Teaching Mind Maps: An empirical study to test impact of teaching thinking tools to enhance coherence in employment documents

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Abstract

This paper sets out to study the enhanced coherence in writing of first time technical writers after teaching the thinking tool like Mind Maps along with other attention directing tools pre writing.

Thinking skills are one of the most important, yet inadequately addressed areas of the curriculum for teaching employability skills and career development. The Scope of this study is a group of 150 third year engineering students majoring in mechatronics, aerospace and aviation, who were required to prepare their employment documents as part of course for employment communication. Instrument used for research is assessment of student's essays on 5 point scale consisting of descriptors based on Topical analysis for Coherence.

Keywords: Coherence, Thinking Skills, Thinking Tools, Mind maps, Career Development.

Introduction

Writing is vital for career exploration and career readiness. It is essential to navigate bias in artificial intelligence based application tracking system to get the initial interview with the employers. Many western universities assess application essays using automatized systems(Melekhina & Levitan, 2015) and Indian students aspiring for their higher education must know how to write essays worth these machines. In technical colleges the focus is not much on teaching language. It has been observed that first time technical writers find it tough to express their knowledge and to reflect their hard work in their research construct and employment documents. As they write and rewrite their manuscripts quality of writing improves on impulse, but no one help by stating the real problem-lack of Coherence. With practice scholars learn to write better without understanding the underlying elements of coherence in writing. Teaching students to collate data in a structured fashion using thinking tools can help improve the quality of technical communication, as coherence accounts for meaningful text tailored specifically for an audience and context(Karadeniz, 2017).

Most graduates would like to be creative. Organization hiring fresh graduates will endorse this urge. However, in the end the big question looms, "How do I do it?" Remembering, visualizing and writing down all learning experiences relevant to a job or admission process in a coherent manner is a daunting. Articulating and customizing these documents further for various application processes is confusing and uphill task(Schwieger & Ladwig, 2018).

Keeping all these complexities in focus, Visual Thinking Tools like Mind mapping and writing structures(Deborah, n.d.) were introduced to undergraduate writing course for employment

documents. Students were taught a module on creating mind maps using key concepts like academic background, personal strengths and weaknesses, co-curricular and extra- curricular participation, trainings and certifications done. This study recorded the coherence in written documents like statement of Purpose, Resume and Cover Letters measuring the frequency of keywords and skills relevant to industry in the preliminary personal essay on 5 point scale consisting of descriptors based on Topical analysis for Coherence(Todd et al., 2004).

Problem Formation:

Employability is complex and creating a marketable personal brand is a creative process. It demands to put lot of information in a coherent manner to match it to the job description. Ensuring keywords of job description are used in written documents and suitable evidences are presented in virtual or physical interviews is a daunting task. It involves great amount of critical and creative thinking(Gushchin, 2015). Students' tie them up to the idea that they are not creative enough, as they simply try to avoid efforts they feel are doomed to fail. This is a classic motivation dilemma described by Attribution theory(Attribution theory in social psychology. - PsycNET,1967)

Writing your self-perceived competencies and abilities developed during higher education for a reader is a demanding task(Super & Knasel, 1981). Collating experiences spanning 10-15 years in a single document; whether resume or personal essay, is very complex and may be demotivating but essential(Monteiro et al., 2020).According to Social Cognitive Career Theory, both self-efficacy and outcome expectations are task specific and domain specific constructs (Arthur Nancy & McMohan Mary, 2018). Writing construct includes both cognitive construct and social construct. Appropriateness of content is always context specific(Di Maggio et al., 2020).

Enabling student creativity using visual thinking tools like the mind maps in their employability training can support in building self-efficacy(Al-Jubari et al., 2021) in writing marketable employment documents. Putting positive learning experiences in a mind map as a pre writing exercise helps foster higher motivation to write as perception of self-efficacy influence writing directly(Buran & Filyukov, 2015). It has an impact on personal goal setting as well(Heslin & Seibert, 2016).

Writing construct will require cognitive competence in sync with social competence specifically while writing employment documents. Written text (linguistic competence) should display knowledge of employer preferences (social competence), along with matching key requirements of job description (cognitive competence) in order to grab the reader's attention(Melo et al., 2021).

Bringing cognitive competence together with social competence using the right words and phrases (keywords from Job descriptions) and putting it all together in a coherent manner relevant to each job/admission opportunity is creative and critical. It require a lot of pre and post writing work(Pennebaker, 2017).

As the focus should be on being more relevant than impressive, it is important to highlight the great stuff in the crowd of average stuff. Utility of simplicity is the prime objective while writing employment documents. A proactive design strategy is required to target reader to avoid psychological human biases along with machine biases(World Economic Forum, 2021).As students start writing without giving a thought to the audience and its expectations, the relationships and interaction among the elements of text, reason for writing ends up being far from satisfactory. What is required is awareness and control of one's thinking and focused approach on the central theme to lend unity to the final product. It requires to be more mindful of the thought process(concern) and using a regulatory device(control) to help focus on the subject at hand(confidence) while exploring the needs of domain ,industry and specific job profile leading to an apt and adaptable document.(Neureiter & Traut-Mattausch, 2017).

Mind Maps popularized by Tony Buzan are network diagrams(Buzan,2002). Mind Maps act as the perfect attention-directing tool being graphic organizers that aid in visual representation of huge amount of information on a single horizontal sheet of paper. Visually presenting a large amount of information on a single sheet of paper with graphics and colors for immediate recollection of the thoughts

helps in attention- directing at goal. The focus here is on Mind maps specifically as it provides scope for integrating two or three thinking tools for specific purposes. Mind maps act as a thinking mechanism, which helps to shape and plan vast information in a coherent fashion. As an example if we keep the job applicant in the center of a map, and draw its environment shaping applicant's personality. It broaden the horizon of writing from

Individual ⬜family ⬜ education ⬜skills ⬜ community ⬜ province ⬜ country ⬜ world⬜ universe.

In other words it help us to shift attention from micro level to macro level with least effort and in organized coherent manner that is easy to comprehend and understand. Hence making the writing task more coherent and cohesive. Mind mapping is creative visualization that is a mindfulness practice. Mindfulness training improve cognitive abilities. Use of colors in maps helps to capture attention leading to better focus(Vijayavalsalan, 2016).

The interaction of organic branches of mind maps develop an understanding of collaboration of evidence and claims leading to interactional coherence in the written text producing impactful evidence based writing(Patterson & Patterson, 2017).Claimed skills when substantiated with evidence tell better stories(Deborah, n.d.).Colorful graphical visualization induce interest and higher motivation for writing(Schunk, 2000).

Three constituents of self-regulation (environment, behavior and personal) when put together on a single sheet of paper it helps to bring out the inter relations of these factors and the final product created by these interactions(personality) leads to deeper understanding of self and helps in better expression of personality for job(Lent & Brown, 1996).

While writing for job/admission application process, compliance to audience expectations in essay structure will be appreciated (norm awareness). Use of Mind Maps induce cognitive and norm competence(Fuller et al., 2018). Innovative writing instructions support improvement of cognitive monitoring abilities, thus stimulating writing proficiency(Kumari, 2016).

As students start writing without giving a thought to the subject and its constituents, the relationships and interaction among the elements of text, reason for writing and the audience ends up being far from satisfactory. What is required is awareness and control of one's thinking and focused approach on the central theme to lend unity to the final product. It requires writer to be more mindful of the thought process and using a regulatory device to help focus on the subject at hand to portray the self-perceived employability confidently(Donald et al., 2019). It can be rightly understood by the allusion explained by Edward de Bono in his book, Teach Your Child How to Think:

"Computers are nothing without software. The human brain is just an excellent memory mechanism. It requires software to turn this memory mechanism into thinking mechanism" (De Bono, 1993)

The above quote refers to the thinking mechanism, which is a skill. Thinking tool is an instrument required to focus on purpose of communication. There is no specific definition of thinking skills. Thinking skills are various mechanisms with which learners transform their experiences into action. These individual thinking processes are called thinking tools(Buran & Filyukov, 2015). We have variety of thinking tools like Mind maps, Time lines, Venn diagrams, Consequence charts, Six Thinking Hats etc. Mind maps are graphic organizers which aid in visual representation of huge amount of information on a single horizontal sheet of paper. It is an attention directing tool which helps to think visually presenting a large amount of information on a single sheet of paper with graphics for immediate recollection of the thoughts to be inculcated in the final written product. The focus in this study is on Mind maps specifically as it provides scope for integrating two or three thinking tools for specific purposes.

It focuses the attention on questions/statements that explain advantages/disadvantages arising from:

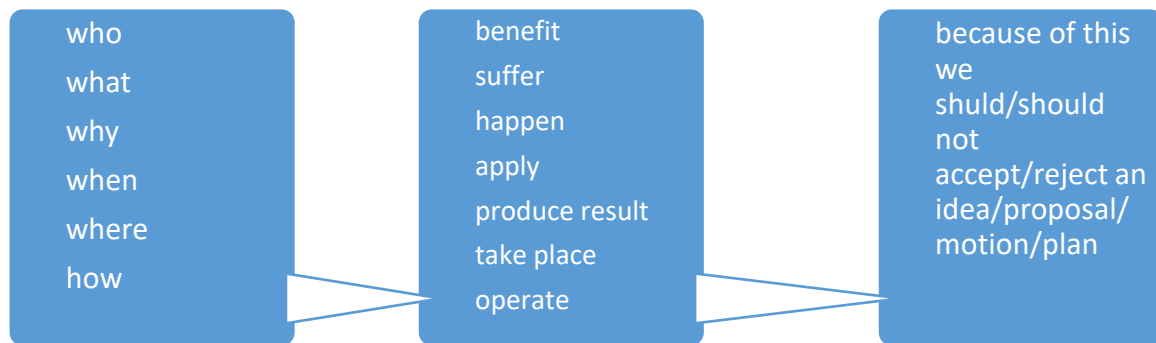| who	benefit	because of this
what	suffer	we
why	happen	shuld/should
when	apply	not
where	produce result	accept/reject an
how	take place	idea/proposal/
	operate	motion/plan

Figure-1

Mind Maps popularized by Tony Buzan(Buzan, 2002) are network diagrams stemming from a central theme connecting the sub topics to the main concept/design or idea in the center. Sometimes they are also referred as spider web charts owing to their appearance.

Researching for technical papers involves extensive notes taking and huge amount of data, it becomes a problem to handle vast amount of information and after a point researcher feels overwhelmed and out of focus(Schwieger & Ladwig, 2018). Mind map act as a thinking mechanism which helps to shape and plan vast information in a coherent fashion. It help to explain the advantages of author's views and disadvantages/clarifications on opposite views by broadening the horizon from individual□family□community□province□country□world□universe, in other words help us to shift attention from micro level to macro level with least effort and in organized coherent manner which is easy to comprehend and understand Hence making the writing task less confusing and more coherent and cohesive(Anderson, 1993).

Mind maps combine visual and linguistic thought.Our brains are wired to rapidly make sense of and remember visual input. Visualizations in the form of diagrams, charts, drawings, pictures, and a variety of other ways can help students understand complex information(Bobek & Tversky, 2016). A well-designed visual image can yield a much more powerful and memorable learning experience than a mere verbal or textual description. Mind maps are a tool for visual thinking which help to organize and present the detailed information about a topic on a single sheet of paper(Bresciani, 2019).

• Sub themes are separated using different colours

• Students were asked to insert smart miniature graphics and images to represent an idea/design or concept. Visual triggers allowed them to capture vast amount of information clearly and concisely.

• Sub themes were further enumerated with supporting evidences and further divisions, like thin connectors radiating out of a brain cell.

• Various factors or constituents of sub themes were connected using stems/hook-connectors/neurons. Associations in various sub themes was shown using arrows, symbols or simply by connecting them.

• Ideas were captured without thinking about chronology or hierarchy. They were grouped together and prioritize later.

Mind map is basically an interconnected structure that links all ideas into a Big Picture overview of the topic, this naturally tends to improve our capacity to associate concepts and ideas with other concepts and ideas in unique ways encouraging creative associations while simulating unique insight, thoughts and answers."- Scinski, Adam.

The Objective

Purpose of this study is to test a shift from chance learning to organized learning through teaching of thinking tools to induce coherence-the connection and organization of ideas in a text to increase unity in written communication.

☐ To assess coherence in writing after teaching Mind Map

☐ To suggest further means and thinking tools to improve the quality of written communique`.

Scope of the paper is limited to a focus group of 150 undergraduate students of engineering who were required to create their employment documents like statement of purpose, resume and cover letters as part of their curriculum for Employment Communication. Initially students were asked to write a dossier for themselves which will act as the base document to create their resumes, cover letters and statement of purpose. Assessment of these dossiers showcased various problems like:

• Weak organization

• Lack of awareness of audience

• Abrupt shifts of time and space

• Fragmentary

• No logical sequence of ideas

• No unity

• Incomprehensible

As our focus group included technical students the assessment concentrated on comprehensibility, coherence and attainment of purpose rather than on learner's language proficiency.

This lead to the introduction of mind mapping where teacher discussed the key concepts essential for the creation if their employment documents. Through mind maps students were taught to consider all factors-CAF (De Bono, 1993) related to the topic and draw them on a horizontal sheet of paper. Each student was asked to draw a mind map keeping him/her in the center and enumerate their academic experiences, co-curricular and extra- curricular experiences, family and friends, values, beliefs, strengths and weaknesses as key concepts in the mind map.

For each subtheme they were asked to provide supporting ideas radiating as thin branches from main branches. They were also asked to use images for quick visual interpretation. (melaniewhiteblog)

As the mind maps were ready, each student is required to write a personal profile using the map. Sub themes helped to form a new paragraph starting with a new concept supported by evidences, but the focus remained onto the central theme that is self.

The data included 150 personal profiles based on mind maps. The group included 14 female and 136 male undergraduates of engineering domains of mechatronics, aviation and aerospace. Their self-dossiers were assessed on a five point scale using Topic Based Analysis (Todd, 2003) to measure coherence.

The descriptors used to evaluate are:

• Frequency of key concepts

• Logical progression of ideas

• Presence of supporting evidences

• Interaction of text and its constituent parts

• Unity and comprehensibility

For presence of each descriptor one point was awarded and an absence was marked by zero.

Mind map induced coherence:

Table-1

MIND MAP INDUCED COHERENCE	
Parameters	%age
Frequency of key Concept	21
Logical progression of Ideas	18
Presence of supporting Evidences	30
Interaction between text	17
Comprehensibility/unity	14

MIND MAP INDUCED COHERENCE (%)

Comprehensibiliy /unity 14%
Frequency of key Concept 21%
Interaction between text 17%
Logical progression of Ideas 18%
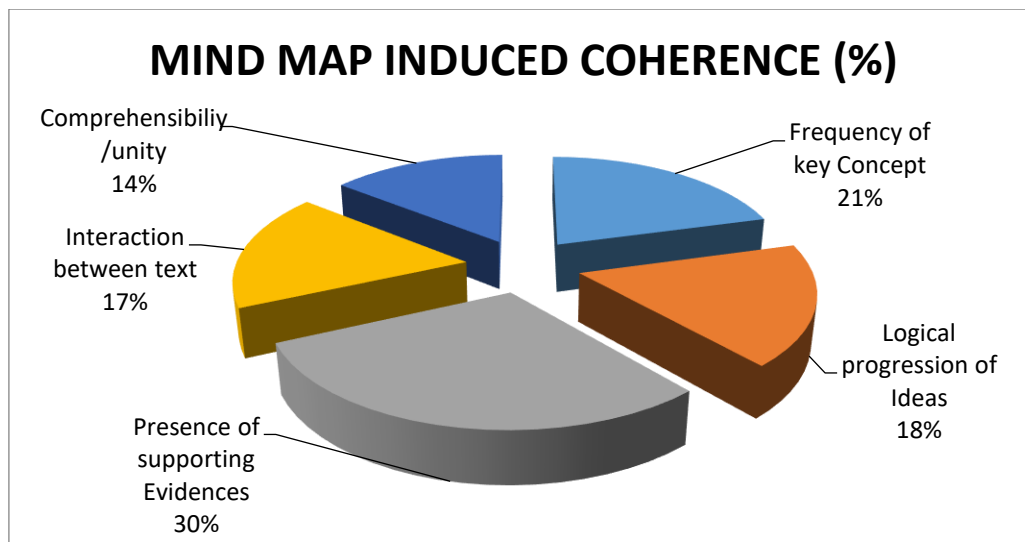Presence of supporting Evidences 30%

Figure-2

Findings:

☐ The analysis of data shows that 21% of the students have shown frequency as Key concept.

☐ 30% of the students used supporting evidences for providing insights on their experiences.

☐ 18% showed logical progression of idea as well as repetition of key concepts to bring home the point.

☐ 17% of the group showed progression from a topical sentence affirming interaction between texts.

☐ Only 14% of the essays assessed showed unity in organization.

Though the authors expected a significant change in writing expression of students while doing this exercise but certain constraints like lack of enough time to practice the thinking tools and review of the write-ups by the students before assessments because of shortage of time lead gave improved coherence. Improvement is rendered by presence of supporting evidences and right chronology in progression of ideas from one sub-concept to another.

Mind Maps utilized as a pre writing strategy to:

• Summarize information and for note taking

• Consolidating information from different research resources

• Brainstorming both individually and in groups

• Presenting information in a format that shows the overall structure of the subject.

• Studying and memorizing information

• Breaking down a large project involving huge data into smaller manageable chunks

• To reveal hidden ideas and concepts

• Develop new ideas and concept

• Help associate related pieces of information

• Improve imagination

• Improve concentration

• Improve speed of learning and recall

• Provides overview of the topic areas for easy reference, while encouraging photographic recall and comparative thinking

• Helps to outline the key areas concisely providing only actionable points, concepts and ideas

• Help in problem solving

• Increased motivation

• Outline key areas for further analysis and research

• Application and enjoyment resulting in higher standards of writing.

Use mind mapping along with other attention directing tools like CAF-Consider all factors is seen helpful for the focused group of students. Mapping helps in associations leading to better understanding of cause and effect relationship of concepts.

Discussion

With complexity in environment, industry and domain comes the stress and anxiety(Ghosh, 2021). Mind maps along with other attention directing tools helps to simplify the complex phenomenon in manageable units, thus assisting in comprehensible and unified communication(Vijayavalsalan, 2016). Though the expected gains from the exercise were high compared to achieved result, still it is proved that the use of thinking tools like mind maps along with other thinking devices can induce increased levels of coherence in the technical writing through logical progression of ideas, better associations in the text and presence of supporting evidences. There are ample of thinking tools available which can be used for specific purposes along with mind maps to enhance the agreement of communication but for this paper my focus was majorly on Mind Map as visual graphic organizers to aid coherent technical writing. Mind mapping supports competency building(Merchie & Van Keer, 2016). It adds effectiveness to employability training to engage Generation Z for career construction and development. Research extend Career Construction theory to provide group training using thinking tools for development of career adaptability with respect to heavily populated nations like India where facilities for individual career construction training counselling are limited and costly. As the scope of study was limited, it calls for further research in use of thinking tools for communicating for careers.

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