



Research article

The effects of multiple intelligence based reading tasks on EFL students reading skills achievements: *The case of university students in Ethiopia*

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ABSTRACT

The main purpose of the study was to investigate the effectiveness of multiple intelligence-based tasks (MI BT) in improving university students reading skills and achievements. It employed a quasi-experimental design that primarily relies on a quantitative approach. Accordingly, a total of 60 students, who were selected purposefully, participated in the study as treatment and comparison groups. The experimental process was carried out with reading tasks that were designed in light of a model for teaching the skills using multiple intelligence-driven tasks. The treatment was provided for 12 weeks, in which three lessons were conducted per week. For similar weeks, the comparison group also attended lessons but followed the conventional approach of teaching reading skills. Quantitative methods were employed to analyze the data collected through tests. Specifically, T-tests were used to generate the output for the findings. Prior to analysis, a data normality check was carried out using Shapiro-Wilk tests, and a p value of .05 was used to determine the level of significance. It was found that multiple intelligence-based reading tasks brought a significant difference in the students' higher and lower levels of reading achievements compared to the conventional methods, with the effect size value ranging from moderate for reading aspects (i.e., reading for main ideas and understanding references) to strong for reading aspects (i.e., reading for details, guessing vocabulary, and inferring meanings from a text). The findings suggest that university teachers should use multiple intelligence-driven reading tasks to raise the comprehension levels of struggling readers in the context of the study.

1. Introduction

1.1. Background

Research narrations about reading definitions before the late 20th century and the beginning of the 21st century up to the present are quite different from the earlier years. The beginning of the 21st century is characterized by an era of engaged reading. Prior to

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1990, reading texts were defined as just printed materials (books or magazines) that were read in a linear fashion. The definition of reading is likely to change due to the growing presence of hypermedia and hypertext [1]. The current researcher, throughout his long experience as a reading skills teacher, has adopted the definition of reading in terms of hypertext in nonlinear ways. That means reading skills have to be understood beyond the confinement of text alone. The practice and teaching of these skills need to be geared more toward multimodal approaches than usual because students' genetic make-up and experiences are different from their figure prints. The reading community, including teachers of reading, began to consider the nature and forms of nonlinear and less traditional forms of text in terms of students learning [1].

Throughout the previous era of reading research, reading was viewed as a discrete skill, but now reading research is directed towards engaged reading and learning [1]. [2]. The current trend requires acknowledging that the concept of reading is not confined to traditional print materials; rather, it extends to texts that students encounter daily, including nonlinear, interactive, dynamic, multimodal, and visually complex materials conveyed via audio-visual media [1]. On the other hand, it is assumed that a search for understanding via text involves the integration of cognitive and motivational forces [1,3]. Accordingly, in the present study, the concept of reading adopts a shift that focuses on learning and practicing it across multiple spectrums or modalities within the framework of multiple intelligence-based tasks.

According to Ref. [2], the theory of multiple intelligences acts as a tool in the hands of teachers in various fields to restructure the teaching-learning process to make students active participants in learning by virtue of appropriate activities that do not thrive in the traditional school setup. Reading skills teachers can make use of insights from multiple intelligence theory to reduce the double burden university students' shoulders in their academic caliber—language and content knowledge, particularly as it is practiced in the context of the current research area [4–9]. The theory covers several areas of education and has been found to yield a motivating outcome. If awareness of the theory rises among the teachers, it won't be a big challenge to mainstream the insights in the curriculum and instruction of lessons [2,10]. And yet, it needs to be studied and tested before application. Teachers can develop strategies that allow the students to demonstrate multiple ways of understanding a text and show value for their uniqueness (individuality). Gardner's pluralistic view of intelligence suggests that all people possess at least eight different intelligences that operate in varying degrees depending on each individual. Students come to class with a variety of intelligences that include both intellectual strengths and weaknesses. Regardless of the unitary ways of conceptualizing human intelligence, it is designated to represent a single or discrete capacity. Intelligence is defined as the capacity to solve problems, surpass challenges, and discover new things or ideas that contribute to or are valued in one or more cultural settings [3].

Reading skills can be enhanced by utilizing multiple intelligence-enriched strategies. Students are more attracted to lessons that dwell on what they are accustomed to. Thomas (2009) argues that human beings possess all intelligence to a varied degree. Intelligence is natural as well as nurtured. The natural intelligence possessed by all human beings, to a varied degree, can be enhanced by the environment. Human intelligence works in groups, not in isolation. They help to learn different types of content. For example, in language, math, physics, science, etc., some intelligence may be aligned to specific contents [11]. Still, intelligence can be used to learn almost all contents with a relative difference in emphasis. What matters is the provision of variety and novelty for classroom implementation. Multiple intelligence theory provides a rich source for both learning styles and strategies [12]. For example, student reading skills and achievements require almost all intelligence to work together. How? Everything in the universe is meant to be read. Reading is not just about something in print. We read pictures, movements, speakers internal thoughts, interactions, nature, verbalisms, arguments, and logics. How can't reading need intelligence? It needs intelligence to enhance students reading achievements. This, of course, has a clear classroom implication.

The argument underscores that an academic decision that resulted from a single and obsolete piece of data from the learner is less likely to represent the overall capacity of a learner, and instruction should be provided in ways that activate the multiple spectrums of learners [4]. The insights derived from multiple intelligence theory cover a number of educational areas and reach the status of instructional approaches [4,13,14]. The application of MIT regardless of subject areas and its acceptance as an instructional tool are among the reasons to emphasize it in the area of reading instruction.

From the researchers' experience and observation, it is a common trend to repeat reading exercises in the practice of teaching aspects of language. If reading exercises are not backed up with novelty, they may not lead to a better understanding. Current trends require the use of multimodal approaches to meet the demands of ever changing needs of students [15]. A study of a brain found that a part of the brain called the Magoun brain is stimulated by novelty. Thus, this part of the brain sleeps unless it's constantly being awakened by new activities [5]. By observing the gap and consulting relevant literature in the study area, this research project tried novel reading tasks that stimulate the use of diverse intelligences and motivations of students in teaching reading, which differs from the usual methods of teaching reading in the context of a communicative English course. The researchers presumed that a lack of novelty in reading classes and the tradition of presenting reading lessons in linear ways may be one of the reasons that university students lag far behind in their reading comprehension skills. ([6–8]).

According to Ref. [2], diversity between and among learners and supreme expectations that students deserve to learn make the tasks of teachers overwhelming. Dealing with individual differences has been one of the biggest challenges facing the educational world today, and it is also one of the ways to come out of most of the discrepancies recorded in the area of education [16]. In this study, the most crucial contribution that EFL education can make to learners' development' is to lead them in a direction where their inside talents best suit them. Multiple intelligences as a learning model that centers learners' inclinations by far may result in scaling up the deteriorating levels of students' performance in reading skills and motivation towards reading [17]. As one of the cognitive skills [2], prioritized MI theory, which paved the way to efficient reading comprehension and vocabulary retention through the eight gates of intelligence. In fact, he approached reading comprehension beyond the single level of intelligence recommended by cognitive psychologists and their advocates. Therefore, strategies based on multiple intelligence theory can help struggling readers improve their

reading efficiency.

1.2. Multiple intelligence based reading instruction

Multiple intelligence theory contributes to language teaching in several ways. Many studies affirm its significance in helping more learning occur compared to traditional ways [16,18–21]. A MI-based project was offered by Ref. [22] to help the students' reading comprehension skills. A group of fourth-graders from a large city participated. They also considered the kids' financial and social circumstances. The purpose of the study was to identify the reading comprehension issues that the pupils were having. It was discovered that MI techniques might be applied to raise students' reading comprehension skills and boost their academic achievement. In the study [19] looked at the connection between Iranian EFL learners' reading comprehension skills and multiple intelligences. A random selection of 117 senior English students was made for the study. Data were gathered and examined following the administration of two different instrument types: the Reading Comprehension Section of the TOEFL (2005, Longman) and the MIDAS Adults (Shearer, 1996). The findings showed that there is a significant correlation between all types of learners' MI profiles and reading comprehension scores. The most significant predictor of learners' reading comprehension abilities is their verbal-linguistic intelligence, followed by their visual-spatial and interpersonal intelligences, in that order. Moreover, learners' reading comprehension could not be predicted by Intrapersonal or Kinesthetic Intelligences. Similarly, multiple intelligences helped teachers think beyond the confines of teaching plans and curriculum [23–26]. Meanwhile, MI is not out of criticism. As Gardner noted in his study, there is no best strategy that works for all learners at the same time. He suggests activities and practices that provide more opportunities for the integration of a number of talents and inclinations than sticking to a discrete intelligence [2]. Similarly [11], found in their studies that MI is demanding and requires an exhaustive plan for its effective implementation. The challenges for teachers, in particular, may be related to a lack of resources and overcrowded classrooms [11].

With all of the challenges one century ago (in the 20th century), Maria Montessori and John Dewey discovered an instructional approach nearly similar to Gardner's innovation of multiple intelligence techniques. Tactile letters and self-paced materials by Maria Montessori and representing classrooms as miniature societies by John Dewey [2]. We know the profound impacts that John Dewey and Maria Montessori have on the learning situation. This, of course, can be mirrored in the impacts MI has on teaching and learning.

Similarly, the reading instructions in the current research adopted multiple intelligence insights under the auspices of the communicative English skills course of university students in the study area. Activities reflecting multiple intelligence theory in the reading classes were included for each lesson [12]. emphasized that multiple intelligence strategies provide the richest insights in proposals for lesson organization. Accordingly, each reading theme is planned to be covered with two lessons that last 40–50 min and focus on different aspects of reading (i.e., reading for detailed information, main ideas, understanding inferences and references, identifying major points, and others). There were five themes that entailed two lessons each. The eight intelligences, according to Gardner's multiple intelligence theory, were covered in those lessons. Learning activities begin with providing a stimulus and problems to be resolved (stimulation and problem-oriented phases; practicing higher and lower reading skills by introducing activities catering for various intelligences).

Part of the activities involved students interacting with the visual input of language, which they needed to process and understand. Students interacted with a text, predicting what would come next and adapting their own knowledge of the subject and language to the text. Visual students learn easily through their eyes; when students are seeing and able to read words from their reading material, they are using their visual intelligence dominantly to get more knowledge. Reading is not always words; it can be taught through reading pictures or even by presenting the reading material in more attractive ways for students. Other activities included reading and reflecting on understanding with movements (kinaesthetic), relating to nature (naturalistic), ordering, analyzing (logical), and synthesizing. Other procedures included group discussions (interpersonal). Eventually, as multiple intelligence theory provides a great variation in assessment, the suggested multiple ways to evaluate students were used [2]. While in the lesson plans there was not much emphasis on assessment, it was important to observe individual students and keep notes on how well they were working and improving in every activity.

This method unquestionably offers educators a new view point. This concept is significant because it emphasizes individual difference rather than assigning intelligence to individuals [27]. When students receive teaching that is appropriate for their intellectual type, academic success increases. Conversely, students find it difficult to learn when their education does not match the way they learn [28].

In MIT-based classrooms today, the teacher must constantly switch between different intelligence modalities [23]. Everybody learns differently and at a different pace, according to MIT. Numerous aspects are impacted by teachers' consideration of this idea during the teaching and learning process. With the use of educational applications based on this theory, students may quickly learn and begin thinking about careers for themselves. They can also build self-confidence, self-knowledge, creative thinking, and respect for individual diversity [28].

1.3. Review of recent related empirical studies

Recently, multiple intelligence (MI) theory has been the area of interest for educational research, particularly who are concerned with classroom instruction. This is because MI considers students' individual difference and engage teachers to facilitate in boosting the analytical skills of the learners [45]. Very specifically, it paves a way to solicit the aptitude of various language learners [51] and create differential consideration in language learning environment [46].

Accordingly, scholars have conducted studies on the roles of MI based instruction in relation to enhancing the learners' language

learning process. In a more general context, an experimental study was conducted by Ref. [50] on the role of MI in the primary education process, and the findings underscored that improvements were noted in terms of the development of linguistic intelligence, logical-mathematical intelligence, bodily-kinesthetic intelligence, visual intelligence, musical intelligence, interpersonal intelligence and intrapersonal intelligence. Regarding studies particular to English language learning [44], have conducted a study on the effect of instruction based on Multiple Intelligences Theory on the attitude and learning of general English. The results of the study disclosed that the attitude of students towards learning English in experimental group improved significantly. Likewise, the study carried out by Ref. [52] on the title, "Does MI offer a new assistance in encouraging students' reading comprehension skill?". He pointed out that musical intelligence is the best predictor for reading comprehension, and therefore, the inclusion of poems and songs should facilitate reading comprehension. Moreover, in another similar study [47], have confirmed that Multiple Intelligences Theory benefits to improve students' reading ability, especially in solving the questions concerning logical-mathematical intelligence and visual-spatial intelligence. A systematic review analysis by Ref. [48] disclosed that multiple intelligences-based instructions can improve students' interest in English learning to a certain extent. This in turn shows that, MI based instruction improves the learners' reading interest. A part from reading, very recent research output by Ref. [49] on Integrating Multiple Intelligence Learning Approach to Upgrade Students' English reading and writing Skills showed that most respondents felt contented and interested in developing and upgrading English reading and writing skills using the Multiple Intelligence Learning Approaches.

To sum up, scholars have agreed on the importance of integrating multiple intelligence-based instruction both at the lower and upper levels of education as it contributes much in boosting learners' creativity and interpersonal interaction which is a vital element for active learning. Particularly, in language learning, the role of MI based instruction contributes much on designing activities which makes learning happens in the classroom. However, most of the recent researchers pointed out on the need for conducting further studies on the roles of MI in developing specific language skills and sub skills.

1.4. Rationale of the study

Reading is one of the English language skills that students at higher institutions are expected to learn. In countries like Ethiopia, where English is used as a medium of instruction and a written language for academic texts and materials at secondary and tertiary levels, reading is by far the most important skill for students [29]. Studies conducted locally found that the literacy levels of lower-grade students were reported to be shocking. Early grade reading assessment studies reported there was no significant difference among students' literacy levels after passing through years of English classes. Students pass from one grade to the next without having the minimum literacy competence stipulated in the national documents. (United State Agency for International Development [30]. Furthermore, students often have no exposure to English before school, and most of them learn English in government-sponsored public schools with insufficient resources or semi-qualified or unqualified non-native teachers who are not well equipped with various language teaching methods [31]. The other serious concern is that the problem transcends itself to the upper levels [30]. Consequently, when students join universities, they do not come with the necessary basic reading skills. Therefore, they still require more support and motivation by presenting lessons that align with their inclinations and talents. According to the observation and experience of the current researcher, this is almost lacking at this level.

Furthermore, presumptions exist among university teachers in the area that generalize students at this level are able readers. The facts observed on the ground don't confirm the presumption. Students came up with all of the deficits due to poor methodological and material provisions. Above all, they are rarely encouraged to experiment with their individual proclivities (intelligences).

Compared to all of its insightful contribution to academic success for university students and being a dependable tool for importing knowledge of science and technology, the practice of teaching reading is not unleashed by linear and traditional procedures. Official documents [29,32] uncovered its deteriorating level as far as the learning situation is concerned. The current researcher repeatedly asks himself why this happens in this context. Why are students observed to have a bad attitude towards activities related to reading passages? The researcher has also noticed that most undergraduate students always face problems with reading and remain silent, unmotivated, and show passive participation when they are asked to complete comprehension exercises.

What are the causes of the problems? How can our students be helped to develop their reading skills to overcome the serious problems they face in comprehending texts ranging from simple to complex? These are apparently some of the questions troubling many teachers of the English language. The problems of teaching and learning the English language in general and reading in particular may be related to designing and presenting lessons in line with the various intelligences of students. For countries like Ethiopia, where the English language is not spoken outside of the classroom yet covers the most significant services in academic and business areas, the major source of English is reading. The limited exposure makes reading the most dependable outlet for other language skills and a means of importing science and technology compared to other skills like listening and speaking.

Although the teaching and learning process has shifted from a teacher-centered approach to a student-centered approach, still addressing the needs and interests of learning becomes a challenge in the research context. The practice of learning to read is not unleashed by linear and traditional methods [6].

These days, 'educational areas make use of the insights from multiple intelligence theory as it encompasses the integration of both learning styles and strategies. Though addressing individual differences is still a challenge in educational settings, it is also suggested as a way to address a number of deficits as far as students' learning is concerned. Several language studies reflect the correlation between intelligence profiles and reading skills. A study conducted by Ref. [17] indicates that the multiple regression analysis reveals that there is a positive relationship between students' MI profiles and reading comprehension skills. Reading instructions are required to make use of dependable approaches that likely motivate and increase learners' engagement. As long as reading instructions follow a dependable theoretical foundation that enhances reading engagement in EFL classes, motivation to read increases to a reasonable degree, even for

poor readers. Multiple intelligence theory, unlike the conventional thoughts of cognitive psychologists, adds the perspective that learners are better supported in their retention of knowledge and skills if instructions are presented in various ways that meet the learning pace and respective proclivities.

The current state of the art in the area of multiple intelligences as a tool to teach various aspects of language has found a number of appealing results. It was investigated that writing tasks that are designed and presented following MI theory boost performance [18]. On the other hand, using a quasi-experimental design with 59 participants [9], also found out that MI strategies have reasonable potential to provide a suitable resource to empower the quality of TEFL. In local studies in Ethiopia [6], also studied the implications of multiple intelligence theory for text book development. This study showed that the great majority of the language tasks are meant to nurture verbal and linguistic intelligence, followed by interpersonal and intrapersonal intelligences. In the study entitled Multiple intelligence theory and its underlying philosophy [19], it was found that learners who performed poorly in traditional classrooms are turned on to learning when the classroom incorporates artistic, athletic, and musical activities. In this study, activities that correlate with the strongest intelligence of learners happen to yield a better result in internalizing and analyzing literary texts than those activities that correlate with the weak intelligence of the learners.

The above studies illustrate MIT as an alternative teaching approach that provides unlimited strategies to enhance novelty in instruction. Meanwhile, the main focus was on identifying strong and weak patterns of learners' intelligences, mainly at lower grade levels, other language skills, text book developments, and the quality of TEFL. The studies added a lot to the knowledge in this area, but still, more studies need to be conducted on specific areas like reading comprehension than TEFL in general, considering higher levels of education. Surprisingly, the researcher was unable to find local studies that investigated using students multiple intelligences as a resource for the enhancement of reading skills. This means no study has been conducted on carefully structuring reading tasks in line with students' intelligences.

Another big problem that the researcher noticed from his experience teaching is what makes EFL learning in general and the learning of reading skills in particular different from similar EFL settings abroad. According to the presumption and the researcher's long experience, the first one could be the amount of support provided for the learners. The country where the current research was carried out is multilingual, where English is never used in any of the communicative situations except for classroom consumption, even relatively with less emphasis in some cases. That means, despite the prescription of the MoE (Countries Ministry of Education) to use English as a medium of instruction beginning in secondary schools, the implementation differs among instructors [14]. Mother tongue, other local languages, and the lingua franca (Amharic) are dominantly used as communication platforms, and their impacts have been studied to be significant [20,21]). Due to this, parents are unlikely to provide any support for the students at the childhood level [16]. The problem is presumed to transcend to higher levels, too. Secondly, students who are admitted to universities come from different social, cultural, economic, and geographical backgrounds. This highly requires preparing lessons that may adhere to the multiple spectrums of intelligences rather than presenting lessons (the reading skills in this case) in a linear and traditional way. Out of several suggestions to reduce persisting problems in learning English, gearing lessons towards students' needs, inclinations, and backgrounds has been the most recent. The concept of multiple intelligences was introduced several decades ago. The theory emphasizes the use of individual inclinations for the success of one's learning. This theory, unlike cognitive theoreticians who view or measure intelligence in terms of the discrete IQ measure, has forwarded an idea that encompasses the measure holistically by using a number of talents like logical, visual, kinesthetic, naturalistic, spatial, musical, interpersonal, and intrapersonal [2]. The need to work with multiple intelligence-driven tasks came up due to the unstructured and less uniformity of implementing the prescribed national course guide for communicative English for university students. This research assumes a paradigm shift towards including students inclinations for the enhancement of their reading skills.

In addition, the literature supports the notion that when a subject is presented from multiple perspectives, like the strategies in the multiple intelligence model, at least four desirable outcomes can be assured. The first relates to addressing different learners who learn differently because not all learners learn in the same way. Therefore, introducing new features in a lesson can reach more learners at the same time. Second, students develop a sense of what it is like to be an expert when they feel that a teacher represents knowledge in different ways. Third, since understanding can be demonstrated in more than one way, a multimodal pathway can provide opportunities for students to demonstrate their new understanding as well as the ongoing difficulties [22,23]. Eventually, learners might be able to develop their weaknesses and be more fulfilled than learners in the traditional classroom [24]. However, the researcher hasn't seen any attempt that explicitly encourages the use of individual inclination as a resource in both course guides and syllabuses for reading enhancement.

The problem seems to be a lack of adequate integration of individual inclinations as a resource in enhancing EFL (English as a Foreign Language) reading skill achievement. As stated in several pieces of literature above [6,14], and [8], the current teaching methods and materials in Ethiopia that use English as a medium of instruction for higher education are failing to equip students with adequate reading comprehension skills, leading to poor academic performance. The study particularly identifies a gap between the objective and activities of the communicative English skills module, and the researcher was unable to locate any document that explicitly prescribes the use of multiple intelligence notions to teach language skills. Therefore, the current researcher hypothesizes that poor reading achievement may be related to a lack of activities or instructions that let learners try out their potential and be successful in their reading achievements.

1.5. Hypotheses

Based on the problem stated in the above section, the following hypotheses were formulated:

H01. There is no significant difference in the reading achievements between the experimental group learners who were imparted using multiple intelligence-based tasks and the comparison group students who were taught through a conventional approach.

Ha1. There is a significant difference in the reading achievements between the experimental group of learners who were imparted using multiple intelligence-based tasks and the comparison student groups who were taught through a conventional approach.

H02. There is no significant difference in the reading achievements between the mean scores of the experimental group learners who were imparted using multiple intelligence-based tasks and comparison student groups who were taught through conventional approaches on various reading levels of achievement at pre-test and post-test levels.

Ha2. There is a significant difference in the reading achievements between the mean scores of the experimental group learners who were imparted using multiple intelligence-based tasks and the comparison student groups who were taught through a conventional approach on various reading levels of achievement at the pre-test and post-test levels.

H03. There is no significant difference in the various reading achievement mean scores of the comparison student groups who were taught through conventional approaches due to multiple intelligence-based reading instructions at pre-test and post-test levels.

Ha3. There is a significant difference in the reading achievement mean scores of the comparison student groups who were taught through a conventional approach due to multiple intelligence-based reading instructions at pre-test and post-test levels.

1.6. General objective

This research in general tried to examine the effect of multiple intelligence-based tasks on improving EFL learners reading comprehension skills.

1.6.1. Specific objectives

The specific objectives of this research undertaking were:

1. To identify students level of achievement in reading through employing multiple intelligence-based reading tasks.
2. To assess the extent to which MIBRI improves lower and higher levels of students reading abilities.
3. To determine whether a difference existed on the magnitude of the impacts multiple intelligence driven reading tasks on various types of reading.

2. The theoretical frame work

Multiple intelligence theory provides a theoretical framework for reading instruction that emphasizes the importance of tailoring instruction to students' individual strengths and preferences. The theory suggests that students will be more motivated and engaged in reading if instruction is designed to align with their individual intelligences [33,34]. This approach to reading instruction is consistent

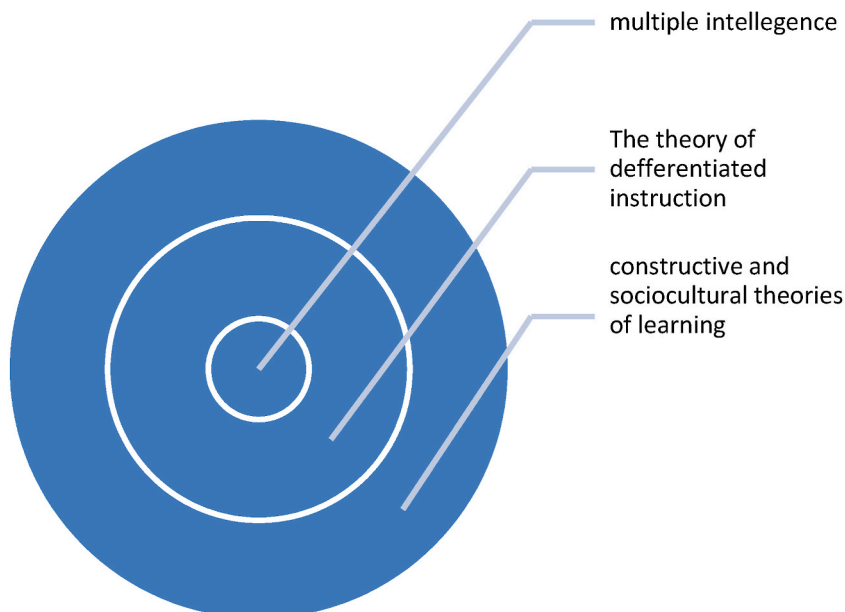


Fig. 1. Theories contributed to the foundation of MIBI.

with constructivist and socio-cultural theories of learning, which emphasize the importance of active engagement, collaboration, and contextualization in learning. Constructivism as a paradigm or worldview posits that learning is an active, constructive process. The learner is an information constructor. New information is linked to prior knowledge; thus, mental representations are subjective [35–39]. The theory of differentiated instruction which is based on the premise that instructional approaches should vary and be adapted in relation to individual and diverse students in classrooms also provides the theoretical foundation for multiple intelligence based instructional approach [25].

Overall, the theoretical framework of the study, which is demonstrated in Fig. 1, is grounded in the multiple intelligences theory and its relevance to reading instruction for university students. The theory provides a useful lens for understanding the diversity of student abilities and the importance of differentiated instruction to enhance motivation and comprehension.

3. Conceptual framework

As it is shown in Fig. 2, multiple intelligences are placed at the center of other variables in the study to show activities frequently used in reading classes and categorize them according to each particular type of intelligence; make plans by selecting appropriate classroom activities and tasks that reflect the various types of proclivities of students. MIT-tailored models of teaching reading skills, which are placed at the base line of the triangle, indicate that the reading instruction is geared and the material is prepared in order to enhance the reading and motivation of the learners. Therefore, the diagram in the conceptual framework shows that an interrelation exists among the variables, with multiple intelligences acting as driving forces.

4. Materials & methods

4.1. Research paradigm and design

The current research makes use of a quasi-experimental design, which falls under the domain of the post-positivist paradigm (Watson, 2015). This design was employed because the samples were not randomly distributed into the control and experimental groups equally. Creswell (2012) suggests that random sample distribution into two groups equally is difficult in a quasi-experimental design because it can disturb the natural learning process or placement of class.

4.2. Participants and research sample

The participants in this research were undergraduate students from Hawassa University, which is located in Ethiopia. Students were first made to complete an intelligent inventory questionnaire adapted from Ref. [40] to identify the dominant intelligence of each participant. Then, they were grouped according to their respective intelligence types. They were made to rotate in various tasks whenever mixed intelligence grouping was sought. The participants were illegible in this case because they fulfilled the multiple intelligence configurations that resulted from the inventory calculation. The data was collected from students enrolled in a communicative English skills course that mainly focused on enhancing reading skills and other aspects of language. The participants were selected purposefully. This was made not to alter the natural placements, yet the assignments to both the experimental and comparison groups were made randomly using lots. A total of 60 students, which means 30 from Section 31 and 30 from Section 51, natural science students from Hawassa University who were taking the communicative English skills course, were participants in the experiment. From the total of 60 students in the two intact groups, the lot has resulted in 30 students from Section 31 being experimental and the other 30 students from Section 51 being labeled as comparison groups. The experimental group received treatment using the redesigned teaching material based on multiple intelligence theory-driven reading tasks, while the comparison group received treatment using the conventional approach.

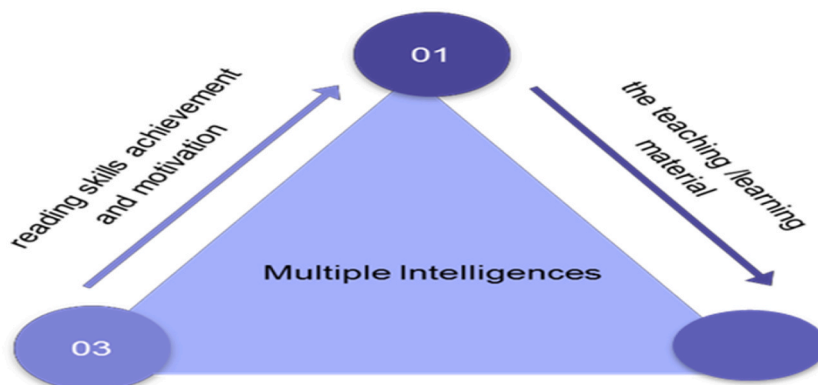


Fig. 2. MI Tailored models of teaching the reading skills [23].

4.3. Instruments

The research aims to test the effectiveness of multiple intelligence-based reading tasks on university students reading skills achievements in the communicative English skills module provided for university students in Ethiopia. A reading comprehension test was used as an instrument. As it was difficult to find a hands-on, standardized test for the group, the reading comprehension test was adapted from various sources yet tried to be aligned with the course objectives and levels of the students. An attempt was made to make the items focus on assessing the specific reading comprehension skills that are appropriate according to communicative English skills module objectives and minimum learning competencies (MLCs). Among others, it included identifying main ideas (5 items), finding details (8 items), understanding references (6 items), guessing meanings that were practiced in the selected reading passages (7 items), and reading and inferring (4 items). A total of 30 items in the reading comprehension test were presented in a multiple-choice format because they were familiar to the students and could be easily scored. Each item had four alternative choices for the correct answer. The students were assessed on two occasions: at the beginning of the study and immediately after the interventions, which took 12 weeks, from October to January 2022.

The instrument was tested for validity and reliability through a pilot study involving 30 students outside the research sample, as suggested by Ref. [41]. To maintain validity, the reading comprehension test was given to TEFL experts to evaluate in terms of its appropriateness, representativeness, specificity, clarity, and gravity. In accordance with this, a few items were reordered, improved, cancelled, and re-examined due to a lack of clarity, representativeness, and difficulty level based on the comments provided by the experts. The test was improved and tested out in the pilot with a group of respondents ($n = 30$) who were similar to the intended target group.

The reliability result using Cronbach's alpha is presented in Table 1 below.

Based on the calculation result in Tables 1, it is obtained that $\alpha = 0.787$, so the instrument is reliable.

4.4. The teaching material and instruction

The experiment was started by redesigning the selected reading skills tasks. Activities were redressed using multiple intelligence-based strategies (the independent variable). This was done first by selecting the reading tasks, followed by redressing them in terms of the seven steps outlined by Ref. [2] for designing multiple intelligence integrated lesson plans as a model. Unlike the conventional tasks prescribed in the module, the reading skills activities and tasks that were applied to the treatment group were altered to reflect the students' multiple intelligences. Several intelligences were employed per reading session, as including all of them per session could be unmanageable due to time. These included verbal and linguistic intelligence. The tasks required students to brainstorm, use new vocabulary orally, predict and tell related stories in their own words". On the other hand, logical/mathematical intelligence students were required to reason out by asking and answering questions about the text, explain their answers, unscramble ideas/letters, sequence narrations, and work with numbers/figures. Likewise, visual and spatial intelligence can be developed through illustrations, producing logos, graphs, and diagrams, and using pictures of the new vocabulary and the themes of the text. Bodily or kinesthetic intelligence include to role-play characters in a text, react to contents using body movements, and use concrete materials while learning the new word or textual information. On the other hand, musical and rhythmic intelligence required learners to create rhythmic patterns, and sing songs, and listen to lyrics related to what they read. Interpersonal intelligence demands students to assessed peers', work, and worked collaboratively. In the same way, intrapersonal intelligence helps students to work individually and reflect on his or her progress and achievements. Finally, natural intelligences help them to associate what they read with a natural prototype in order to experiment with. These have been done to investigate the effect of using multiple intelligences on university students various reading skills achievements [23].

4.4.1. The intervention lesson

In the actual study, the two groups were given a pre-test before the treatment. The treatment in the experimental group was teaching and learning reading skills using multiple intelligence-driven reading tasks. Meanwhile, in the control group, there were conventional reading lessons (using lectures, questions and answers, and assignments). This treatment was given over 12 weeks, with 50-min sessions conducted three times a week. On the selected five reading themes and passages, a total of 36 lessons were conducted. The principles used to guide the lessons were taken from Thomas Armstrong's design of lessons using the theory of multiple intelligences in education.

The steps used in redressing and designing the lessons from the module are:

Table 1
Reliability test.

Reliability statistics	No. items
Cronbach's Alpha	
0.787	30

By using a significance level of 5 % for $N = 30$, the value of α table = 0.787 is obtained.

1. Focus on a specific objective or topic. Make sure you have clearly and concisely stated the objective.
2. Ask key MI questions—ask MI questions that can pump the creative pump.
3. Consider the possibilities. Think about the possibilities for methods and materials that seem more appropriate.
4. Brainstorm. Using the MI planning sheet brain storm as many teaching approaches and methods for each intelligence. When listing approaches, be specific about the topic you want to address (e.g., video clip of rain forest rather than simply video clip).
5. Select appropriate activities. From the ideas on your completed planning sheet, circle the approaches that seem most workable in your educational setting.
6. Set up a sequential plan. Using the approaches you've selected, design a lesson plan or unit around the specific topic or objective chosen.
7. Implement the plan. Gather the materials needed, select an appropriate time frame, and then carry out the lesson plan. Modify the lesson as needed to incorporate changes that occur during implementation, e.g., based on feedback from students [23].

The lessons for the intervention were conducted by a trained teacher but observed by the researcher using a pre-prepared checklist on the fidelity of the right plan for implementing multiple intelligence-based reading tasks. At the onset of the intervention, three lessons were conducted as a pilot, and the remaining 33 lessons were followed after a post-lesson discussion with the teacher who provided the intervention. Carrying out all the steps with courtesy, post tests were provided for the groups to measure the effects of the intervention.

4.4.2. Fidelity to the intervention program

Treatment adherence was assessed by observing every third lesson out of the 36 intervention lessons using a pre-prepared observation checklist in collaboration with an independent rater. A total of 12 sessions were observed. Overall adherence to treatment averaged 84 %, ranging from 79 % to 88 %.

4.5. Methods of data analysis

The pre-post test results of the reading comprehension achievement test (dependent variable) were analyzed using both descriptive (mean, standard deviations) and inferential statistics (t-tests) because the study is only comparing two groups or conditions [42]. The scores collected from the tests were computed using the SPSS version to compare inter- and intra-group differences. The inter-group comparisons (between experimental and comparison groups) were made by employing the independent samples *t*-test, and the intra-group (differences within a group) comparisons were made by the paired samples *t*-test. In a similar vein, the effect size is also measured using Cohen's *d* index of effect size formula to see the strength of the difference or how strong the effect was. In this study, the researcher used [43]Cohen's suggestion: 0–0.20 = weak, 0.21–0.50 = moderate, 0.51–1.00 = moderate, and > 1.00 = strong effect.

4.6. Ethical issues

Before participating in the research, participants in this research got an explanation in advance about the research objectives and voluntary participation in this research. The researchers have obtained human research ethics approval from the institution. This study was governed with the ethical principles specified in the Hawassa University. Hence, approval for the study protocol was granted by the Hawassa University Ethics Review Committee (CRERC) under reference number [CSSH/92/2022]. Informed consent was obtained from all participants, and they were provided with clear information regarding the nature, purpose, and potential implications of the study. Confidentiality and anonymity of participants have been strictly maintained throughout the research process, and any identifying information has been appropriately safeguarded. Finally, the participants were informed that they had the freedom to decide whether or not to participate in the study, and they had the option to withdraw from the intervention at any point if they wished. Any assessment related to this research had nothing to do with the university's grading or result system and was only used confidentially for research purposes.

5. Results

5.1. Normality test

Prior to presenting data for analysis, a normality check was done to verify if the assumptions that were required to make the decision on the type of statistical tests to be used were qualified. This was made using Shapiro-Wilk tests as suggested by Ref. [26]. The distribution of the scores from reading achievement tests for both comparison and experimental groups is shown in Table 2 below:

Table 2
Test of normality.

Reading achievements	Group	Kolmogorov-samirnov			shapiro-wilk		
		Statistics	df	Sign	statistics	df	sign
	Experimental	0.110	30	0.200	0.956	30	0.241
	Comparison	0.172	30	0.024	0.944	30	0.115

By using a significance level of 5 %, based on the results of the reading achievements post-test data in the experimental group, the probability score (Sig.) was $0.241 > 0.05$, while the probability score (Sig.) of the reading achievements post-test data in the comparison group was $0.35 > 0.115$. Therefore, it can be concluded that the samples of the comparison and experimental groups were derived from a normally distributed population. Since the data meets normality criteria, a statistical test to determine the effectiveness of multiple intelligence reading tasks for enhancing university students achievements can be performed.

5.2. Reading achievement independent sample pre-test for different levels of reading

Based on the data collected, the scores for specific levels of reading were analyzed. As one of the hypotheses required possible impacts multiple intelligence tasks had on various levels of reading, the results found in this regard are indicated in [Table 3](#) below. For different number items in the specific levels of reading, the results found are presented in the table. The P value in both groups found was $P > 0.05$. Therefore, the independent sample *t*-test for aspects of reading, as indicated in [Table 3](#) below, showed no significant difference between the two groups before the intervention.

5.3. Students' reading skills achievements after the intervention

After the treatment, however, it can be noted an increase in achievements, particularly in the experimental group (the treated groups that attended multiple intelligence-based reading practices compared to the comparison or group that was imparted using a conventional approach). This finding indicated the claim in the hypothesis that a change was due to multiple intelligence reading tasks. Unlike the average reading scores before intervention, the P value here is 0.000. Therefore, the independent sample *t*-test after the intervention yielded a significant difference in the reading gross scores compared to the group that didn't make practices using multiple intelligence-driven reading tasks, with an effect size of 2.74 that indicated a strong effect. See [Table 4](#) below:

5.4. Reading achievement independent sample post-test for the different levels of reading

Unlike the results obtained at the pretest level, being part of the study for the students brought about different outcomes in the groups. Accordingly, compared to the experimental group, the comparison group yielded a lower result on the same test. This, of course, doesn't mean the comparison group didn't make improvements, but the changes were not statistically significant. The P value found out was $P < 0.05$. Therefore, the independent sample *t*-test for most levels of reading at the posttest level indicated there was a significant difference between the two groups after the intervention. See [Table 5](#) below. Results appear to indicate that multiple intelligence theory-based activities are an effective instructional strategy for improving the reading comprehension test scores of struggling readers at this level. Multiple intelligence theory-based activities provide students with various modalities, and this may facilitate the learning of content knowledge in other subject areas, too.

5.5. Reading achievements paired sample *t*-test -experimental group

The results of the paired sample *t*-test were particularly important to distinguish the clear impact the intervention had. Below, the scores were paired for each coded student at pre- and post-levels. The results were compared in terms of significance levels. Both descriptive and inferential results of the students for this test are presented. The P value found for all levels of reading was $P < 0.05$. Therefore, the paired sample *t*-test for most levels of reading at the posttest level indicated there was a significant difference between the two groups after the intervention. The results of Cohn's *d*, which ranged from 0.7 to 1.41, also showed the intervention resulted in reasonable effects on most levels of reading. All students learn different contents completely differently from one another. The implications of this result may encourage teachers to think about intelligence-based tasks that are appropriate for different types and levels of reading. See [Table 6](#) below.

5.6. Reading achievements paired sample *t*-test for comparison group

Below are the results of the paired students at pre- and post-level reading scores in the comparison group. The results were compared in terms of significance levels. Both descriptive and inferential results of the students for this test are presented. The P value found for all levels of reading was $P > 0.05$. Therefore, the paired sample *t*-test for most levels of reading at the posttest level indicated

Table 3
Independent sample pre-test for different levels of reading.

Reading Levels (Reading for ...)	Experimental Group N = 30			Comparison Group N = 30				
	No. items	Mean	SD	Mean	SD	t	df	Sign
Details	8	3.6	1.24	3.1	1.52	-1.2	58	0.20
Main ideas	5	2.4	1.35	2.0	1.20	-1.1	58	0.27
Guessing vocabulary	7	3.1	0.75	2.9	1.0	-0.54	58	0.58
Understanding references	6	4.2	1.1	4.1	1.3	-0.52	58	0.60
Inferring meaning	4	2.83	0.91	2.23	0.93	-2.51	58	0.015

Table 4
Reading skills achievements after the intervention (NO. = 60).

GROUP	Mean	SD	t	Sig (2-tailed)	Cohen's D
Experimental Group	20.1	2.9	-10.4	0.000	2.74
Comparison Group	13.01	2.21			

Table 5
Independent sample post-test for the different levels of reading.

Reading Levels	Experimental Group No.			Control Group No. = 30				
	No. items	Mean	SD	Mean	SD	t	df	Sign
<i>Details</i>	8	4.8	1.59	3.5	1.33	-3.6	58	0.001
<i>Main ideas</i>	5	3.36	1.27	2.33	1.02	-3.45	58	0.001
<i>Guessing vocabulary</i>	7	4.36	1.18	2.83	1.46	-4.45	58	0.000
<i>Understanding references</i>	6	4.86	0.97	4.2	1.03	-2.57	58	0.013
<i>Inferring meaning</i>	4	3.0	0.87	1.76	0.93	-5.28	58	0.000

there were no significant differences between the two groups after the intervention. The findings in Cohn's D indicated a weak impact recorded at the post-test levels of the comparison group. See [Table 7](#) below.

6. Discussion

This study aimed to determine how well Multiple Intelligence-Based Reading Comprehension Instruction (MIBRCI) impacted the reading comprehension abilities of university students. The findings of the study disclosed that students' reading comprehension skills were significantly improved by MIBI. A positive change in students reading achievements and comprehension level was recorded due to the intervention compared to the groups, which were only taught using conventional ways of presenting reading lessons by using lectures and common ways of answering comprehension questions. There was an improvement with regard to various levels of reading, such as reading for details, main ideas, guessing vocabulary, understanding references, and inferring meaning from a text, in the experimental group. The group that attended conventional ways of presenting a reading lesson, however, didn't show significant improvement in most levels of reading. The result assured a positive impact on multiple intelligence-driven reading tasks for the enhancement of various reading abilities. There was a statistically significant difference between the groups before and after the treatments for different abilities of reading in the experimental group. In a similar vein, the effect size is also measured using Cohen's d index of effect size formula to see the strength of the effect. In accordance with this, the effect size for all types of reading abilities was computed and found to range from 0.70 to 1.41, which showed the intervention positively impacted the reading achievements of students (i.e., moderate to strong). From this, it was possible to conclude that the treatment had a significant effect on the experimental group's various levels and types of reading achievement that were stated in the results section and reading test instrument, like reading for text main ideas, for details, guessing vocabulary, understanding referential meanings, and inferring meanings, which reasoned to accept the alternative hypotheses.

In line with the findings of the current study, several studies by researchers have shown that employing multiple intelligence strategies throughout learning improves linguistic ability and achievement in education. For example [13], found that MIT-based education was determined to have a large effect on students' academic achievement levels. [27], in a systematic review of multiple intelligence studies for educational achievements, forwarded the positive contribution of strategies fetched from the theory.

Unlike the aforementioned ones, which focus on the general academic performance of the learners, the current results focus on the contribution of MIBI to reading skills and the sub skills embedded in them. Accordingly, it was disclosed that MIBI improves the learners' reading achievement, particularly reading for details, main ideas, guessing vocabulary, understanding references, and inferring meaning from a text, which were not seriously examined in other research with such a design.

On the other hand, though they lack empirical evidence, other scholars have also attempted to associate the ability of learners to use their potential in the academic context with the range of multiple intelligence-based strategies they employ. For example [2,28], who stated that readers are highly interested in lessons and activities that provide students plenty of opportunities to understand and

Table 6
Reading achievements paired sample t-test results of the experimental group.

Reading Levels (reading for.)	No. of items	Pre-Test		Post Test		t	df	Sig	Cohen's d
		Mean	SD	Mean	SD				
Details	8	3.13	1.5	4.8	1.59	-4.12	29	0.000	1.08
Main ideas	5	1.86	1.45	2.96	1.24	-3.08	29	0.001	0.81
Guessing vocabulary	7	2.63	1.71	4.36	1.17	-5.16	29	0.000	1.18
Understanding references	6	4.0	1.28	4.8	0.97	-2.86	29	0.008	0.70
Inferring meaning	4	1.66	1.02	3.0	0.87	-5.13	29	0.000	1.41

Table 7
Paired sample t-test results of the comparison group.

Reading levels (Reading for ...)	No. of items	Pre-Test		Post Test		t	df	Sig.	Cohen's d
		Mean	SD	Mean	SD				
details	8	3.1	1.5	3.3	1.2	-0.68	29	0.500	0.14
main ideas	5	2.5	1.0	2.3	1.0	0.736	29	0.46	0.20
Guessing vocabulary	7	2.5	1.5	2.6	1.4	-0.43	29	0.67	0.06
Understanding references	6	3.2	1.1	3.4	1.0	-0.94	29	0.354	0.19
Inferring meaning	4	1.8	0.80	1.8	0.87	-0.162	29	0.873	0.00

make use of their own inclinations and potentials, Furthermore [28], found that learners who performed poorly in traditional classrooms are turned on to learning when the classroom incorporates artistic (spatial intelligence), athletic (kinesthetic intelligence), and musical (rhythmic intelligence) activities.

[29] also argued against the conviction of educationalists that the thought of multiple intelligences should be restricted to kindergarten and lower-level students. It has to be mainstreamed to higher levels, like universities and even postgraduate levels, as it contributes much to better learning. The result of this research implied the potential advantage of gearing instruction towards students' talents and inclinations not only at lower levels but also at higher levels, like universities [30].

Individualizing and pluralizing instructions are the major insights collected from multiple intelligence strategies [28]. Multiple intelligence tasks are assumed to integrate both learning styles and strategies. For this reason, they can help learners be successful. The biggest challenge, however, relates to preparing tasks that adhere to individual intelligence, interests, and needs. Aligning tasks in line with students' intelligence requires teachers to plan ahead, use resources, and be innovative enough, as seen in the intervention lessons for the consumption of this research endeavor. It was the researchers' experience that planning multiple intelligence lessons was so demanding as a teacher. But, through practice and reflections and comments by fellow teachers, it becomes interesting and helps students achieve more in their learning. As a way out of this challenge, it is important to categorize students according to their dominant intelligences using an intelligence measuring inventory. Then, it is important to plan and deliver tasks enriched with multiple intelligence strategies.

Similarly [10], found in their studies that MI is demanding and requires an exhaustive plan for its effective implementation. The challenges for teachers, in particular, may be related to a lack of resources and overcrowded classrooms [11].

The above discussion tried to emphasize the findings that came out of the intervention. With all of its unfamiliarity for students in the research area and its demanding nature, it was understood that activities that based students intelligence possibly created variety and enhanced the amount and quality of learning to read.

7. Implications of the findings for practice

Since it was conceived as a cognitive theory, multiple intelligence insights have passed through a number of debates. Yet it continued to be more popular as it contributed a lot to different areas of knowledge. The theory has two clear implications in the area of education. The first one relates to individualizing instruction. Since each human being has his or her own unique configuration of intelligence, we should take that into account when teaching, mentoring, or nurturing. As much as possible, we should teach individuals in ways that they can learn. And we should assess them in a way that allows them to show what they have understood and to apply their knowledge and skills in unfamiliar contexts. The findings are the results of project interventions that made use of multiple intelligence-based reading tasks. That tried to address individual inclinations for enhancement of reading achievements.

The second one is pluralizing. Ideas, concepts, theories, and skills should be taught in several different ways. Whether one is teaching the arts, sciences, history, or math, the seminal ideas should be presented in multiple ways, considering the intelligence configurations of students in the classroom.

8. Conclusion

The major objective of this research undertaking was to determine the extent to which a multiple intelligences instructional approach as a kind of differentiated instruction could result in the improvement of university students reading performances at various levels. The systematic intervention program that integrated strategies from the approach proved to enhance reading achievement and interest in it. Currently, teachers and curriculum designers rarely integrate multiple intelligence insights to support struggling readers in the study area. Curriculum documents do not explicitly encourage teachers to make the most of multiple intelligence insights for the betterment of reading. Multiple intelligence-driven strategies reasonably accommodate individual inclinations for the creation of better learning. Current literature emphasizes individualizing learning, which in turn likely raises students' scores and satisfaction. The findings of this research indicated that multiple intelligence-driven reading tasks positively impacted both reading comprehension and enhancements of various aspects of reading. Hence, the research was intended to shed light on the possible integration of multiple intelligences at this level of education and raise awareness on the part of practitioners to make use of the approach as an alternative method to boost the capacity of university students comprehension abilities and bring struggling readers towards the minimum reading competence level that is marked by the Ministry of Education in Ethiopia, where English is becoming increasingly important but much support is lacking, to learn the language. Of course, this research is limited in its scope as it was carried out focusing on a

communicative English skills course for university students. Data were collected from limited participants focusing on specific content (reading achievements). The researcher believes multiple intelligence tasks and intervention outcomes could possibly be sources of more empirical evidence or generalizations if other data related to demographic variables (age, gender, and academic levels) were included. While he believes that future studies with a different design, a large sample size, longer intervention periods, and advanced measures will provide a better generalization of the instructional approach, the researcher hopes such studies may possibly reduce the magnitude of dissatisfaction in the area of learning English, particularly reading skills.

Ethical statement

This study was approved by the Ethics Committee of Hawassa University with Ref. No. CSSH/92/22. In addition, written consent was obtained from all participants for the study.

Data availability statement

We don't have a repository. But, we will provide you on request.

CRediT authorship contribution statement

Teshale Alemu Gebremeskel: Writing – original draft, Validation, Methodology, Formal analysis, Data curation. **Mebratu Mulatu Bachore:** Writing – review & editing, Supervision, Conceptualization. **Elias Woemego Bushisho:** Writing – review & editing, Data curation, Software.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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