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Reducing Cognitive Overload among Students through Language Games

Kala Chandrasekaran, M.A., B.Ed., PGCTE(CIEFL), M.Phil.

We Need to Adopt New Methods

In a globalised world where success in work depends to a great extent on one's communication skills, the modern English teacher needs to provide able support in the form of materials and tasks that will help students of engineering and technology develop their communication skills.

The teacher's objective should be to develop suitable teaching methodology for students of engineering and technology who find the conventional methods of teaching irrelevant and moribund. It is indeed a challenge to the teacher to change teaching methods according to the varied and diverse learner abilities and knowledge.

Students look for learning strategies which have high interest value and matter which can be rapidly assimilated. The linguistic skills of students should be developed by laying a greater emphasis on accuracy on grammar, vocabulary, genres of writing, and mechanics such as spelling and pronunciation.

If students are encouraged to play vocabulary enrichment games in a non-threatening environment, their interest in language learning is kindled.

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Grammar reinforcement through games transfers language usage principles from working memory to long term memory and this results in better understanding and usage of English. The materials and methods of teaching should enhance the engagement of students. The teacher should challenge conventional thinking and innovatively use all available resources to drive positive changes in the lives of the learner fraternity. The faculty is expected to capture a sense of optimism about the future and determination to shape one’s own destiny among students. Their services should empower students to achieve their aspirations.

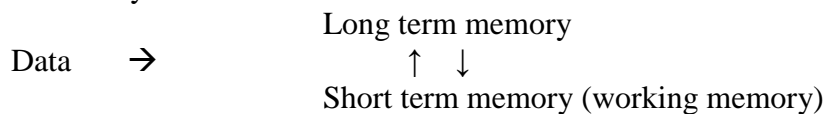
The teacher is expected to achieve three goals: accepting no limits, alternative thinking and driving positive change in learners. Accepting no limit means taking on big challenges. Alternative thinking means breaking the shackles of conventional methods of teaching, and positive change means impacting the lives of the learner community – catalyzing ambitious and innovative growth of learners.

With the conventional teaching, the classroom is teacher-centred and lecture-oriented. But new methods are task-based and skill-oriented. The new method demands an actual use of the English language in the classroom and encourages interaction among them. The teaching of mixed group of students with a wide range of abilities in English always presents a considerable challenge to English teachers. The onus lies on the teacher to guide and provide extra support to low-achievers from the vernacular medium of instruction. Correcting mistakes rigorously made by learners in early stages may discourage them from trying.

Working Memory versus Long Term Memory

Students utilize their working memory and long term memory to acquire information. Schema acquisition is limited in working memory as its capacity is also limited. The term "cognitive style" refers to the way pupils process information in their head in a way that is distinctive to that individual. A person is set in a particular cognitive style from birth. In contrast, a learning style is a manner in which a learner interacts with and responds to the learning material or environment. A person's cultural background may influence his learning style. The student may also use a different learning strategy depending on the task.

In Cooper’s opinion the working memory is limited while the long term memory is essentially unlimited.



Working memory can at a time deal with seven elements of information simultaneously. According to Einstein, “interest is the best teacher”. If teachers create interest in students in the subject, then half of the job is done. Where the learning process is joyful, then maximum learning takes place.

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Visual Learning

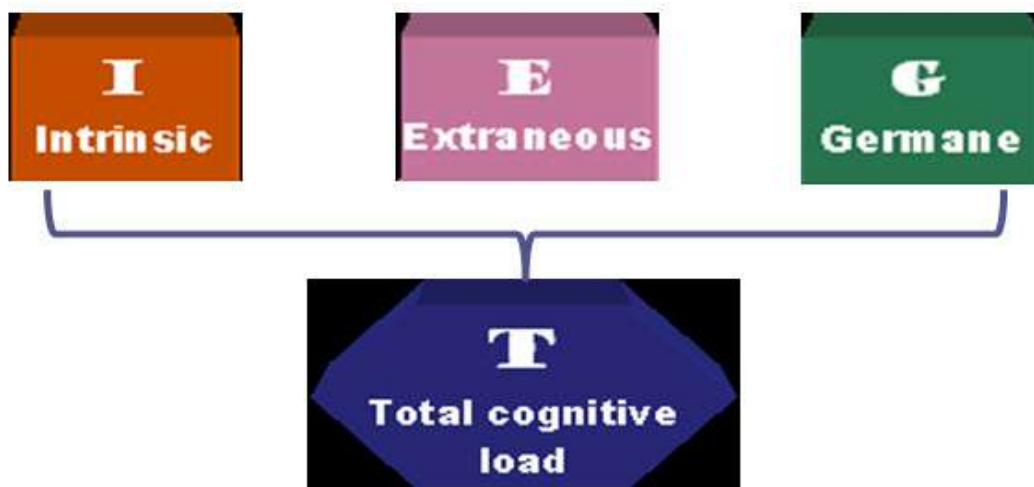
Visual learning refers to a student's need to see body language or facial expressions from the teacher to fully grasp the lesson in addition to visual inputs on screen or on the blackboard. Others are auditory learners who get the most out of the lesson through lectures and discussions. They may benefit from noting things like voice, pitch and tone. Kinesthetic learners need hands-on experience with the subject, and they need to be able to explore their world or environment. They may become restless if forced to sit through long lectures with not enough activity.

Types of Cognitive Load

A potential problem is that the processing demands evoked by the learning task may exceed the processing capacity of the cognitive system—a situation called cognitive overload.

Types of Cognitive Load

Modified from Chipperfield (2006)



Meeting Students' Needs: Reading Comprehension

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Nowadays it has become common for all engineering colleges to proudly claim to have a language laboratory as it is prestigious to say that language learning is taught through multimedia. But the skills we concentrate on for aiding the vernacular medium students should be custom-made. Reading comprehension skills in the software packages or in the textbooks have to be tailor-made to suit the level of students. Some passages having difficult and unfamiliar phrases and complex clauses baffle learners and they keep reading the same lines without proceeding further.

For example phrases like “taking cognizance of the fact”, and “intrepid venture” affect split attention among students. The same expressions form passive vocabularies for a high achiever but for a low achiever they make them get stuck in the same lines and they are not able to complete the reading comprehension in time. Here the use of cognitive ergonomics plays a vital role. Cognitive ergonomics is cognitive engineering that prescribes solutions to cognitive design problems. Software should engage students in the learning process through language immersion.

Methodology Adopted

When the affective filter caused by lack of motivation and self-esteem is brought down, a better learning can take place. Initially vernacular medium students were given newspaper headlines to read to encourage content understanding. They were also told to use their existing, already acquired schema to gain competency in the target language. They were encouraged to use their first language competency to learn the target language. For low achievers it is necessary to persuade them to concentrate on content rather than form to gain proficiency in English.

While dealing with the teaching of the vernacular medium students, a sample of 30 were taken and they were initially given conventional methods of teaching namely the chalk and talk method and the method of making them memorize the answers. This method did produce temporary results in the sense that the learners were able to reproduce essays, letters and simple grammar usage by rote learning. But in the long term, it did not have the desired result. Then for a period of four months they were taught using multimedia, interactive participatory activities and language games. It was found their learning curve was higher if they were made to actively engage in the learning process. When cognitive skills consistently match students’ learning styles, this creates optimal learning.

Design Materials to Reduce Cognitive Load

From time immemorial, educational reforms have been advocated for effective learning. The methods of teaching, materials for teaching have been on a constant revamp. Making English learning interesting to vernacular medium students in a professional college has been a challenge to English teachers. Learning English is not a high priority to engineering students. But the importance of English for professional college students cannot be overemphasized.

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When teaching English in a mixed ability class, the teacher finds some students sitting completely bored and frustrated with glazed eyes. They are physically present but are mentally absent. This is a sign of cognitive overload. Cognitive ergonomics is cognitive engineering which ensures effective utilization of materials so that maximum learning takes place. Effective cognitive ergonomics optimizes learners' performance.

English for Specific Purposes and Cognitive Load

English for Specific Purposes is an important component for engineering students. It is essential to create a diversity of language teaching and learning situations which are meant to take the stakeholders around the world. Graham Cooper (Cooper., Graham (1998) Research into Cognitive Load Theory and Instructional Design at UNSW accessed on 3.8.2011) describes cognitive load as “the total amount of mental activity imposed on working memory at an instance in time”

The major element that contributes to cognitive load is the number of elements that need to be attended to. Reducing the intrinsic cognitive load and the extraneous cognitive load and increasing the germane load in language learning result in maximum learning. These days an unimaginable repertoire of information is thrust on a heterogeneous mixture of students. Teachers should possess a high degree of confidence to adopt different teaching methods that absorb the interests of students and motivate them to become autonomous learners.

Impact of Mother Tongue Medium on English Learning

When students enter college from school, even English medium students find English usage in classrooms difficult to follow because the English language was taught to them through the medium of Tamil. The mushrooming of English medium schools and convents has not really resulted in learners' fluency and accuracy of English in semi-urban and rural areas. Students from vernacular medium are at a disadvantage. It is never easy for teachers to change their methodology. By an extended practice, it becomes a habit and to deviate from that requires a lot of effort and conscious labour.

With the advent of technology, it has become common to all technical institutions to have language laboratories where learners are given hands on training in the four skills of language: listening, speaking, reading and writing. Multimedia teaching techniques are used to make content interesting not only in language learning but also in learning all other technical subjects. But when students are not competent in English, the deluge of information thrust on students through the various media act as barrier to learning.

Materials Tailored to Reduce Cognitive Overload: Business English Game

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Teaching Business English through games helped. Students were given situations and they were given choices and asked to choose the most suitable one. Corporate jargon and official tone were taught to the students. To increase the Business English vocabulary of students, they were asked to visit websites of various companies (IT companies for IT, CSE students, and construction companies for Civil engineering students). They were asked to study the websites and guess the meaning of words used there. Games like ‘Identify the Entrepreneur’ (JRD Tata, Dhirubhai Ambani) were played in the class.

Prefixes and Suffixes

Teaching prefixes and suffixes through a game made it interesting for them to try. They were given a root word with different prefixes as choices and were asked to make a word opposite in meaning using the correct prefix. Students should accept the correct prefix and reject the wrong prefix. Then the words keep building like a pyramid. As initially it is pick and drag the cursor, it was motivating for them to try these games for a long time. Many vernacular medium students were not aware of the many prefixes and suffixes which they can use. This game helped them with a choice of prefixes and suffixes and made them choose the correct one.

Master Your Tenses

The tense game is another computer game which has three levels. So a novice can start with the lowest level and then slowly graduate to the higher levels. Students were given different examples of tense usage in all the three tenses – present, past and future. A game in which the learners have to “treasure-hunt” the correct usage of tenses was customized for ESL learners. Paragraphs were dictated to students and it was tested how fast students can type a dictated paragraph without making errors.

Matching Two Sets of Sentences

A sentence from everyday conversation was given on the left and on the right there was a choice of six to eight sentences. Students should pick and match from the right side the correct choice of sentence with the one on the left. The choices were such that the students could only choose the correct answer from the right.

Some Essential Processes

While customizing games for learners of English as a second language, it was ensured that **redundancy** was eliminated. The same text was not given in both audio and visual form.

Exercises were constructed in such a way that they were given in small bite-sized chunks or sub-schemas which they can easily absorb. **Segmenting** of long passages into bite-sized modules ensured that students did not get distracted while reading. Some of the reading and

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listening comprehension passages were tailor-made removing complex phrases, clauses and vocabulary so that “**split attention**” does not occur. Glossary at the end of the reading comprehension results in split attention. Hence it was removed. The barriers to learning were completely weeded out. While making students play language games, the narration and visual support were **synchronized** instead of giving them successively. Having glossary at the end of the passage also effects split attention among low achievers. It distracts them from reading for meaning.

Avoiding Overload

When information content is rich and the pace of presentation is fast, overload occurs. It was ensured that learners can learn on their own speed. To facilitate easy learning, mind mapping and mnemonics were taught to students. Learners took part in dramatization so that they could get to use English in a non-threatening environment. Learning situations were created where the English grammar rules could be internalized and using the language becomes spontaneous. Mind-mapping, mnemonics and association of ideas were also used to reinforce what is learnt and it was found that the learning curve of the vernacular medium students improved (Fig.1).

Graph

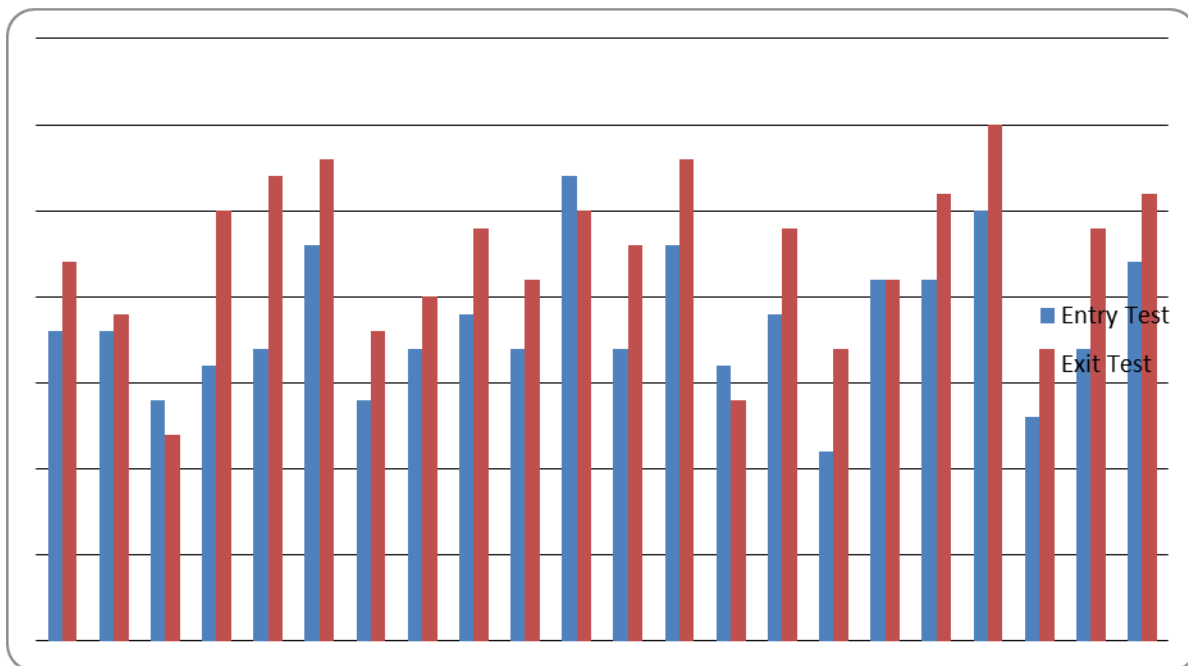


Fig.1 Scores of students in entry and exit level tests

Conclusion

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“English is a necessary tool for a person who wants a good job and a cosmopolitan outlook,” says Ms.L.Mingyan, a Chinese learner of English. Students were given constant practice for attaining dexterity in English communication skills. The vocabulary games not only enriched their vocabulary but helped them use appropriate words in academic and professional contexts. As effective communication is the fulcrum on which successful relationships are built, learners were given the confidence to use English effectively.

At the end of the target period, it was found that students had lost their disinterested and passive look but had started actively participating in the activities instead of being silent spectators. They had developed a more lucid writing style because the activities had promoted learning. When a test was conducted at the end of four months, the learners admitted to being equipped with fundamentals of business communication.

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