



Using Ergonomics Based Instruction in Teaching English Language Integrated Skills

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Abstract

Ergonomics is a multidisciplinary scientific discipline that studies man-artifact interaction. Ergonomics-tailored teaching and learning materials and activities require to consider jointly the needs of the users (i.e. teachers and students) and the resources within the learning environment. The fundamental question confronting educational ergonomics is how to incorporate ergonomics into interventions targeting designing features in the learning environment to improve the learning performance of EFL students, particularly English language integrated skills. This paper, therefore, sets out to show how ergonomics features that consider users' factors and reduce discomfort can be utilized in teaching the English language. It addresses the following points: the definition of ergonomics based-instruction, the importance of using ergonomics in EFL education, and how teachers can incorporate ergonomics in teaching the English language integrated skills. Finally, the researchers provide conclusions and pedagogical implications as well as suggestions for future research agenda regarding adopting an ergonomics perspective in EFL education and fostering ergonomics literacy.

Keywords: Ergonomics-based instruction, educational ergonomics, English language integrated skills, optimizing the learning environment

Introduction

Utilizing innovative approaches to design and manage inductive learning environments that effectively satisfy the needs of 21st-century learners is an increasingly important theme of educational research. The methodological shift from instructivism to constructivism alters the work of teachers from information transmission to the design and management of student-centered learning tasks and learning environments within which learners can learn safely through exploration and manipulating the objects in the environment as well as take a significant level of responsibility for regulating their learning behaviors and products. Ergonomics is one of these innovative approaches that focus on the optimum design and usability of physical things within the learning environment. The focus of contemporary pedagogy is on pedagogical ergonomics, which tries to thoroughly examine and design educational activities within all aspects of the educational system, including those of the instructor, the student, and the learning environment, to guarantee their efficacy and optimality.

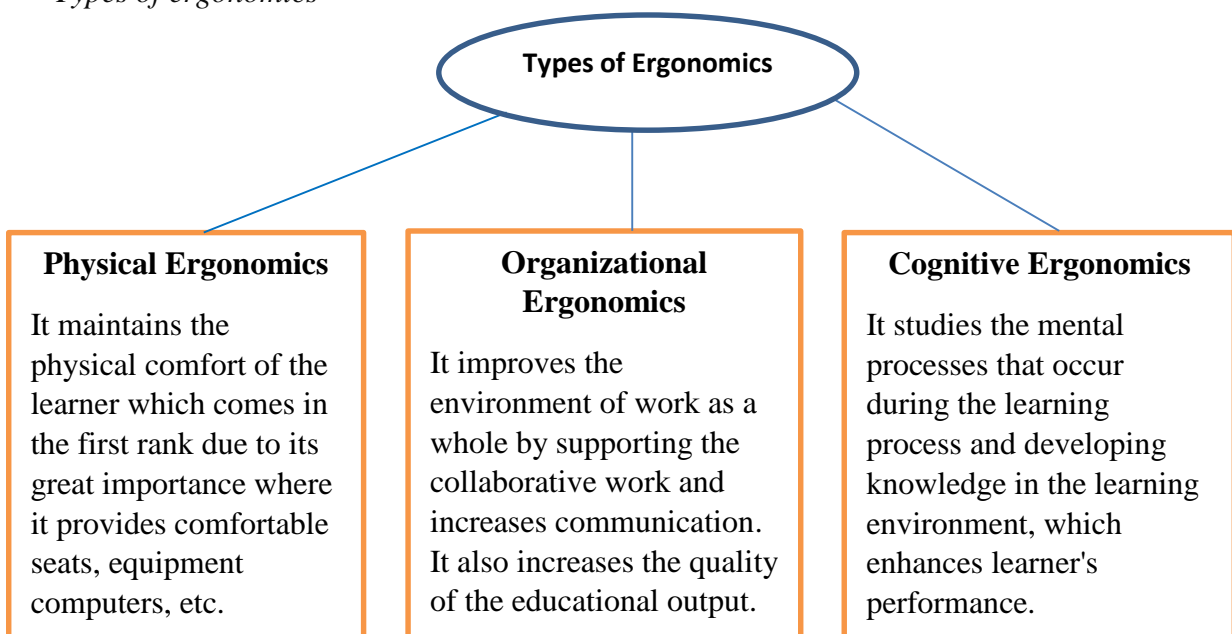
Wilson (2000) defines ergonomics as the scientific study of the interactions between human factors and other elements of a system, to enhance human welfare and the productivity of a system as a whole. Raby et al. (2003) assert that ergonomics stems from the Greek ‘ergon’ meaning work, and ‘nomos’ meaning rules. This discipline studies human/machine interactions in different environments including the educational world. Faheem (2021) adds that ergonomics refers to the science of improving product design to optimize human convenience and comfort. It is the study of how to arrange equipment and furniture so that people can work or perform other activities more efficiently and comfortably considering the relationship between workers and their environment. The International Ergonomics Association (IEA, 2003; cited in Karwowski, & Zhang, 2021, p. 3) defines ergonomics as follows:

The scientific discipline which is concerned with understanding the interactions among humans and other elements of a system and the profession that applies theory, principles, data, and methods to design to optimize human well-being and overall system performance.

Guerrettaz (2021) mentions that ergonomics is an interdisciplinary field that seeks to understand purposeful human activity, including fields such as industry and office workplaces, medicine, energy systems, aviation, and sports. Ergonomics is centrally concerned with patterns of human-object relationships that are best understood overall in relation to sociocultural contexts. Karwowski and Zhang (2021) state that the ergonomics discipline emphasizes a human-centered, holistic approach to system design that takes into account the organizational, developmental, ecological, and environmental aspects of human well-being as well as the physical, cognitive, and neurological aspects. In this perspective, Christy and Duraisamy (2020) refer to three main types of ergonomics: physical, cognitive, and organizational (figure 1).

Figure 1

Types of ergonomics



1. *Physical ergonomics (PS)*: It is the most important type, where physical comfort comes first in terms of importance to the students. The tools used include comfortable seats, computer equipment, etc.)
2. *Organizational ergonomics (OE)*: It examines ways to improve the entire work environment. It includes finding ways to enhance teamwork, advanced communications, and increase the quality of work production.
3. *Cognitive ergonomics (CE)*: It focuses on cognitive procedures in the design of environment and technology. It is a scientific discipline that studies, evaluates, and designs outputs, tasks and environments, and systems and how individuals interact with their cognitive abilities. It is mental processes that include cognition, memory, rational thinking, motor response, and interrelationships among students in a learning environment. It includes related tasks, decision-making, and performance-based skills, interaction between humans and the work system, reliability on humans, and stress at work and training.

Ergonomics, Žunjić et al (2015) mention, highly contribute to the quality of education through three streams including preserving students' health, creating a comfortable working environment, and adjusting instruction according to students' abilities. Dul and Ceylan (2011) clarify that the field of ergonomics deals primarily with the working environment, improving health and safety, and sometimes productivity and quality. Designing a work environment that enhances creativity and the ability to innovate in products and processes. The degree to which individuals generate new and useful ideas depends on the support they receive from their work environment. The goal of ergonomics is to optimize human well-being and overall system performance." A creative learning environment can promote students' and teachers' well-being.

Therefore, there should be facilities that provide interventions that make the work environment more conducive to members' creativity.

What is obvious in the aforementioned introduction is that ergonomics is a new instructional approach in English language education, particularly in Egypt. This research attempts to make contributions at both theoretical and practice levels; as pedagogical ergonomics is illustrated in relation to multiple specializations of human knowledge and insights for utilizing ergonomics in English language instruction are provided. Thus, this research calls for more use and development opportunities of ergonomics to provide an enhanced learning environment with rich tasks for EFL learners. Additionally, this research aims to raise awareness of the importance of ergonomics in the field of English language education and encourages EFL teachers to implement it. The focus of this research lies in exploring how PE, CE, and OE can be effective in teaching English four skills. Moreover, the three types of ergonomics are integrated and lead to more productivity in using English language skills. Accordingly, this research explores one main question: *How could ergonomics be incorporated into teaching ELIS?* Underlying such a question are the more basic ones that inform the research:

1. What is pedagogical ergonomics?
2. What are ELIS that EFL students need to learn?
3. How can Ergonomics be incorporated into teaching ELIS?

Therefore, the current research sheds the light on the significant role of using ergonomics in teaching English language integrated skills (ELIS). Following is a review of what pedagogical ergonomics refers to, rationales for incorporating it into EFL instruction, and implications for utilizing ergonomics in developing English language integrated skills are provided.

Pedagogical ergonomics

Although the application of ergonomics in education has gotten relatively little attention, it is one area where it can have a substantial impact. Educational ergonomics, as Kao (1976) conceptualizes it, is an interdisciplinary branch of ergonomics that targets educational effectiveness focusing on the interaction of educational performance and educational design. Tang (2020) adds that educational ergonomics is part of a learning environment that depends on the interaction of learning performance and learning design. Educational ergonomics is an alternative to traditional educational studies as it provides a comprehensive approach to design factors at different levels such as classroom, policy, and program levels that help to enhance the effectiveness of education in various local and regional institutions.

Pedagogical ergonomics, as Kuts and Lavrentieva (2022) note, is a new direction of modern pedagogy that aims to comprehensively analyze and design the pedagogical activities of teachers and students in the system and consider the relationship of the human factor with the elements of the learning environment to assure its effectiveness and optimality. Furthermore, pedagogical ergonomics focuses on designing appropriate alternatives for particular activities related to using new technology; formulating requirements for technical teaching aids, and considering the level of readiness of teachers and students to use instrumental pedagogical technologies.

Many educators and researchers linked educational ergonomics to constructivism. Soltaninejad et al. (2021) argue that ergonomics is highly connected to the constructivism theory where learning occurs through the interaction of the student with the other students, the teacher, the educational materials, and the learning environment in order to construct new knowledge or

solve a problem. Bures (2014) points out that the learning environment in which the student spends long hours must be a safe, attractive, healthy, and enriched place to pave the way for better learning. In the constructivist approach, Anagün (2018) adds, learning occurs when students explore and interpret their surroundings and one of the teachers' main challenges is to create an effective learning environment that encourages students to participate actively in learning activities.

Aljohani (2017) mentions that constructivism entails some important principles which help teachers design supportive learning environments that consider learners' different backgrounds, knowledge, experiences, and interests to help learners make connections, construct knowledge and solve problems. The social constructivist theory entails one of the important principles which is the meaningful participation in the social life of a group and the meaningful use of language as an interpersonal, intersubjective, and collaborative process of creating shared meaning.

Ergonomics is one of the instructional approaches that can help in solving many problems students face and can increase their productivity. In educational systems, Smith (2007) argues, student learning success is significantly correlated with some design factors including task design, design of the teaching process, design of educational materials, environmental design of the classroom, design of educational technology, educational system design, and community quality. Kao (1976) categorizes Educational Ergonomics into five categories as follows:

1. *Learning ergonomics* examines educational skills of handwriting, reading, drawing, using tools, managing educational activities, and the assessment system.
2. *Instructional ergonomics* includes designing books, teaching aids, teaching methods, and lesson preparation.

3. *Ergonomics of educational facilities* involves educational furniture, laboratories, library, classroom, and office design.
4. *Ergonomics of educational equipment* provides educational equipment with quality assurance of performance, fixtures, and safety.
5. *Ergonomics of educational environment* which is concerned with lighting, space, colors, and placement of devices.

Uche and Okata (2015) and García-Tudela et al. (2020) agree that ergonomics is the approach that provides the adaptation of the physical or the virtual environment to the individual characteristics of its users. Ergonomics does not provide only flexibility and personalization of learning or working environment but also students' well-being and security. If the physical teaching and learning environment lacks the main determinants that help in achieving the success of the teaching and learning process, the desired educational goals will not be achieved. So, there are several considerations to have an appropriate learning environment that must be focused on educational and teaching facilities, the availability of comfortable facilities and buildings, the regularity of their maintenance services, and the suitability of equipment for users. Additionally, Pitehnoee et al. (2020) clarify the importance of physical ergonomics highlighting how the behaviors or development of learners are influenced by the features of the learning environment including ambient aspects (e.g. temperature, air quality, and lighting), physical aspects (e.g. visibility, furniture, and layout), and technical aspects (e.g. personal computers, internet access, audio, and video equipment).

Ansari et al. (2018) state that effective learning and teaching can be achieved in a safe, stress-free space in classrooms. The physical environment of educational facilities can help teaching, learning, and academic performance, while inadequate facilities can cause stress and

agitated behaviors in students. Physical environments of classrooms have a vital role in student's satisfaction, and a higher level of satisfaction can increase the level of skills, mentality, and knowledge of students. Educational furniture is used in classrooms of many colleges, institutes, and universities, and students spend a major part of their time sitting on this furniture in classrooms. Many health problems can happen because of improper chair designs and that affects student's academic performance.

Kurata et al. (2015) indicate that the application of cognitive ergonomics contains enhancement in human information processing to reduce accidents and errors and thus develop quality and output. According to Caas (2008), cognitive ergonomists perform a cognitive analysis of interaction to speed up the completion of interaction tasks, cut down on human errors, accelerate learning, and raise user satisfaction with a system. Cognitive ergonomists examine how human work is represented and how it is processed cognitively. The phrases cognition and ergonomics are used to investigate the cognitive aspects of the interaction between people, the work system, and the artifacts that are found in it to effectively design them. When explaining the interactions with objects, cognitive processes like perception, learning, and problem-solving must be taken into account.

According to Tolan (2016), cognitive ergonomics provides a chance to rethink how we approach education. Cognitive Ergonomics evaluates the nature of the content and introduces it to the brain so that it is prepared to receive it, as opposed to starting by choosing the content and scheduling it for delivery. Much like different portions of the body, different areas of the brain perform some activities better than others. Learning is a process that results from exposure. The brain is constantly aware of its environment, albeit to varying degrees of consciousness. By

preparing alternative forms of representation, lowering content complexity, and measuring a material's cognitive complexity, it is crucial to give pupils the freedom to choose their formation.

Due to the importance of using ergonomics in different fields of life, some studies have been conducted to explore its efficiency in the field of education. Tang (2020) investigated the effectiveness of using ergonomics to raise the professional development of 36 master students who worked as translation trainees before graduating from two main universities in China. Results proved the importance of using educational ergonomics in professional development programs for teaching translation in the Chinese language. Additionally, Ehrensberger-Dow et al. (2016) surveyed the aspects of ergonomics as defined by the Association of International Ergonomics and how the three types of ergonomics in professional workplaces relate to translation practices and processes. It was found that CE is concerned with the planning, structuring, and management of user interactions that take place in tandem with organic cognitive functions which resulted in improved performance. Researchers affirm that using language technology tools and resources has become a significant component of professional translation efforts.

Andrade and Cumbajin (2013) conducted a macro project called "Implementing an Interactive English Lab" conducted by 7th Cycle English Career Students at Cotopaxi University of Technology to help students develop and improve their English skills by incorporating new study habits. The main function of the English Lab is to facilitate student interaction and improve communication between teachers and students through the appropriate use of physical and sensory elements such as lighting, colors, sounds, space, and furniture. Ergonomics and furnishings ensure the safety and comfort students need to succeed in their studies. English Interactive Labs has been developed with quality standards to maintain the physical and mental health of students and teachers while continuing the teaching and learning process with minimal stress and maximum

effectiveness. Results revealed that ergonomics promoted the mental, physical and social well-being of students and teachers and considered the emotional state in transmitting and receiving knowledge.

English Language Integrated Skills (ELIS)

English teachers should be aware of the four 'macro' skills in language teaching as they are the core elements of communication. Two of these skills, listening and reading, are called receptive skills, while the other two, writing and speaking, are called productive skills. Heng (2014), Mutsotso and Nabukonde (2019), and Pardede (2020) agree that integrated skills are the teaching approach that integrates the four language skills (listening, speaking, reading, and writing) to enhance students' ability to use English to be able to have social, educational and professional opportunities. This approach does not follow the traditional segregated language skills as authentic daily communication needs people to integrate the four language skills. This approach gives the learners the chance to communicate with each other naturally and use all language skills together.

Klimova (2014) and Billoon (2018) add that ELIS confirms the importance of natural, everyday experience, oral and written languages as authentic communication would not be achieved without the integration of the four EFL skills. EFL learners need to practice the language authentically to speak fluently and write accurately and fluently. The integrated teaching of skills gives the learners the chance to become competent users of language as a whole by getting involved in collaborative work.

Pardede (2019) clarifies that the teaching and learning process of ELIS, tasks, and activities should be a sequence in a logical progression. The most common and convenient way to make the

sequence of integrated skills in the topic or task in the lesson unit(s) is using the pattern that the practice of receptive skills of listening and reading leads to the practice of the productive ones of speaking and writing. This integration can be achieved when the learners are exposed to reading and listening to interesting authentic texts, videos, music, and magazines. Then, they are asked to reuse some of its content in practising productive skills.

However, Akmal et al. (2020) indicate that teachers can face challenges in teaching ELIS in the classroom. For example, the lack of students' vocabulary, school environment facilities, and teachers' problems in designing the activities and materials. So, the teachers follow some strategies to get rid of such challenges (e.g, enriching vocabulary through flashcards, grouping students randomly, preparing their own material and equipment, motivating them by giving interesting short movies and games, and expanding their knowledge about ELIS.

Hinkel (2018) mentions some fundamental factors need to be considered in ELIS. First, it is important to acknowledge learners' needs and goals, then to decide what skills are suitable for integration. Second, there should be a focus on recognizing effective teaching and learning strategies and techniques that help learners to achieve their learning outcomes: this can be achieved by providing the opportunity for productive practice. Teaching EFL speaking skills that are integrated with other skills can boost learning in different means, for example by helping language learners increase their vocabulary and grammar background and by developing their pronunciation.

Burns and Siegel (2018), Pardede (2019), and Akmal et al. (2020) confirm the importance of using natural and authentic materials in teaching and learning ELIS. Authentic communication cannot be achieved without the integration of the four EFL skills. Integrated Skills focuses on the

four main English skills through a “Communicative Language Teaching” methodology. The patterns of new grammar are gained in the context of a conversation or a real-life situation. Students can take part in many activities to practice English including listening tasks, role-playing, and debates. In addition, collaborative work can improve student’s ELIS through practising authentic communication in groups. Henríquez and Esteban (2021) conducted a study to investigate the role of gamification in enhancing ELIS. Using motives to enhance intrinsic motivation increased students’ production. This was achieved through using gamified methods and Keeping aspects of fun and playing games present in the background of academic learning. It will be useful to use a variety of materials, as it could be applied with traditional materials where using technology is not a priority in this approach.

Some different motives and factors affect learning and teaching the English language integrated skills. Learners need to be involved physically, mentally, and emotionally in learning. There are several other factors such as anxiety that could affect learning processes and outcomes. In this regard, it is important to consider learners’ attitudes and how they feel when dealing with learning ELIS. Therefore, teaching methods and strategies should be designed in such a way as to consider learners’ experiences and backgrounds and enhance their motivation and interest to acquire ELIS. The more comfortable learners feel, the more fluent they become with the use of communicative teaching techniques. So, ergonomics is effective to be applied in teaching ELIS as it is applied in different fields and has approved its effectiveness. So, there should be many studies and research that focus on the merits of using ergonomics in teaching English as a foreign and a second language.

Ergonomics and EFL Teaching

Implementing ergonomics concepts and principles practices has been effective in raising productivity and performance in a variety of fields. However, more research is needed, especially in the area of EFL teaching, to fully understand the benefits ergonomics intervention may have for improving student learning. Ergonomics as an instructional approach can be used in EFL teaching and learning as it is highly connected to the principles of constructivism where peer interaction, learner ownership, and authentic learning experiences are critical for learning. Current trends in EFL education advocate a social constructivist pedagogy that prioritizes learner participation in collaborative activities over individual perceptions of language learning. Learners are expected to develop EFL skills through social interaction. Ergonomics provides a learning environment that is closely related to constructivism due to the collaborative and interactive nature of learning.

Raby et al. (2003) highlight that ergonomics as a discipline seeks to pinpoint how the sociological, cultural, physiological, psychological, or organizational factors influence the way students interact with one another, and organize their work and the whole language learning process. Moreover, ergonomics studies physical and verbal behaviors and mental activity as well as the actual performances or productions of the learners to improve specific learning situations. From the perspective of pedagogical ergonomics, as Kuts and Lavrentieva (2022) point out, it is important to ensure that educational technologies consider the motives, temperament, and engagement of students; allow students with special needs to study; activate students' perception of information; and increase their emotional tone.

Kuts and Lavrentieva (2022) highlight the significance of using educational technology based on pedagogical ergonomics as follows: (1) provides the optimal way to design learning

activities, (2) improves the quality of instruction through proper distribution of time, transfers routine functions to instrumental technologies prevents fatigue by setting a specific pace, (3) ensures convenience, reliability and safe use of equipment in the EFL learning and teaching process, (4) reduces the intensity of educational work, (5) prevents overload on the language apparatus and foreign language teachers, and (6) allows intensification of foreign language learning due to the maximum load of the language and auditory channels of learners, activation of their mental and speech activity. Similarly, Mohamed (2018) assures that using online materials and English websites is the preferred way to learn English better as it becomes easier for students to communicate directly with native English speakers.

Ergonomics recently gained attention as an effective educational approach, however, there is a dearth of studies that have examined its efficiency in language education. Laborda et al. (2010) explored EFL university students' opinions about incorporating ergonomics features in an internet-based oral and written English as a foreign language test platform called PLEVALEX. Results revealed that this modified language test interfaces become simplified and better test students' EFL skills than other e-learning platforms and websites that focus on assessing student's technological skills more than language skills.

Elghotmy and Ghoniem (2019) found that ergonomics-based instruction proved its effectiveness in improving English majors' English language creative writing skills. Results indicated that providing a safe and stimulating environment enriched with websites, videos, and PowerPoint presentations reduced the students' fears in practicing the language and increased their sense of enjoyment. The results of the study concluded that the students became more independent while writing, providing feedback to peers, and improving the quality of their writing.

Further evidence can be found at the study of IshrathJahan and Jaichithra (2020) who examined the impact of integrating ergonomics in a physical facility to increase the English vocabularies related to ergonomics of classroom. The findings indicated that effective utilization of school physical facilities play enhanced students' academic performance and enriched their vocabulary.

Faheem's study (2021) reflected the importance of ergonomics in using an interactive English language laboratory containing suitable teaching resources and materials, in the English language learning process. The study suggested using ergonomics, more suitable devices, technologies, and furniture to reinforce the mental, physical and social welfare of the teachers and students to help them with muscle disorders, mental stress, and obsession. It recommended providing new technological equipment and creating a culture of ergonomics to generate a feeling of well-being inside productive classes and workplaces.

In the same vein, Li et al. (2021) clarify that teachers play an important role in fostering a safe and supportive learning environment that considers the academic and emotional needs of the students. When providing instruction, teachers should be aware of the cognitive capacities, emotional dynamics, and views of their pupils; make efforts to build cordial relationships with students; acknowledge the diverse perspectives of the students; and refrain from harsh judgments. Mehring (2016) assures the importance of collaborative learning activities that deepen and improve language use with prompt and useful feedback from the teacher. According to Qutob (2018), the teacher creates and facilitates the physical and social aspects of the classroom environment using a variety of group projects and peer tutoring to increase student interaction in the classroom and engage them in conversation and practising ELIS.

Peng (2016) focuses on the opportunities and limitations students perceive in the EFL classroom environment. Rudolf and Griffiths (2009) point out that implementing ergonomics principles in the school learning environment addresses diverse issues (e.g. physical factors such as equipment and work area; teaching factors such as instructional material, technologies, and curriculum; environmental factors such as temperature and lighting; and temporal factors such as schedule and length of the school day and breaks). Accordingly, improving the educational environment, the suitability of textbooks, and the suitability of teaching methods must be considered as priorities.

To sum up, EFL teachers should be aware that developing the learning environment effectively and powerfully can improve their teaching and enhance students' learning of English. Therefore, EFL teachers should be more sensitive in their English classrooms, knowing that their knowledge of the new EFL strategies skills can have a positive influence on reducing students' anxiety in acquiring ELIS, and result in effective learning outcomes.

Conclusion and Recommendations

This research aims to give a theoretical overview of incorporating ergonomics in education and provide insights into how PE, OE, and CE can be effectively utilized in teaching EFL integrated skills. The following points emerged from the present research: (1) students need to practice the authenticity of the language collaboratively in a more comfortable, safe, and conducive learning environment; (2) teachers need to adopt an ergonomist view in developing learning activities and tasks as well as in preparing learning environments; and (3) ergonomics encourages teachers to utilize the emerging technologies of the Internet-of-Things (IoT), Industry 4.0, virtual and augmented reality, machine learning, and artificial intelligence (AI) effectively. Therefore, in

order to provide better ergonomics-based instruction for EFL learners, classrooms should be equipped properly with features of physical, organizational, and cognitive ergonomics.

Considering the features of educational ergonomics in designing a productive EFL learning environment, some recommendations can be provided as follows:

For EFL learners:

Teachers can prepare a suitable learning environment using the physical, cognitive, and organizational types of ergonomics to teach the EFL integrated skills. This can be achieved by forming tasks and activities as follows:

1. Displaying video content, and activating closed captioning helps all readers, including EFL students, understand what's being said.
2. Students have a voice-to-text option in Google Docs (under the Tools menu) that can help learners who have some oral language proficiency but struggle with spelling and writing. Students can even transcribe a text into Google Translate by clicking the arrow next to the language, and if necessary, they can transcribe it into their own language.
3. Drawings, handouts, and even words on desks can all be considered visuals. Whether the teacher is instructing children or adults, visuals can make it easier for learners to understand and relate to actual objects, which facilitates their quicker acquisition of unfamiliar words. Every great teacher is aware that using a pictorial wall can greatly aid in helping students' vocabulary growth. Additionally, the teacher can allow his/her students to watch English-language movies. If possible, consider subtitling the films to encourage active participation in the activity.

4. The students may become more engaged and have a broader understanding of the subject if the teacher considers their interests in designing learning materials, activities, and tasks. When students are enthusiastic and interested in the material, they find it simpler to relate to the new language, which makes crossing the language barrier simpler.
5. In multilingual classrooms, tools like Google Translate are becoming more common. Using technology and digital tools is no longer just an option—it's practically required. There are many ways to use technology when teaching languages, such as using video clips, language apps, and music in the classroom. But the teacher should keep in mind that not all English language learners will have access to a smartphone or tablet, so he/she should make sure the technology he/she intends to use in his/her lessons is usable by everyone in the classroom.
6. Interactive lessons are a fantastic way for English teachers to increase their students' confidence levels and language proficiency. Students practice their new vocabulary and improve their ELIS through group projects and interactive activities. Additionally, because it's a social activity, it can encourage reluctant students to open up in the classroom environment.

For EFL teachers:

An important factor of the efficiency of pedagogical technologies in teaching foreign languages, along with the level of foreign language communicative competence, is the ergonomics literacy that prepares individuals to perform their roles effectively in the workplace. In this vein, Karwowski and Zhang (2021) state that the design of interactions with technological artifacts and work systems requires the involvement of ergonomically competent people who can make

informed choices, make use of beneficial affordances of the artifacts and environment, and design the effective interactions between the artifact systems and humans in the context of the specific environment. However, some educators, as Smith (2007) argues, are almost unknowledgeable of the contributions that ergonomics make to improving the design of educational environments, processes, and systems, and to promoting student learning. Accordingly, there is a critical need to develop and deliver professional training courses workshops, and training programs in pedagogical ergonomics to bridge gaps between research, education, and practice; and promote professionalism in ergonomics through fostering teachers' awareness of the principles and implementation of ergonomics and strengthening the application of this discipline.

For administrators:

As ergonomics is important for safety, health, productivity, and performance, educational institutions, as Rudolf and Griffiths (2009) recommend, need to make changes and create long-term plans to enhance their available resources and services which influence student comfort and productivity and can offset the cost of renovating school furniture.

Suggestions for further research

It is a fact that no research is complete in its own right. Therefore, this research suggests several possibilities for future studies of EFL integrated skills and ergonomics-based instruction as follows:

- Examining the effect of ergonomics-based instruction on developing students' English language skills at different academic levels and different contexts.
- Investigating the effect of ergonomics based-instruction on EFL students' motivational aspects such as engagement and anxiety.

- Examining the effect of ergonomics-based instruction on enhancing non-academic skills.
- Exploring designing EFL textbooks and materials using an ergonomics-based approach and examining the comprehensibility and user-friendliness of these educational materials.
- Developing and conducting professional development programs to train English language teachers on utilizing ergonomics in English language instruction and investigate their perceptions of integrating ergonomics in English language education.
- Investigating the effect of utilizing ergonomics in developing interventions for students with foreign language learning difficulties and comparing its impact on students with different abilities.

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