve their English language skills. The results of this study will offer helpful information to curriculum designers, educators, and policymakers by emphasizing the value of using multisensory approach while teaching English to students to improve their well-being. It will also assist teachers in strengthening their English teaching approach, and the following researcher will use the work of the preceding one as a model for their work or that of other researchers.

Keywords: Multisensory, Well-Being, English Young Learners.

Abstrak

Studi penelitian perpustakaan ini menyelidiki fungsi teknik multisensori dalam meningkatkan kesejahteraan siswa dalam belajar bahasa Inggris sebagai bahasa asing. Studi ini mengeksplorasi kemungkinan dampak penggabungan multisensori dalam merancang strategi pembelajaran dengan mempertimbangkan interaksi antara keberhasilan pengajaran bahasa. Dengan meninjau literatur yang ada dan bukti empiris, teknik multisensori dapat memperoleh manfaat dalam meningkatkan kesejahteraan siswa yang mengalami kecemasan bahasa pada pelajar bahasa Inggris. Petunjuk penting dari pendekatan multisensori adalah untuk mengurangi kecemasan, mendorong partisipasi, menumbuhkan pengalaman belajar yang baik, dan meningkatkan kesejahteraan siswa. Fokus well-being yang sering terjadi pada pembelajar muda yang menerima bahasa Inggris sebagai bahasa asing adalah mengenai kecemasan berbahasa yang dialami siswa yang tentunya sangat kompleks dan menghambat proses dan perkembangan

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pembelajaran bahasa Inggris pembelajar muda dimana pendekatan multisensori dalam hal ini Penelitian ini diyakini dapat memecahkan masalah kecemasan berbahasa pada siswa. Oleh karena itu, pendekatan tersebut akan berdampak positif terhadap proses pembelajaran dan kesejahteraan siswa, karena memperhatikan proses pembelajaran bahasa Inggris untuk kesejahteraan siswa sangatlah penting dan perlu diperhatikan oleh guru agar siswa dapat meningkatkan kemampuan bahasa Inggrisnya. keterampilan. Hasil penelitian ini akan memberikan informasi bermanfaat bagi perancang kurikulum, pendidik, dan pembuat kebijakan dengan menekankan nilai penggunaan pendekatan multisensori saat mengajar bahasa Inggris kepada siswa untuk meningkatkan kesejahteraan mereka. Hal ini juga akan membantu guru dalam memperkuat pendekatan pengajaran bahasa Inggris mereka, dan peneliti berikutnya akan menggunakan karya peneliti sebelumnya sebagai model untuk penelitian mereka atau penelitian peneliti lain.

Kata Kunci: Multisensori, Kesejahteraan, Pembelajar Muda Bahasa Inggris.

A. INTRODUCTION

Teaching English to young learners is very important to develop their essential learning early because, at an early age, they will quickly improve their English skills since they are youthful rather than when an adult person starts learning English. Prayatni mentioned several reasons why teaching English to young students is essential, including the potential for linguistic competency to increase with earlier foreign language acquisition. The chance for the learners to pronounce words like a native speaker, improve their academic performance overall, develop superior problem-solving skills, and better appreciate various cultures is significant (Prayatni, 2019). As well as Pinter stated that learning a foreign language has multiple advantages for young students. Early communication should be encouraged because it helps children's communication abilities. Lessons that are enjoyable for learning English encourage interest and passion. In addition, kids can improve their linguistic skills, cognitive abilities, and knowledge of various cultures (Jazuly & Indrayani, 2018).

However, the learning process for the young learner as a non-native speaker can sometimes be challenging due to the negative response during the learning process. English language learners have lower processing speeds, lower short-term motivation, issues with attention sneaking more efficiently, a higher risk of testing stress, a higher probability of anxiety and problems, motivated by a fear of making mistakes and being criticized, stress and burnout among students are made worse by academic pressure, which is inspired by the value of English competence in educational contexts. These challenges can impact their well-being in the English learning process, interfering with the learning process, especially their behavior toward learning English. Svitlana cited that the consequences of language anxiety on students have

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received a great deal of attention in teaching English. Anxiety about learning a foreign language is a universal human feeling triggered by various environmental reasons or by combining other forms of anxiety (fear, stress, threats, risks, unintended psychological causes) in learning English (Svitlana, 2017). Therefore, to avoid negative responses that impact the well-being of students, activities or learning processes must be carried out in a way that positively impacts children's development. According to Zheng, the emotional state of students is thought to be influenced by various factors both inside and outside the classroom, and students' well-being is seen to impact both their learning process and outcomes positively. When students are happy in school, they develop good attitudes toward the learning-teaching cycle and improve their performance. The well-being of students enables them to cope with the negative effects of the environment (Zheng, 2022).

Therefore, it is crucial to investigate innovative methods of instruction that support students' well-being while allowing efficient language as educational systems work to deliver holistic learning experiences, especially for young learners. In providing young learners with an engaging method of language acquisition, teachers should also be prepared for the activity and instruction by considering their age and level of interest. The majority of learning activities for young students involve movement and senses. The teacher requires visuals, pictures, materials, and actual objects. Young learners learn by interacting with the language through the teacher's entertaining and relevant teaching style. Teachers must design various activities, classroom layouts, spaces, tactics, and procedures because children's attention spans are limited (Hartina, 2019). Young learners are crucial to a child's language development because they establish their basic language abilities. English language teaching materials must be created with integrated multisensory learning strategies to maximize young students' learning experience. By helping children better understand and remember linguistic concepts, multisensory learning uses a variety of senses, including the visual, aural, kinesthetic, and tactile. Based on Manja, early childhood education conveys that including multisensory exercises in the curriculum is crucial. Early childhood education teachers believe that the types of activities implemented are essential based on several activity criteria, including art and material activities. These activities stimulate the senses of sight, sound, smell, and movement. (Manja et al., 2022).

In learning the English language, most teachers often only use two senses such as auditory and visual, to improve the students listening, reading, and speaking skills. Hence, multisensory

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is an extraordinary approach because it can use more than one sense to enhance students' learning abilities. According to Al Adzillina and Hasanah, students can acquire language through a variety of senses by using a multisensory teaching approach. Reading information, looking at a text or picture, or reading on the whiteboard requires both sight and hearing (auditory or visual). The remedy, however, is to use more students' senses, especially touching (tactile) and moving (kinesthetic), as students' auditory processing may be weak. Students will benefit from developing kinetic and tactile memories in addition to auditory and visual ones (Al Adzillina & Hasanah, 2021). In addition to the tactics' inherent effectiveness, utilizing a multisensory approach during the learning process can make learning enjoyable for the students. It results from the variety of materials used to develop all the senses through the learning process. Students will not grow bored because they move around and use their senses rather than just learning through chalk and discussion. Since they may study in a secure environment and use their five senses, this will help improve their comprehension and skills (Sarudin et al., 2019).

Li cited that by supporting their students in the learning process, teachers can significantly improve the well-being of their students. It also hypothesized that classroom teachers who control their negative emotions can significantly positively impact students' well-being. It is only possible because these teachers are competent at creating a pleasant learning environment, which is crucial for students' sense of enjoyment and engagement among the participants (Li, 2022). Thus, the multisensory approach benefits students' well-being by boosting emotional control, attention span, and stress management. Using several senses in a fun and exciting learning design to learn a language produces immersive experiences, improves connection, lowers fear, and promotes well-being.

Educators and curriculum designers must adopt multisensory approaches in ELT environments, given the advantages of these approaches on language acquisition and well-being. Teachers can construct inclusive learning environments that support students' cognitive, emotional, and physical growth by including a variety of sensory stimuli and activities that cater to specific learning preferences. It could help better language learning results and advance students' well-being. In conclusion, integrating multisensory approach into English language instruction has excellent potential for enhancing students' well-being. By utilizing all senses, teachers can design exciting and dynamic lessons that target individual learning preferences, improve language learning, and positively affect students' emotional, social, and cognitive

growth. By helping educators who want to incorporate multisensory approaches into their language teaching practices, this article will examine the potential advantages of these approaches and offer helpful advice.

B. LITERATURE REVIEWS

The students are approximately four to six years old and are still building their complex child development. Based on Lolita, gross and fine motor skills, speech, language, socializing, and independent living skills are all essential components of a child's complex body structure and function improvement. (Lolita, et al., 2019). In helping young learners build their development, the learning activity should be based on their developmental needs, which refer to the children's development indicator. According to Bago, the ability to measure childhood development more thoroughly is made possible by using a multidimensional hand. However, they implicitly assume that all the components (such as reading, counting, number recognition, getting along with others, and physical and health abilities) have equal weights in child development when developing the multidimensional child development indicator (Bago et al., 2020). Therefore, the teacher needs to evaluate the student's learning styles by considering their needs in the development stages. Beisly and Lake cited that based on child development theories, educators can recognize and evaluate developmental achievements, comprehend children's socio-emotional capabilities and cognitive levels, and design curriculum and learning activities that are developmentally appropriate. Teachers are assisted in implementing strategies and practices to maximize learning and development by thoroughly understanding the subject, such as young children's age-related traits and behaviors (Beisly & Lake, 2021). In conclusion, teachers who teach young learners need to be able to develop the learning materials by using their creativity to teach children as young learners, by considering and evaluating the child's development into the learning strategies to give creative and active learning to build the students development at an early age in education.

Based on the arguments cited in Oktarina's research, creating appropriate learning materials is referred to as material development. It may be carried out by a teacher, author, or other people. All techniques practitioners use to generate or use language acquisition resources are material development, including material assessment, adaptation, design, manufacture, exploitation, and research (Oktarina et al., 2022). Ramadhani explained that resources for learning, such as teaching tools, play a crucial part in facilitating learning. Teachers can learn

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more quickly and effectively and help students achieve learning goals by employing quality and appropriate teaching resources. Students are expected to change their self-worth through their academic efforts, starting with a deliberate attempt to advance their knowledge and practical abilities. Measurable actions, attitudes, and performances can show these traits. Therefore, the teacher's job is to help students consciously raise quality by planning and carrying out effective learning (Ramadani, 2022). By connecting it with the previous arguments, the teachers need to be able to prepare or design the learning materials based on the student's level, which is not only about the specific subject materials but also the activity to develop the student's basic skills. Therefore, the learning activity suitable for teaching students is the multisensory approach, which is according to the young learners' level and can help the students improve their child development ability based on their senses.

Multisensory is a technique or approach that can be applied while conducting an exercise designed to improve students' memory. The activity will incorporate the students' motor skills and senses of sight, hearing, taste, touch, and smell to help those who have trouble understanding a subject benefit from multisensory instruction. This strategy develops a sensory-based activity to enhance their language learning skills. Multisensory strategies are direct teaching techniques that engage the visual, auditory, tactile-kinesthetic, and sensory systems to teach language in its linguistic layers and articulatory-motor components (Birsh, 2018). The use of multisensory is also to strengthen the memory based on the senses that the students use during the learning process at the same time based on multisensory activity. According to philosophy, the multisensory impact is more receptive to learning, memorization, or focus than the concept of comprehension (O'Callaghan, 2019).

Therefore, according to research, over the past ten years, there has been a growing interest in the neurological processes that underlie the processing of multisensory stimuli and how multisensory input can be used to enhance teaching methods and student learning, which the multisensory processes at an advanced stage and the value of multisensory teaching techniques in the early literacy education of children with typical development (Fattokhevna, 2023). Furthermore, engaging multisensory approaches in response to information may function as the brain's equivalent of sensory compensation when one sensory system experiences problems. Because of this, learning in a "unisensory" environment may be less efficient, less organic, and unable to provide the best possible learning atmosphere. Building a multisensory learning environment necessitates giving students a variety of tasks that motivate them to participate in

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the development of the learning process by fusing the senses (Parra G., 2021). Regarding multisensory learning, Syahputri cited that it has long been used in education to help students remember information using all of their senses (Syahputri, 2019). According to Sarudin, students could develop a strong connection between sensory stimulation and cognition, engage more intensely with the subject matter, and retain information for longer using multisensory learning techniques (Sarudin et al., 2019).

In conclusion, the multisensory approach influences students to strengthen their memories through their senses. The method is very beneficial for young learners because it helps them reduce their difficulty in learning and essential development for early-age students. Multisensory also can be used in developing English materials for children's learning levels, which is very challenging for early-age students to start new language skills. By using this approach, it also helps the students to motivate and enthusiast the students' learning process. However, the teachers need to be extra creative in using multisensory to develop the English learning materials to connect them with the appropriate and related subject according to the children-level lesson plan

C. **RESEARCH METHODS**

This study used a library research methodology to examine the multisensory approach to foster the students' well-being of English language learners. In finding and analyzing the published relevant material, library research comprehensively examines academic records, digital libraries, and other related resources. The collected sources are evaluated for quality and relevancy. The study only includes scholarly articles that provide insights into the multisensory and its implications. The selected article resources criteria are:

- 1. The publications are within the last ten years since 2013.
- 2. The references are taken from the same topic with a different focus area.
- The first keyword to find the resources is "The multisensory in English language 3. teaching."
- The second keyword to find the resources is "Student well-being in education." 4.
- 5. The result and discussion will be the existing research collections as the proof of this library research.
- 6. The research focus area is based on the Education in English language teaching. Based on the references used in this study, the findings and discussion will be linked or

related to the relevant theories based on the existing or previous analysis. The purpose is to clarify the conclusions based on the arguments from the studies, which also discussed the topic of the multisensory in English language teaching to develop the student's English language

D. RESULTS AND DISCUSSION

The findings of this article are based on the result of the existing research as the proof related to the title of this research about the role of multisensory approaches in fostering students' well-being in English language teaching. Thus, according to a study, the effectiveness of multisensory learning is increased for all students. Although 65% of people process visual information better than others, this is not always true. Others must "approve" the experience or act it out to increase their probability of maintaining it. Some persons store information better when it is combined through the auditory canal. The teacher may ensure that all students, not just those gifted with a specific method to process information, benefit from their learning by creating what appeals to all - or primarily - reason. As a result of the study's findings, it was determined that multisensory learning was more successful. All disciplines and multisensory fields have abilities that teachers can employ; these skills can be integrated into the curriculum and impact how students learn in real life. Students can actively participate in the learning process using multisensory learning, which the teacher can implement. The teacher can assist any student with an individual style of learning. Students can experience learning through multisensory means through multisensory learning. However, multisensory learning is not practiced in all schools, an obstacle to its full implementation. (Survaratri et al., 2019).

Another result of a study about the role of multisensory approaches is that adopting a multisensory approach can aid dyslexic students with reading in English. However, doing so is not always acceptable throughout every learning process for such students. Alternating moods or "tantrums" are every day in dyslexic students. As a result, creative and various teaching and learning strategies must be used, and each student's needs, goals, and materials must be considered. This method's benefits include meeting learning objectives, being suitable for children and focused on them, motivating students to learn, boosting their self-confidence, and maximizing their developmental potential. The drawbacks include the cost of supplying extra media and the short implementation period (Puspitaloka et al., 2021).

The next existing research showed that using several senses such as sight, hearing, touch, and movement to engage students is known as multisensory education. Students are more likely

to remember material and show a greater comprehension of it when they are actively engaged in the learning process. Through the observation of particular behaviors, such as active involvement, movement, gestures, and contact with learning materials, the researcher evaluated student engagement. For instance, an effective delivery of the lesson and higher levels of student involvement occurred when the teacher encouraged pupils to move around, make gestures, or work with objects. The researcher came to the conclusion that students were behaviorally and emotionally engaged in their education because of the prevalence of these engagement characteristics. Because it shows that pupils are actively engaged in the learning process rather than merely passively absorbing knowledge, this emotional and behavioral engagement is vital.

Additionally, students' mental investment in learning is referred to as cognitive engagement, which is influenced by their emotional and behavioral involvement. Students are more likely to put out effort, provide accurate answers to questions, finish assignments, and present their work with confidence when they are emotionally and behaviorally engaged. These behaviors demonstrate a deeper level of comprehension and involvement in the learning process, as well as their cognitive engagement with the subject matter (Theresia & Recard, 2021).

The results demonstrate how well multisensory approaches work when teaching English, which benefits all students by accommodating different learning preferences. These methods help dyslexic students read, but because each student's demands are different, they must be carefully considered. Through active participation and interaction with the learning materials, multisensory education increases student engagement and promotes deeper comprehension and cognitive engagement. Overall, these findings highlight how crucial it is to use multisensory approaches in language instruction to promote student well-being and enhance learning outcomes.

E. CONCLUSION

The research emphasizes the importance of using multisensory methods in English language learning to promote students' well-being. Multisensory learning is more effective for all students, as different learning styles are preferred. Teachers can incorporate these methods into the curriculum, fostering inclusivity and a deeper understanding of the subject matter. However, not all schools have fully implemented multisensory teaching methods, suggesting a

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need for wider adoption. The study also highlights the advantages of using a multisensory approach when teaching dyslexic students to read in English. Innovative and varied teaching tactics can help meet learning objectives, be appropriate for students, motivate students, improve self-confidence, and optimize developmental potential. However, disadvantages like higher resource costs and shorter implementation times highlight the need for thorough planning and preparation. In conclusion, the research underscores the significance of using multisensory methods in English language learning to improve students' well-being. These methods accommodate a range of learning preferences and address specific difficulties, including those faced by dyslexic students. The study calls for educators and institutions to overcome implementation barriers to fully benefit from multisensory techniques and improve students' overall well-being.

REFERENCES

- Al Adzillina, N., & Hasanah, H. U. (2021). The Impact of Multisensory Method on Students' Memorizing Vocabulary at Halimah Kindergarten Prenduan Sumenep. *PANYONARA:*Journal of English Education, 3(2), 155–166. https://doi.org/10.19105/panyonara.v3i2.4317
- Bago, J. L., Ouédraogo, M., Akakpo, K., Lompo, M. L., Souratié, W. dite M., & Ouédraogo, E. (2020). Early Childhood Education and Child Development: New Evidence from Ghana. *Children and Youth Services Review*, 108, 104620. https://doi.org/10.1016/j.childyouth.2019.104620
- Beisly, A. H., & Lake, V. E. (2021). Knowledge of child development: Associations among pre-service teachers' level of education and work experience. *Journal of Early Childhood Research*, *19*(2), 195–210. https://doi.org/10.1177/1476718X20942948
- Birsh, J. R. (2018). Multisensory Teaching of Basic Language Skills.
- Fattokhevna, A. N. (2023). International Journal of Education, Social Science & Humanities.

 FARS Publishers International Journal of Education, Social Science & Humanities.

 FARS Publishers, 2, 523–530.
- Hartina, S. (2019). Teachers' Techniques in Teaching English to Young Learners. *Indonesian TESOL Journal*, 1(1), 78–88. https://doi.org/10.24256/itj.v1i1.538
- Jazuly, A., & Indrayani, N. (2018). Guidance of Teaching English to Young Learners (TEYL) for Early Childhood Education Teachers at Ad Dhuha Kindergarten of Jember. *Linguistic*,

Pembelajaran (JPP)

https://journalversa.com/s/index.php/jpp

- Volume 6, Nomor 2 Juni 2024
- English Education and Art (LEEA) Journal, 1(2), 168–179. https://doi.org/10.31539/leea.v1i2.175
- Li, S. (2022). On the Role of Teacher-Student Rapport on English as a Foreign Language Students' Well-Being. *Frontiers in Psychology*, 12(January), 1–5. https://doi.org/10.3389/fpsyg.2021.822013
- Lolita, L., Dewl, Y. L. R., & Murti, B. (2019). Multilevel Analysis on the Contextual Effect of the Integrated Health Post Activity on Development of Children Under Five in Kubu Raya, West Kalimantan. *Journal of Maternal and Child Health*, *4*(4), 222–229. https://doi.org/10.26911/thejmch.2019.04.04.01
- Manja, S. A., Masnan, A. H., & Mustafa, M. C. (2022). *MULTI-SENSORY ACTIVITY IN EARLY CHILDHOOD EDUCATION: TEACHERS 'PERCEPTION ON THE. October*. https://doi.org/10.55573/JOSSR.051602
- O'Callaghan, C. (2019). A Multisensory Philosophy of Perception. In *A Multisensory Philosophy of Perception*. https://doi.org/10.1093/oso/9780198833703.001.0001
- Oktarina, Y., Inderawati, R., & Petrus, I. (2022). Developing Local Culture-Based EFL Reading Materials for the 21st-Century Learning. *Studies in English Language and Education*, 9(3), 1128–1147. https://doi.org/10.24815/siele.v9i3.24660
- Parra G., L. (2021). the Effects of Multisensory Approach in the Development of the Reading Comprehension Skill. 65–73. https://doi.org/10.51508/intcess.202145
- Prayatni, I. (2019). Teaching English For Young Learners. *Jurnal Ilmiah Profesi Pendidikan*, 4(2), 106–110. https://doi.org/10.29303/jipp.v4i2.90
- Puspitaloka, N., Syarif, H., & Ermanto. (2021). Teacher's Perception on How Multisensory Approach in Teaching Reading for EYL with Dyslexia. *Proceedings of the Ninth International Conference on Language and Arts (ICLA 2020)*, 539(Icla 2020), 179–183. https://doi.org/10.2991/assehr.k.210325.033
- Ramadani, F. (2022). Developing English language material for high school level using pictures media to improve students speaking skills. *Peel (Paser English Education and Linguistic)*, *I*(1), 41–46. https://doi.org/10.56489/peel.v1i1.80
- Sarudin, N. A. A., Hashim, H., & Yunus, M. M. (2019). Multi-Sensory Approach: How It Helps in Improving Words Recognition? *Creative Education*, 10(12), 3186–3194. https://doi.org/10.4236/ce.2019.1012242
- Survaratri, R. D., Prayitno, E. H., & Wuryani, W. (2019). The Implementation of Multi-sensory

Pembelajaran (JPP)

https://journalversa.com/s/index.php/jpp

Volume 6, Nomor 2 Juni 2024

- Learning at Elementary Schools in Jakarta. *JPUD Jurnal Pendidikan Usia Dini*, 13(1), 100–113. https://doi.org/10.21009/10.21009/jpud.131.08
- Svitlana, T. (2017). Overcoming Language Anxiety Among the English Language Learners: Psycho-Pedagogical Aspect. *Science and Education*, 23(7), 102–106. https://doi.org/10.24195/2414-4665-2017-7-16
- Syahputri, D. (2019). The Effect of Multisensory Teaching Method on The Students' Reading Achievement. *Budapest International Research and Critics in Linguistics and Education* (*BirLE*) *Journal*, 2(1), 124–131. https://doi.org/10.33258/birle.v2i1.192
- Theresia, N., & Recard, M. (2021). Applying Multisensory Approach To Promote Engagement in Primary English Home-Based Learning. *ELTR Journal*, *5*(2), 105–119. https://doi.org/10.37147/eltr.v5i2.118
- Zheng, F. (2022). Fostering Students' Well-Being: The Mediating Role of Teacher Interpersonal Behavior and Student-Teacher Relationships. *Frontiers in Psychology*, 12(January). https://doi.org/10.3389/fpsyg.2021.796728