

Enhancing Knowledge Acquisition in Maritime Training: Alleviating Comprehension Difficulties

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Abstract - This paper discusses the importance of comprehension in the context of maritime training, which is essential in mastering the complexities of the maritime industry. Comprehension, incorporating listening and reading skills, is a backbone of maritime communication for onboard interaction and interpreting knowledge crucial for maritime operations. It helps understand maritime law, ship manuals, and oral instructions during various ship operations and emergencies. The paper discusses factors influencing effective comprehension, including cognitive processes and linguistic proficiency which covers skills limited to vocabulary, morphology and syntax. Additionally, it explores the pedagogy of managing students with comprehension disabilities, which have been overlooked in the past. This is a major challenge faced by maritime training institutes, which impedes the learning process. To address this, a test was administered to 1588 aspiring seafarers to identify factors contributing to underperformance and implement measures to enhance comprehension proficiency by recommending strategies like active reading, listening techniques, and mnemonic devices. The analysis revealed concerns for approximately 25 per cent of candidates in verbal intelligence and 12 per cent in word power. This paper concludes by proposing pedagogy to improve learning outcomes, offering valuable insights for educators, maritime professionals, and stakeholders seeking to optimize learning within the maritime sector.

Keywords: Comprehension Difficulties; Learning Outcomes; Linguistic Proficiency; Pedagogy.

INTRODUCTION

The comprehension of written content, both in print and digital media, and oral content in general and professional communication plays a vital role in the maritime profession,

especially in interpreting laws, regulations, technical manuals, operational instructions, and interactions with the crew and other professionals, as well as for making informed decisions. Despite its importance, comprehension challenges at higher education levels are often overlooked, necessitating further research. Communication courses should therefore emphasize comprehension skills, including decoding, predicting, summarizing, visualizing, analyzing, synthesizing, and critical thinking.

At the primary level, the focus is on listening comprehension, shifting to reading comprehension at the secondary level. Effective reading and listening skills are crucial for academic and professional success, and neglecting them can affect students' academic performance.

Thus, to identify the areas of concern for the students of Marine Engineering and Nautical Sciences, their entry-level comprehension abilities were assessed by conducting a test. The test was administered to 1588 candidates who wanted to join marine engineering or nautical sciences programs. Some of the parameters of the test included verbal intelligence which involves problem-solving through language comprehension, non-verbal intelligence which involves solving problems using reasoning and graphics, and aptitude test which measures general intelligence, numerical skills, perceptual formation, clerical abilities, speed and motor coordination, and spatial understanding.

The study showed a strong correlation between verbal and non-verbal intelligence and overall aptitude suggesting that aptitude remains within an acceptable range even if one intelligence component is weaker. Verbal and non-verbal intelligence can be enhanced through targeted pedagogical strategies. Therefore, students with high aptitude, despite weaknesses in either verbal or non-verbal

intelligence, can be considered for maritime courses, given appropriate educational interventions.

Additionally, inefficiency in verbal and non-verbal intelligence negatively impacts physics and math (PM) scores. Complex problem statements hinder students' interpretation, affecting their performance. Definition-heavy numerical problems pose comprehension challenges, leading to difficulties in interpreting both words and graphics.

Considering the result of the test, the paper discusses the pedagogical strategy which includes 5 steps to improve the comprehension proficiency of the students shown in fig. 1.



Figure 1 Five-steps Pedagogy

LITERATURE REVIEW

Comprehending written content either in print or in digital media plays a vital role in every walk of life from learning to earning. Especially, in professional activities which include interpreting laws and regulations, instructions and technical manuals, critical thinking and decision-making, comprehension is a vital responsibility of all involved. Very little thought is given to the problems of comprehension at the higher level and there is a need for sufficient research to make it strong in the field of education. In maritime training, comprehension plays a significant role in the interpretation of ship manuals, maritime regulations and instructions during ship operations. Hence, while designing the course in communication, comprehension skills should be regarded as essential with a gradual introduction of its subskills like decoding, predicting, summarizing, visualizing, analyzing, and synthesizing at all levels of the curriculum.

At the primary level, the focus is on listening comprehension while at the secondary level the emphasis shifts to reading comprehension. It is seen that listening to a passage often helps if the person is unable to interpret by reading. Although, both are receptive skills in language acquisition, there are differences in the approaches towards mastering. Listening involves interpreting sounds, words, sentences, and overall discourse, while reading involves comprehending words, sentences, paragraphs, and passages. As mentioned, at the higher level reading becomes more important being the secondary skill. Moreover, it

complements writing higher order articles, papers, reports and technical documents by engaging the reader in gaining knowledge, insights and understanding of the core areas of their interests.

In essence, reading is a cognitive activity in which the reader engages actively to gain understanding and reflect on their responses [1]. Reading skills imply better academic performance, lower academic dropout rates, better access to a salary, and greater social mobility, ensuring active participation of expert readers in today's society [1]. Similarly, listening skills imply better impromptu communication, good social bonding, better understanding and less miscommunication.

At the higher level of learning mostly the texts are expository as they aim to inform or explain in a logical manner focusing on clarity and precision. However, sometimes these could be descriptive to describe characteristics, functions or specifications of objects or narratives to report incidents or narrate case studies. Although reading is crucial, effective listening also plays an important role in the maritime sector as it involves oral communication while performing ship operations and in emergencies, there is no room for miscommunication.

Effective reading comprehension is influenced by various primary aspects, including general background knowledge, familiarity with typical text forms including narrative and expository texts, vocabulary knowledge, and reading fluency meaning readers can recognize words automatically and group them into meaningful phrases, which allows them to read smoothly and with minimal effort, and finally task persistence which enables the reader to continue reading challenging tasks [2]. Similarly, effective listening is influenced by attentiveness, empathy, nonverbal clues, open-mindedness and genuine interest of the listeners [3].

RESEARCH METHODOLOGY

Considering the basic linguistic requirements of the maritime education/industry, there was a need to assess the entry-level of the students by conducting a test. The test aimed at the development and implementation of a Tolani Maritime Institute (TMI) specific screening system to improve student selection. This online test was customized

to suit the marine industry. For the test to be valid, 24 faculty members who were ex-mariners took the pilot test to give their inputs for the selection of the parameters and the weightage to be given to each of these parameters. Some of the parameters of this test to identify the areas of concern were 16PF (Personality Factors), interest, PM (Physics Math), verbal and non-verbal intelligence and aptitude. The faculty took this online test for one and a half hours. The real-time test was of 6 hours by splitting it over two days (3 hours a day). 90% of 1588 respondents completed the test. One of the aims of the test was to identify comprehension disabilities while learning the concepts of engineering and nautical sciences. Therefore, for the selection of the students who fit in the requirements of the maritime profession and the training, it was necessary to check the relation between the parameters of the test and their application to the maritime industry.

The study reflected a notable correlation between verbal and non-verbal intelligence and overall aptitude. Data analysis showed that high levels of verbal and non-verbal intelligence are strongly associated with strong aptitude scores. Therefore, students who excelled in either verbal or non-verbal intelligence still demonstrated high aptitude. This suggests that verbal skills can be enhanced through targeted pedagogical strategies, and the same applies conversely. The ideal scale rank for consideration was 1,2 and 3 for all the three parameters of the test. 4 indicates moderate difficulty and 5 indicates severe difficulty. A score above 5 would be more challenging for the students to address during their academic endeavors.

The hypotheses made to identify the co-relation between the parameters under consideration are as follows:

H0- The parameters tested for selecting the candidates for admissions are independent variables and have no co-relation.

H1- The parameters tested for selecting the candidates for admissions are independent variables and have some positive co-relation.

Looking at the analysis in table 1, the co-relation between verbal intelligence and aptitude as well as between non-verbal and aptitude is reasonably good.

Table 1 Co-relation and Hypothesis Testing

	Variable 1	Variable 2	Correlation	p-value	Hypothesis Testing
0	PHYSICS	MATHS	0.29368	0.0000010870	H1
1	PHYSICS	APTITUDE	0.32242	0.000000753	H1
2	PHYSICS	VERBAL INTELLIGENCE	0.22616	0.0001996261	H1
3	PHYSICS	NON VERBAL INTELLIGENCE	0.16447	0.0071848484	H0
4	MATHS	APTITUDE	0.36736	0.0000000006	H1
5	MATHS	VERBAL INTELLIGENCE	0.31853	0.0000001100	H1
6	MATHS	NON VERBAL INTELLIGENCE	0.13277	0.0304076888	H0
7	APTITUDE	VERBAL INTELLIGENCE	0.61563	0.0000000000	H1
8	APTITUDE	NON VERBAL INTELLIGENCE	0.53612	0.0000000000	H1
9	VERBAL INTELLIGENCE	NON VERBAL INTELLIGENCE	0.49823	0.0000000000	H1

For less than 5 scale rank in all the three parameters under consideration, the acceptance of the students for the courses is justified. Thus, more than 60% of the respondents have acceptable aptitude if their verbal and non-verbal intelligence is good. It is discernible that if the aptitude is good then there is a positive co-relation in Math and Physics. Consequently, if the verbal intelligence is good the aptitude is good and the academic performance will improve.

Let us see the impact of the P-value used to test the hypothesis as given in fig. 2.

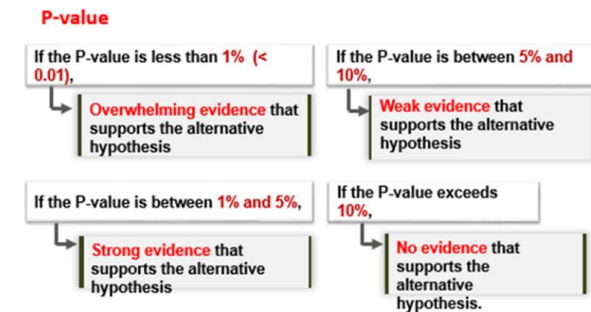


Figure 2 Impact of P-value

Applying this to the data, the verbal intelligence and aptitude and non-verbal intelligence and aptitude both have less than 1% P-value clearly seen in table 1. This implies that it strongly supports H1.

In short, the co-relation analysis indicates that a lower P-value signifies a stronger correlation and better performance. This means that enhancing verbal intelligence, regardless of the students' current level, will naturally boost their academic performance.

Table 2 and 3 further support this finding, demonstrating that aptitude remains within an acceptable range even if one of the intelligence parameters is weaker. Consequently, students with high aptitude, despite

potential weaknesses in either verbal or non-verbal intelligence, can be considered suitable candidates for admission into courses in the maritime sector, provided that appropriate educational interventions are implemented to address these areas of concern.

Table 2 High Aptitude Low Verbal Intelligence

Sr No	PM Test-out of 40	Verbal Intelligence	Non-Verbal Intelligence	Aptitude Test
256	17	9	1	3
488	21	9	1	3
676	23	9	1	3
703	23	6	4	3
919	26	6	5	3
942	26	9	8	3
1020	27	9	10	3
1321	30	6	1	2
1360	30	9	1	3
1502	32	9	1	3

Table 3 High Aptitude Low Non-verbal Intelligence

Sr No	PM Test-out of 40	Verbal Intelligence	Non-Verbal Intelligence	Aptitude Test
15	8	1	6	3
26	10	1	6	3
351	19	1	10	2
463	20	1	6	2
728	24	1	6	3
932	26	2	9	3
933	26	1	7	1
942	26	9	8	3
966	26	1	7	3
1020	27	9	10	3
1313	30	1	6	3

An additional observation from this study is that inefficiency in verbal and non-verbal intelligence negatively impacts Physics and Math (PM) scores. This suggests that when problem statements are lengthy or complex in language, students struggle with interpretation, which adversely affects their performance. Furthermore, numerical problems that are heavily definition-oriented pose challenges in comprehension, leading to difficulties in interpreting both words and graphics. The striking feature of this data is that if the verbal intelligence ranks more than 6 there is not a single respondent with rank 1 or 2 for aptitude. And there are only 2 respondents with aptitude rank 1 and 2 when the non-verbal intelligence ranks more than 6. Thus, low verbal and non-verbal intelligence affects aptitude. Table 4 provides sufficient evidence.

Table 4 Low Aptitude Low Verbal and Non-verbal Intelligence

Sr No	PM Test-out of 40	Verbal Intelligence	Non Verbal Intelligence	Aptitude Test
19	9	10	9	6
29	10	10	10	7
43	11	10	8	5
55	11	9	10	7
93	13	10	8	5
105	13	10	10	6
106	13	10	10	6
138	14	9	10	6
145	14	10	8	5
174	15	10	10	7
185	15	9	9	5
201	15	10	8	6
219	16	9	10	7
229	16	10	10	6
284	17	10	7	6
286	18	7	9	6
310	18	10	9	6
314	18	9	10	6
354	19	9	8	7

Having taken into account these findings, it becomes necessary to devise step by step strategy for satisfying the needs of the industry and aspiring marine engineers and nautical officers.

RESULT AND PEDAGOGICAL DISCUSSIONS

As a result of the study, the students with difficulties in verbal and non-verbal intelligence can be considered to be admitted to the maritime training courses provided proper targeted pedagogical strategies are planned. Out of 1588 candidates around 25% showed difficulties in verbal intelligence and 15% in nonverbal intelligence as shown in table 5.

Table 5 Representation of Scores <5 for the Three Parameters

Category	Score	No of studentnts	%
Verbal	<5	1179	74.244332
Non Verbal	<5	1362	85.768262
Aptitude	<5	1246	78.463476

Incorporating LSRW (Listening, Speaking, Reading and Writing) approach at the higher levels of education will enhance the verbal intelligence of the students. Bringing out the interrelatedness, interdependence and connectedness of concepts is often viewed by many scholars as an ideal pedagogy [3]. Hence it is essential to focus on each language skill with equal weightage. However, since the paper focuses on comprehension, only listening and reading skills are considered in this discussion.

When students are conscientised to understand that, listening, reading, speaking and writing, are related and interdependent and therefore, one would not be able to fully develop his reading, speaking and writing skills

without listening skills, they are enticed to take the lessons seriously [3]. Hence, it is suggested that listening to be given one fourth of the weightage in the assessment to bring seriousness.

Given that listening is crucial and the most basic skill to master, the teaching strategies should include many listening activities. The two essential sub skills of listening for effective communication are:

1. Prediction: It enables to predict in the given context and especially, in emergencies or in safety related discourse this skill will be crucial.
2. Summarization: It enables to summarise or locate the main ideas.

The major challenge in learning this skill is the speed of speaking. With proper focus and giving intensive listening exercises this challenge can be minimized. The testing of these subskills can be a part of the internal assessment system like listening to clips and responding.

Similarly, although reading is being taught right from the early school days, the need to develop the skill is still felt and the results discussed in this paper support this statement. The teaching method is single, the teaching design is monotonous, the classroom atmosphere is dull, and students just passively accept knowledge [4]. Therefore, it has become an urgent task to transform traditional reading teaching methods, stimulate students' reading motivation, enhance their reading interest, and ultimately improve their reading ability [5].

For reading comprehension, some of the essential subskills are:

1. Skim and Scan: It enables to look for the specific information while reading the log entries or general information.
2. Intensive Reading: It enables to look for the minute details in the text. Especially while reading manuals of the ship and machinery helps to follow the instructions meticulously.
3. Extensive Reading: It enables to look for additional information while studying a subject. Hence, reading magazines and papers, journals and other reference books enhances the subject knowledge [6].

The major challenges in learning reading skills are a lack of diversity in tasks and interest, lack of motivation, slow speed of reading and focused reading [7]. Many times students do not know what to read for and how to locate the necessary information in the given texts. However, by devising step by step learning approach this can be achieved. Thus, for enhancing both the receptive skills following model is recommended:

Step 1: Lead in

Brainstorming of the listening or reading topics by giving general instructions. The students should think, recollect and generate some ideas about the topic.

Step 2: Pre-listening/Pre-reading

Students can talk to each other and share their knowledge and experience about the topic and prepare some notes to help them further. Vocabulary related to the topic can be discussed and the faculty may assist them in identifying the words and expressions.

Step 3: While-listening/While-reading

Students listen/read the clips/text and individually try to understand it. The faculty can provide sets of questions to help them look for specific information as well as intensive listening and reading.

Step 4: Post-listening/Post-reading

Students present the answers to the class. This can be done with group discussion. Students first discuss their answers and interpretations in groups and then present to the class.

Step 5: Conclusion

With the help of the teacher summarization of the clip/text is done.

In addition to this method, the assessment should be done accordingly by making them listen to the clips and read the passages. Although reading comprehension is assessed in most of the examination patterns, listening needs more attention.

CONCLUSION

There are two main conclusions:

1. High verbal intelligence enables good understanding of any course leading to better academic performance.
2. It is possible to enhance verbal intelligence following a structured approach of LSRW.

ACKNOWLEDGEMENT

I would like to express my gratitude to the Principal of Tolani Maritime Institute, Dr Sanjeet Kanungo for encouraging and guiding me towards this quantitative research by providing factual details. I would like to thank my colleagues Mr Rahul Kale and Dr Ganesh Ingle, Mr Sachin Vyavahare, Mrs. Shabana Shekh and TMI faculty for providing all the necessary help to come up with the pedagogy for dealing with such situations.

REFERENCES

- [1] M. Urrutia, et al., "Impact of Affective and Cognitive Variables on University Reading Comprehension", *Education Sciences*, 2024, 14, 554.
- [2] T. Ko, and M. T Huges, *Reading Comprehension Instruction for Adolescents with Learning Disabilities: A*

Reality Check", *Education Sciences*, 2015, 5, pp.413-439.

- [3] K. Fenyi, et al., "Teaching Listening Skills in Senior High Schools in Ghana: Issues and Directions", *Journal of English Education*, July 2021.
- [4] G. Feng, and J. Zhong, "On English Reading Teaching in Junior High School based on ARCS Learning Motivation Model," *International Journal of Social Science and Human Research*, vol. 7, pp. 3580-3593, June 2024.
- [5] P. John, "Building a Quantitative Linguistic Profile of Bridge Team Communication for a Performance Assessment of Native and Non-native Speakers of Maritime English," *University of Tasmania, Australian Maritime College*, March 2019.
- [6] H. Hijazi, et al., "Cognitive Linguistics: A Brief Introduction," *Scientific Reports*, vol. 14, 13678, 2024.
- [7] H. K. Wardan, et al, "Identifying Students' Difficulties in Reading Comprehension Tests" *English Journal of Indragiri: Studies in Education, Literature, and Linguistics*, vol. 8, No. 1, pp. 2589-5140, January 24.