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Multi-Criteria Decision-Making Interventions to Reinforce the Reading Skills of the Technical Students

K. Velmurugan[1], Smrutisikta Mishra[2], and G. S. Mahapatra[3]
[1]Department of English, Anurag University, Hyderabad-500088
[2]Department of Humanities and Social Sciences, National Institute of Technology Puducherry, Karaikal-609609 [3]Department of Mathematics, National Institute of Technology Puducherry, Karaikal-609609
*****Corresponding Author

velmuruganhs@anurag.edu.in *0000-0003-4067-6745*
smruti@nitpy.ac.in, and
gs.mahapatra@nitpy.ac.in

Abstract **- All readers have their own strategies while reading. They do face difficulties in using the appropriate strategy because they blend all the strategies to obtain or achieve specific criteria to achieve the desired comprehension, and in the end, they land up in significant confusion and inefficient reading. This paper aims to identify the vital reading strategies used mainly by the technical students while reading a text and further to classify the reading strategies under the designated criteria that are necessary to be practiced developing the reading efficiency among the technical students. Instead, if they try to find out the specific strategy to follow up for gaining the desired criterion, that will indeed help them better read any text. This paper is validated and illustrated mathematically using Multi-Criteria Decision-Making representation in assessing the data collected from students at different engineering colleges, including some central technical institutions. This paper provides technical students with an idea of using a specific and appropriate strategy which helps them in the application of precis strategy while facing challenges in different aspects while reading.**

Key words **- Reading skills, Strategies, Multi-Criteria Decision-Making, Vocabulary stock, Eye-fixation, Re-read, Performance score.**

JEET Category: **Research, Pedagogy of Teaching and Learning**

I. INTRODUCTION

One of the most insightfully discussed aspects of educational strategy and preparation for English Learners emphasizes the language of classroom instruction. Educators and researchers approve that to prosper in language skills and participate in social life; all the learners must develop strong English proficiency and literary skills. The argument centers on the inquiries of the finest customs to enhance the acquisition of English and the enduring part of learners is to deepen their English skills with appropriate strategies for various aspects to acquire reading skills, the societal and enlightening outlays of losing proficiency in the second language, the role of instruction in the language classroom in a systematic subsidiary first language, and guiding values from childhood that may promote English language.

Recent studies indicate the advantages of Reading Criteria, such as predicting, regulating specific background knowledge, reading aloud, re-reading, referring dictionary or any other material for clarification, synchronizing prior knowledge, and sentence patterns for adults competent in second languages. In the meantime, however, there are major individual alterations among the strategies while reading a text for proficiency and eventual stages of accomplishment in learning a language. Considerably, competence in the strategies varies accordingly towards the criteria for language learners. “Technical communication through reading activity refers to comprehending and prior knowledge implementation with technical information in such a manner that any reader can easily understand and achieve the task” (Graves and Graves, 2012). It is pointed out that in order to make technical students efficient in reading, it is significant to be attentive on some of the key- points like “level of experience in subject matter, their background knowledge of the context, re-read attitude towards learning new concepts and relevant demographic characteristics such as age, sex, race, socio-economic background, and first language”. In the current paper, this aspect has been discoursed in detail not just for users/ readers of technical students but also for the engineers whose efficiency level would increase in reading technical texts. This tendency would grow on the way to globalization and innovation that has posed everyone for an essential in a perfect and standardized medium of communication.

II. Review of Literature

Reading acts as the role of the substantive part of Language acquisition to academic achievements and career progression among the learners and teachers respectively. “Therefore, for a person to diligently dig

deeply to the root of knowledge and its enduring gift; is through reading" (Danie et al, 2017). Tharumaraj & Nooreen Noordin (2016) explored the study, which tried to analyse teachers' reading habits and teaching strategies for reading skills. Once the technical institute learners try to get on with the appropriate strategy applicable while reading to a different criterion by themselves as far as possible, they may require an assistant from the mentor side to find the matching the similarities in reading, for example, vocabulary, but in general, they are rapid or confused to identify specific strategies for reading. Sometimes, they will possibly not be too anxious with grammatical accuracy, even at this stage. They argue for involvement in the conversation and trying hard to make their opinions heard. This circumstance is the one that they will read spontaneously, and grammatical accuracy is a secondary thought. The interface with text is spontaneous and informal, so they will not be aware of considering the form of what they read. "A growing body of research suggests that growth in early literacy skills, including letter sound fluency, is predictive of later reading outcomes" (Van Norman and Nelson, 2019). "Reading comprehension is a fundamental resource for educational and social development. It is a skill that brings into play a diverse and complex set of processes and cognitive functions based on building a mental representation of a given text" (Abusamra et al. 2020).

To simplify approaches to English Language Teaching, (Sinha, 2015) points out that language advances are divided into two anxieties in linguistically diverse settings: (a) The diversity in the first language of the learners which might interfere/intervene with the process of new language learning (b) The difference in the competence of the learners with respect to English which does not justify the validity of the resources for each learner. Learners trying to enhance their English language skills as a second language need further language support, which is L1. They need to practice the language in a reading part with appropriate strategies in order to develop their skills. Further, it has also been attempted to introduce Multi-Criteria Decision-Making - MCDM tools to provide a metric for defining and evaluating graduate attributes (Ghomshei, 2018). "The very fact that ELT has emerged as a hugely researched area in the last fifty years justifies its increasing demand in the globalized world of today" (Sinha, 2016). "The feasibility and utility of combining a test of word knowledge, lexical decision, that is well-established in psycholinguistic research, a decision-making model that supplies information about underlying mechanisms, and standardized tests" (McKoon and Ratcliff, 2016). "This amalgamation of investigated how reading interventions impact behavioural/social skill outcomes by reviewing studies that included a reading intervention without behavioural/social skill components and behavioural/social skill" (Roberts et al. 2015). "The results of the study might assist in the search for effective techniques for developing text comprehension in the Second Language or Foreign Language classroom" (Marzec-Stawiarska, 2016).

The central impression of suggesting the methodology is to tap the certain criteria viz., vocabulary stock, re-read for better understanding, the role of specific textual background/familiar knowledge, read aloud for pronunciation practice, reference material consultation, and prior linguistic knowledge awakening among the learners through an approach that analyses based on the concept Multi-Criteria Decision-Making to identify and highlight the different criteria along with reading strategies.

III. Language Learning and Teaching

The language has four primary skills such Listening, Speaking, Reading, and Writing or LSRW. The extensive competence in the English language considers receptive skills such as listening and reading helps to acquire language through receiving information, whereas productive skills such as speaking and writing help produce information. The students are evaluated through the concept of performance by the individual to test their competency level. Students tend to rely on blending all the reading strategies of language skills rather than particularly specify what basis they depend on that strategy will be questionable. On what basis do they have acknowledged and applied a strategy to overcome or complete the particular criteria would be a big question. Students from their childhood use their senses to communicate their thoughts and ideas of these language skills. "Reading habits are the intellectual activities for gaining more information, knowledge and learn to achieve various types of activities" (Babu & Durgaiah, 2016). "Reading habits also are progressively significant in the present-day atmosphere of rapid scientific alteration at the comprehensive level" (Asokan & Dhanavandan, 2013). They are likely to modify their ideas through various aspects from their reading skills which tempt them to participate in the conversation for the benefit of the assumptions they make.

The investigation of criteria and strategies on students from technical institutes either focus on a particular strategy or blending all strategies together while reading. There should be a specific strategy for specific criteria rather than focusing on all, leading to confusion in comprehending a text. A great question here is why is a particular strategy required if a reader follows his or her own strategy while reading a technical text. But here, while blending all the strategy while reading a text which will not allow one's mind to be flexible in comprehending a text in a particular way.

Questioning from the text will help both the reader and evaluator understand what really goes in reading a technical text. The learners from the technical institutes would be able to comprehend the technical text by focusing on the different strategies upon the text. Dunlosky (2013) has pointed that student who resolve

new glitches that contain transferring that was acquired through learning through practice session accomplish better when they practice with self-explanation techniques. One's the students started practicing the specific strategies for obtaining certain criteria. It would benefit more in order to acquire the reading skills. "Second Language-L2 readers were involved in the metacognitive process such as setting goals of reading, monitoring understanding of the text, and revising their strategy use" (Park et al., 2014). "Reading comprehension is indispensable for several noteworthy options of the day-to-day life by understanding and examining a paragraph with tables, charts, images, etc.," (Velmurugan and Smrutisikta Misha, 2020).

"A comprehensive examination of the ways in which people use language while reading to express thoughts and emotions is required for a proper natural language semantics. In order to extract "word meaning" from a vocabulary where natural language's numerical representation through strategies, and multiple criteria have been developed by researchers in natural language processing" (Deepak Kumar et al., 2023).

C. Importance of Reading Skills for English Language Competence

Firstly, any language skills are divided on the source of comprehension skills and production skills. Reading comprehension through input can be equated with receptive skills and productive skills through producing more like output skills. Though they are entirely different in their form with respect to levels of performance demonstrated by the students, and in addition to the pedagogical techniques working to augment the performance, they are interlinked with each other for their improvisation from basic language learning and teaching. So as to make the entire process of language learning in a proficient manner and teaching more efficiently while teaching reading skills, it is very important to identify the criteria and strategies applicable for improving reading skills through focus-to-text modes of instruction. "This is an occasion to scrutinize the involvement in their phonological skills or visual perception skills to the experiential variability in reading accomplishment" (Dessalegn et al, 2013). "Reading speed performance may be partially accountable for abstracting the indispensable sentence structures or syntax information from visual perception, consisting of a domain-general and a domain-specific expertise-based portion in the given text" (Korinth et al, 2012). "At the same time with regard eye fixation by readers from the text, it is investigated that the high-skill readers bounce more words than low-skill readers as a result of eye fixation duration meting out differences based on reading skill. Hence, the reading skill is conceivable to impact word bouncing when the amount of information in the eye fixation falls in the interior the word proof of identity duration" (Eskenazi and Folk, 2015).

D. Purpose of the Present Study and Methodology Adopted

4.1 Purpose of the Study

In the light of numerous facets conversed so far, the purpose of this qualitative case study on the reading skills of technical students is to recognize how language instructors in a technical institution effectively implement strategies to inculcate the skills among the students. The study involves mostly with students-centered while reading a text which is reflected through the instructions from the language teacher.

4.2 Methodology Adopted

As the core tool of data collection, the researcher can learn multiple interpretations of a situation as experienced but the different people involved. Such is the privilege of being close to the source of the data and the theories that inform the approach (Creswell, 2014). In the present study, **the size of the data set** was collected through numerous questionnaires from about **240** students from various Engineering colleges of Tamil Nadu and Union Territory of Puducherry, which includes Government college, Govt. aided college, Private Engineering colleges, and Central Institutions from Union Territory of Puducherry. All the questions centered around reading strategies adopted by the students and their instructors in a language classroom. Eventually, the data was quantitatively and qualitatively analysed to find out the strategic trends of reading among the students and strategies prioritized by the instructors for acquiring the language, thereby leading to enhanced learning outcomes. Different Criteria (C1, C2….C7) and Strategies (S1, S2…S7) of reading were selected and consolidated from the data collected. Each of its prominence and performance scores was recognised, analysed, and validated mathematically through Multi-Criteria Decision-Making (MCDM) technique.

4.3. Multi-Criteria Decision-Making (MCDM)

MCDM is a mathematical approach through which the multi-objective, multi-variables, and multiple conflicting tasks can be analysed in the specified time period to recognise the categories or solve different problems or decision-making in a prioritised manner organising, solving decision and planning problems that involve multiple criteria. "One of the main characteristics of the MCDM techniques refers to the fact that most of them can deal with both quantitative and qualitative data, and also with the subjective opinions and /or the preferences of experts" (Cohon, 2004). The determination here is to sustain decision-makers facing such problems. Indeed, there ensures a unique model solution for such difficulties. It is essential to use decision-makers' preferences to segregate between resolutions that need to frame the study in a focused manner without any discrimination in identifying the problems.

E. Present Study Design

5.1 Problem Statement

The general problem addressed in this study is that the students are:

I. Blending all the strategies while reading leading to slow, confused, and inefficient reading.
II. They are unable to identify appropriate strategies focusing on specific outcomes when having difficulty in reading a text.
III. Focusing on Traditional focus-to-text modes of instruction without clearly knowing if doing so consequences enhance learning outcomes.
IV. Fail to recognize which strategy works the best to the specified different criteria that enhance the reading skill.

F. Experimentation

6.1 Criteria and Strategies or Alternatives of the Study

The following are major criteria selected, which are essential to determine the competence level of the technical students for acquiring proficiency in reading. To acquire the criteria under reading skills, the following strategies were selected to be practiced.

C1: Vocabulary Stock	S1: Prediction
C2: Sentence pattern Identification	S2: Eye fixation / Visual perception
C3: Role of specific textual background / familiar knowledge	S3: Scanning
C4: Read aloud for pronunciation practice	S4: Skimming
C5: Re-read for better understanding	S5: Intensive reading
C6: Reference material consultation	S6: Extensive reading
C7: Prior knowledge awakening	S7: Vocabulary recognition

The study aims to understand the criteria applicable for enhancing the reading skills among the technical students by incorporating appropriate Strategies for the different Criteria posed as a questionnaire and learning how to identify the similarities and differences the students use while reading. “Reading comprehension and measures of lower-level comprehension skills (vocabulary, grammar, and word processing) and a higher-level comprehension skill (inference making), to determine if these measures of higher and lower-level comprehension skills predicted different levels of variance in reading comprehension” (Srisang & Everatt, 2021). The reading skill portion in this study included academic reading by the technical students through the text using prediction, scanning, skimming, eye fixation, intensive reading, extensive reading and making inference techniques in reading, reading research abstracts and research articles (Phantharakphong et al. 2019). “An inspection of the cross variability showed that word decoding in English that explained in unique variance in reading a text, while receptive vocabulary did not explain additional variance in reading” (Wawire and Zuilkowski, 2020).

A. Data Sets Used in the Present Study

The data collected from the technical students of various technical institutions through open-ended questionnaire were mathematically converted into a percentage for the different variables posed in the questionnaire that help to identify the number of students who responds to the parameters of strongly agree, agree, disagree, strongly disagree, and can’t say according to the Strategies used by them to attain different reading Criteria.

B. Data Analysis and Interpretation

The response received through data sets from students for attaining the reading Criteria with different applicable strategies was analysed through Multicriteria Decision Making approach to specify applicable strategies for enhancing the reading strategies among the technical students. Through the data received as responses from the technical students, that categorises variables from different Criteria, and different applicable Strategies which helps to organise/point out the most useful to least useful strategies and the order in which it would perform well for better understanding in reading text. And the performance score calculations of each Strategy used are based on the teachers' and the students' responses. The data was analysed and interpreted from three set perspectives, namely (i) equal weightage perception of faculty and student, (ii) Faculty-based perception, and (iii) student-based perception that classifies the better attainment of different Criteria of reading among the technical students, which would also prioritise the different strategies used for the same through the MCDM approach. “Braten and Anmarkrud (2013) as long as added sustenance for the use of strategic instruction in reading comprehension among the adolescents that refers to daily reading instruction provided without any particular training and which does not pay attention on a specific type of intervention in reading a text.”

7.1. Equal-Weightage Perception

The equal weightage perception of both faculty and student represents the responses collected from technical students and factors to categorize the importance and utilization of different Criteria and different Strategies while reading a text, and rank them as per priority.

Therefore, based on the performance score the important criteria to be followed for efficient reading are given in the following order of importance and usage C2>C6>C4>C1>C7>C3>C5. This weightage focuses on the different criteria that are firmly distributed with the equal proposition is given for analysing the appropriate strategies that work among the technical students while reading a text and also for the betterment in attaining the different criteria with

appropriate or applicable strategies to enhance the reading skills through MCDM concepts.

From the output of MCDM with equal weightage, it is positively found that the C2 syntax or sentence pattern scores 0.68 as performance being the initiative according to the response provided by the technical students that helps in understanding the text by the technical students. In the text-structure strategy condition, students were evidently qualified by what means to trace the theme, recognize the core idea, find subsidiary indication for the significant knowledge, and classify different structural constructions in the text (Ward-Lonergan and Duthie, 2016). C6 reference material consultation stands as second with the performance score 0.61, which shows there would be in need of cross reference for clarification while reading a text. C4 read-aloud for pronunciation practice performance score 0.59 that eliminates the shyness of the readers while reading.

The C1 vocabulary stock scores 0.52, though its requirement helps the reader to fulfil the reading objective. C7 prior knowledge awakening performance score is 0.44 representing the readers in awakening the concepts in the text with the information they had already known. C3 specific textual background/familiar knowledge progressively promotes the readers rather than taking much time to think and recollect the relevant information from the text scores 0.427. C5 re-read for better understanding performance score is 0.420 considered to be the least one according to equal weightage perception represents the readers don't require to re-read while they understand the concepts at the beginning while reading. The equal weightage given to different criteria helps identify what is prioritised in understanding a text in a clear manner among the technical students and faculties.

The equal weightage further concludes that the various strategies of reading a text under different criteria would make readers more oriented towards sentence pattern identification and the least one in re-read where the students never take steps to read a text again for more clear understanding for better performance in reading in reference to equal weightage perception.

7.2. Faculty-Based Perception

The faculty-based perception represents the responses collected from faculty to categorize the importance and utilization of different Criteria and different Strategies while implementing reading skills in the language classroom.

Therefore, based on the performance score, the important criteria to be followed for efficient reading are given in the following order of importance and usage C1>C5>C4>C3>C2>C6>C7. The faculty-based perception represents the projection of analysing the appropriate strategies that work among the technical students while reading a text and for the betterment in attaining the different criteria to enhance teaching reading skills effectively. From the faculty-based perception of MCDM, the C1 Vocabulary performance score is 0.559, which acts as the initiative for any reader to know about the word stock first to understand the meaning while reading a text.

The score provided by the faculty represents the word reading, rapid naming, and orthographic skills were increased moderately to highly loaded among the students for their better understanding of vocabulary through specified factor, which represented general reading (Chow et al. 2017). C5 re-read for better understanding scores 0.553 that represents the readers to understand clearly without any disclamation in reading. C4 read-aloud for pronunciation practice scores 0.546, which expresses to eliminate the shyness while reading a text through the response provided by the technical students. The C3 performance score is 0.544, which represents the specific textual background knowledge. C2 score 0.541 concentrate on syntax or sentence pattern identification. C6 reference material consultation scores 0.540 that represents according to faulty-based perception, the reference from the mentor would be more helpful than any other material. C7 performance scores 0.51 where prior knowledge awakening placed at last where prior knowledge would be the least while reading a text. The faculty perception targets vocabulary that prioritise, and the least one is prior knowledge while reading a text. Knowledge about specific topics or domains helps the readers to understand background knowledge of the text they read (Alexander et al. 1994) and also simultaneously helps to gain the vocabulary (Beck et al.1982) that contributes to increase the reading comprehension where second language readers are not an exception (Park & Kim, 2011). The conclusion represents that the various strategies of reading a text under different criteria would make readers more oriented in accumulating the vocabulary and understanding the meaning of text clearly among the technical students. The language instructor is considered as it is necessary for him or her (teacher) to direct the students to inculcate the fundamentals of the strategies while reading and regulate their level of understanding to pick out the vocabulary which is placed by the writer or author in text. The instruction plays a major role in performing any activity or test or task or challenges in reading comprehension.

7.3. Student-Based Perception

The student-based perception represents the responses collected from technical students to categorize the importance and utilization of different Criteria and different Strategies while reading a text. Therefore, based on the performance score, the important criteria to be followed for efficient reading are given in the following order of importance and usage C2>C4>C6>C5>C3>C1>C7. The student perception of different criteria with different strategies applicable for reading among the readers of technical institutions. The purpose of analysing the data from the response received from the technical students varies from

faculty-based perception to student-based perception to view over the reading skills, which are most appropriate strategies that would focus more towards students oriented to be proficient in reading skills.

According to student perception the output of MCDM, it is categorically representing that C2 syntax, or sentence pattern identification plays a vital role as its performance score is 0.599, which ease them in reading a text. The emphasis on vocabulary progressions is not destined to reject the advanced-level issues, such as difficulty in sentence formation, also impact the reading comprehension that individual variances in reading would consume to overcome the other factors as well (Gordon et al., 2020). C4 read-aloud for pronunciation practice scores 0.567 that eliminates the reader's shyness over pronouncing words while reading a text. C6 reference material consultation scores 0.546 that acts as a guide to infer the meaning with unfamiliar words and their different usages. C5 re-read for better understanding scores 0.535 that represents the understanding level without any disclamation in reading. C3 score of 0.515 represents the specific textual background/familiar knowledge that represents the readers to use their background knowledge of particular text that relates to the content provided in the text. The performance score of C1 is 0.503 represents that the vocabulary stock plays a major role in showing the lack of vocabulary knowledge among students is highlighted here through the score. The performance score of C7 is 0.425 where prior knowledge awakening stands last while reading a text that highlights the readers never put much effort by concentrating on their prior knowledge or sometimes even inefficient to recall or recollect the knowledge, they gained earlier due to lack of practice. The student perception targets high on syntax or sentence pattern identification, whereas readers' efficiency in finding the structure of a sentence in a text is highlighted. The least one is prior knowledge that represents the lack of recalling or recapping what they read in different text material.

TABLE 1: OVERALL PERFORMANCE SCORE ON THREE DIFFERENT WEIGHTAGES

Criteria	Performance Score on Equal Weightage	Performance Score on Faculty Weightage	Performance Score on Students Weightage
C1	0.522	**0.559**	0.503
C2	**0.687**	0.541	0.599
C3	0.427	**0.544**	0.515
C4	**0.596**	0.546	0.567
C5	0.420	**0.553**	0.535
C6	**0.615**	0.540	0.546
C7	0.448	**0.515**	0.425

The performance scores of MCDM of all three i.e., equal weightage, faculty-based and student-based perception highlights the various strategies of reading a text under different criteria enhance the readers more priorities in accumulating the ideas, understand the meaning of text in clear manner and also for the betterment of the technical students in their higher studies. Accordingly, the mentor would design the teaching material and emphasis not only on the top strategies most frequently used by any upright reader to comprehend the given text (predicting, scanning, skimming, clarifying, and summarizing), but similarly on a larger variety encompassing all strategies, making connections, visualizing, knowing how words work, monitoring, summarizing and evaluating, which are highly used for teaching reading comprehension (Ioniţiu, 2019). The study revealed that most of the respondents read various information sources because they are interested in the topic of the study (Kumara and Sampath Kumar, 2019).

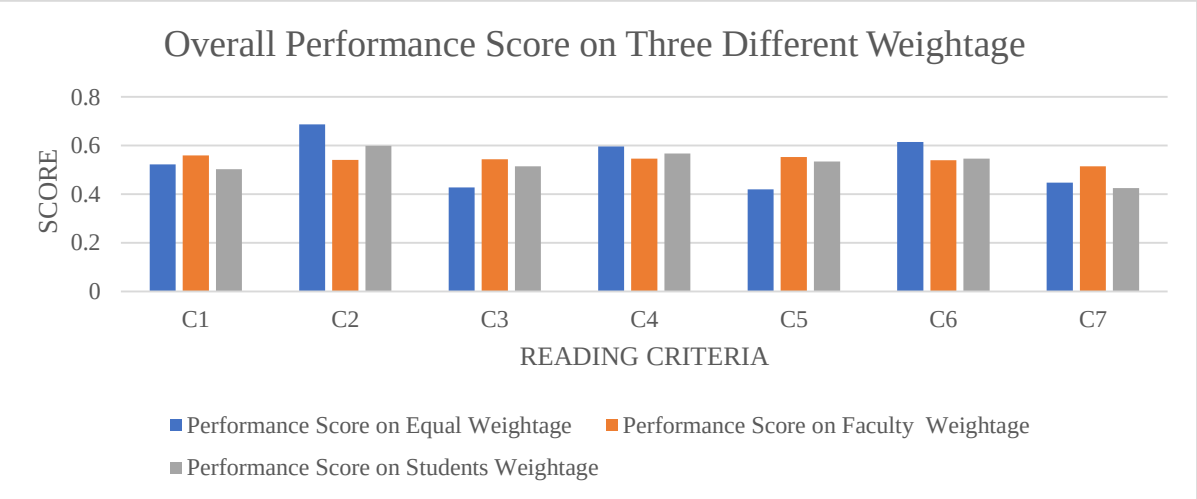

Chart 1: Overall Performance Score on Three Different Weightage

The above chart 1 represent the three different weightages given to the reading criteria with application to the reading strategies. The C1 represent and highlights with the score value of **0.559** with the application of vocabulary stock by the faculty. The C2

sentence pattern score higher in equal weightage with the value **0.687** comparing to student and faculty perception. The C3- role of specific textual background represents highest from faculty perception with the value of **0.544**. The C4 - read aloud with the highest value **0.596** in equal weightage. "An individual as a reader, opined by Velmurugan et al., 2023, has to follow some of the crucial and vital personality traits for increasing their upcoming career through reading strategies based on the criteria required where he/she can attain the stability in fixing with the vocabulary he/she is comfort with to perform his/her language skills."

C. Conclusion and Future Work

Reading skills may be considered to be time-consuming at the initial stage among the technical students where they do get bored on reading without having any fundamental knowledge about or ignorant about the Strategies to be followed and the attainment of Criteria, they have to make it ease in their classroom. The database precisely highlighted on reading strategies used by the technical students once they started to be aware or conscious about the different Strategies and different Criteria to be accumulated while reading that allows them to predict & comprehend the text without any anxiety and also less time-consuming. One of the most fundamental causes that trigger anxiety in human behaviour is the compulsion to perform in an artificial environment which takes one out of his/her comfort zone (Sinha, 2017). The next part is an effort to propose a basis to encounter the aforesaid task. "Therefore, the study determines which kinds of exercises are used the most frequently in the technical English coursebooks that help to carry out for better understanding of the text" (Veverkova, 2016).

The study on reading skills with its different Strategies and different Criteria discuss the continuation in language learning through reading that helps to enhance our comprehension and understanding of how students grow as an efficient reader. Succeeding this study, it is essential to concentrate on implementing appropriate strategies for the specified criteria.

To make the present study in an efficient manner, the analysis through Multi-Criteria Decision-Making helped much to have clear outcomes with different Strategies and Criteria applicable for the technical students to enhance reading skills. In future work, the Task-based language teaching strategies may be included in the syllabus or curriculum, adopted by the instructors, and implemented in the classroom with more variables like listing or brainstorming, sequencing, classifying, problem-solving will be taken up in the future course of work. The findings were from the application of strategies with multiple criteria that they could relate while reading which is required to fulfill the need that is specified for the reader in the text. The overall score performance highlights with application of different strategies depends on the how he or she much consider while reading with criteria specified leads to where the wrought conclusion is unblemished.

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