Abstract

When the topic of mind mapping is raised to instructors in higher education it is typically looked down upon as something that it is either old or seen as having little benefit to our students. This paper will demonstrate ways in which mind mapping techniques have and are being used to aid in student creativity and innovation while positively influencing their learning and comprehension.

If presented with a problem or a task, students come up with some ideas relating to the topic or problem. Rarely do they sit down and try to do a proper brainstorming of the problem before trying to solve the problem or situation. This is common in both individual or team settings. With formal instruction in brainstorming techniques and by using mind mapping, they are able to record their initial thoughts in some sort of informal, organized manner. As their thoughts are recorded, greater depth of detail and other ideas can be formed from the initially derived ideas. Mind mapping is a visual aid that promotes the ability to innovate and be creative. For these very reasons mind mapping has recently found its way into the corporate and industrial worlds.

A study was conducted over a two-year period in which students were exposed to and expected to use mind mapping in project and individual work. The result of the study overwhelmingly showed that mind mapping positively impacts their learning and is a very effective tool to enhance creative and innovative thinking.

MIND MAPPING EXPLAINED

Mind mapping is a learning technique that was developed in the 1970’s that allows users to generate documents or maps in a graphic form that allows the user(s) or readers to see clearly the
interrelationships between ideas and facts. It has been shown to be a very powerful tool in the
transfer of details and knowledge while emphasizing the interconnection of this information.
This is the true power of the mind mapping and it has been validated through the results of our
study.

Mind maps can be generated in two ways, the first being a manual technique where the maps are
hand drawn. With manual techniques, there is a learning curve that must be overcome to
generate maps effectively. It takes some practice in defining locations and placement of topics
and details. It has been noted that the use of colors and symbols can positively influence the
information retention of the presented information. If the maps are to be shared, the
photocopying or scanning must be used which can slow the transfer of the map to others. It also
makes the maps a reference document, not a living document for changes.

Mind mapping has seen a growth in interest and use based on the ability to create the maps in a
digital format; this is the second way in which maps can be generated. The electronic software
that is now available allows the maps to be created quickly and reliably. These maps offer the
same value as manual maps with the added benefits of being easily exchanged or viewed during
courses or meetings while also allowing for the inclusion of other artifacts such as documents,
drawings, pictures, multi-media, and internet links. Teams can use one map as a common
placeholder of information and use it to grow the map into further detail, solutions, or ideas. This
makes it a natural tool for creativity and innovation. These features have strongly impacted the
acceptance of mind mapping not only on an individual level but also as a worthwhile tool in
businesses.

MIND MAPPING TODAY

When the topic of mind mapping is raised today in academia, a love-hate relationship is normally
experienced. Often it is seen as a mundane or very simple or basic tool that does not offer much
value and it has been looked down upon by instructors that have pre-established materials for
their classroom presentations. By implementing mind mapping in their classroom or teaching
style, they would be required to modify their presentation material and/or the style in which they
teach.

Most teachers use PowerPoint or overhead slides as their presentation medium. This has been the
accepted manner for several decades and was probably used during their education. It is also
used almost exclusively in industry. This is beginning to change.

With the recent availability of mind mapping software, it is now being used in industry. The fact
that industry and businesses have accepted this technique, and that they see value in its use,
should alert academia to the needs to instruct our students to not only the use of it, but also to the
value in all areas of academia; innovation and creativity being just one venue.

CREATIVITY AND INNOVATION

Creativity and innovation are not inclusive terms. Creativity is ones ability to use their
imagination to come up with ideas for something new or an improvement on an already
established topic. These can be for theoretical topics or products. Innovation is the development
of these ideas into something that can be applied.
Regardless of what is being studied, developed, or imagined, how does the person or group working on an idea or concept come up with their ideas and how do they not only keep track of their ideas, but how do they communicate these ideas to others? Each person has their own “style” as it is a very personal trait and not everyone has the same abilities. Nor can we just turn this ability on in someone. What we can do is teach our students the processes through which their ideas can take root for evaluation and further development.

**Introducing Brainstorming Techniques to Students**

Many of our students have a good idea of brainstorming but they do not understand the nuances that allow it to be a powerful tool for idea generation.

The most important of these nuances is the fact that the idea cannot be judged until a later time. Brainstorming is the opportunity for the free flow of ideas and thoughts without any restrictions as the judging impedes the needed flow of creativity. The benefit to this disorderly flow of ideas is that others are allowed and encouraged to add ideas based on others ideas. Both creativity and innovation utilize the brainstorming of solutions to a problem or a way to make something real.

**How is Brainstorming Information Captured?**

The ability to convey your idea to others is the most frustrating part of collaborative work; the inability to make others understand your ideas or concepts. For most individuals, graphics, diagrams, doodles, and notes are the most commonly used techniques for the capturing of the their creative ideas or concepts. These are representations of the author’s thoughts, a personal form of brainstorming. With group brainstorming, information is captured at first with handwritten notes on large sheets of paper. These are later gathered and displayed for further analysis and further brainstorming. Both of these types of brainstorming can still lead to further confusion by the audience.

The one medium that crosses all of the information capture techniques is mind mapping. Where it is being taught or utilized, mind mapping is a very effective tool to gather and develop ideas into a viable solution or application. This can all be done in one document without losing the continuity of information.

**Two-year Study on Mind Mapping Use by Students**

The primary objective of this study was to determine if students benefitted from the use of mind mapping techniques either in their personal or project work, and if classroom presentations using mind mapping would benefit the student in their learning. Up to 160 students were targeted for our study. It was originally to be conducted for one year but it was extended for an additional year to verify our findings from the first year. Our students consisted of approximately 100-130 first year students with 20-30 students of later year levels. The students were all from various engineering technology programs.

**Project Rationale**
Get students to think logically in their development of projects, notes, schedules, and writings while allowing them to see a visual way to collect and present their thoughts. Help them learn brainstorming techniques therefore assisting them in teamwork and projects by providing a structured tool utilizing a clear graphical representation of concept relationships and engineering design.

Anticipated impact on teaching and/or learning

These techniques can be used across any discipline or course, regardless of college or program. Students will see an advantage in taking notes as clarity of relationships becomes obvious. Faculties encouraging the use of these techniques have seen a marked improvement in understanding and presentation of information.

Impact on Student Success

Mind Mapping was incorporated in class sessions, and according to student feedback, is a highly effective learning tool. The results of the surveys have shown:

- A clearer understanding of relationships and facts.
- Better notes.
- Easier studying.
- Ability to reach across varying cultures and learning abilities.
- Beneficial to all students regardless of their academic standing or year.
- May result in increased retention of first year students by providing students with organizational and classroom skills that promote academic success.

Software Used

A Cloud based Internet mind mapping software was selected based on its collaborative features. The product was purchased for our students to use during the execution of our study. It allowed the users to work individually or form groups or teams for collaborative work and allows all of the members to have access to the same mind map.

The benefits of this type of mind mapping software is that it allows all of the team members to have access to the same information while allowing each to access, retrieve, or modify information from the same map. This replicates global collaboration techniques and is now used as a tool on projects within businesses. Another feature of this software is that it is also possible to have instant message communication with any online users. This is very similar to what is used in businesses that do not have all of their employees at the same physical space, be it globally or at the same location.

Results

A prior to and after participation quantitative surveys of students were conducted (n=154). These surveys were conducted to assess students’ preferences, attitudes about, and usefulness with the mind mapping techniques and software. The students surveyed were in eight
different classes across four different instructors. The students ranged from first year to graduate students. The majority (69%) of students were not aware of mind mapping before the class. Over the 1st to graduate student distribution of the study group the results were consistent that the majority of students were not exposed to this technique.

![Figure #1 Percentage of Students Exposed to Mind Mapping (Pre-Survey)](image_url)

To introduce the mind mapping concept a video and handout was reviewed with each student group to demonstrate the process and specific examples. Of those students who were aware of mind mapping before the exposure in class (31%), the majority (77%) used the mind mapping concept multiple times using a manual version of mapping ideas. These students who were previously exposed to mind mapping, 64% responded that using mind mapping enhanced their learning of new concepts. For the students who were not aware of mind mapping, after the video and handout review the majority felt that the mind mapping tool would help them in this specific class and with other classes (66% and 70% respectively). The students responded most positively that they felt the mind mapping technique would help them in their completion of class projects and with taking and organizing notes. The undergraduate students had the largest percentage of students who felt this tool would help with projects. Across all of the student years the students felt that this tool would help them take and organize notes as shown in Figure 2.
Figure #2 Percentage of Students who felt Mind Mapping would help with Project Work

% of Students who felt Mind Mapping would help with Project Work

% of Students who felt Mind Mapping would help Take or Organize Notes

Figure #2 Percentage of Students who felt technique would help with projects and notes
After the students utilized the mind mapping tool for the class term the majority (74%) felt that if the software was available for student use in the University computer labs or available for download that they would use the tool. 78% of the student’s felt that the mind mapping technique was beneficial to the completing of class projects with 85% of them affirming that the mind mapping technique enhanced their learning. As an additional confirmation of these positive results 76% of the students noted that they utilized the mind mapping technique for other tasks outside of the assigned class material. Of the students who utilized mind mapping for other tasks the majority reported using it for scheduling tasks (91%), and completing writing assignments (86%) with a smaller majority using it to take and organize notes (61%). After the class exposure to mind mapping 76% of the students felt that they would use mind mapping again and 76% felt that the mind mapping tool should be incorporated into other classes.

Using Mind Mapping in the Classroom

The tried and true method of presenting material to classes has been through lecture, accentuated by electronic presentation software or the instructor’s use overhead slides. These “technologies” offer the instructor an organized set of topics and the order of its intended delivery. The students are required to follow in this sequence. This can be positive or negative depending on the learning style of each student. The slides can contain much information or can just highlight topic points that are going to be covered.

It can be summed up as a “push” system. It is rather rigid and the most common comment that is heard from students and other faculty that have seen mind mapping used in classroom presentations is that the information does not show any visual connection between the information that mind mapping allows.

Mind mapping can be used as a “push” tool as in the normal manner of education, or it can be used as an interactive teaching technique. If used in the “push” style classroom, students benefit from the ability to see the connections between topics. This requires little modification to the manner in which the course is presented.

When mind mapping is used in the classroom, it offers an opportunity to have an extremely interactive and dynamic classroom. This technique allows for creativity to flow from the students. Facts are not just “pushed” towards the students, rather, the instructor can “pull” that same information that they were going to present from the students.

This is done through assignments that require the students to make decisions on the importance of information, a “discovery” of facts. When done in the right manner, it has been shown that the students present at least 90% of the information that was to be presented by the instructor. This in itself is another manner of learning. The interactive style offers many learning moments throughout the class and assists in the development of comprehension and application. These discussions are ripe for students to be creative and to think outside of the box.

Through the use of an interactive teaching style, the instructor can also add input from the students into the map as it is presented in the classroom. Other digital content can also be added to the map, making the software extremely interactive while still containing the required
material. Documents, videos, Internet links, presentations, spreadsheets, pictures, and scans can all be included in the map. The ease in which this material can be added and accessed during the course presentation allows the classroom to flow easily and without interruption.

Using mind maps for classroom presentations for the past two school years, it has become apparent that the mind mappings use can be very effective. This is shown by student comments during class and on course reviews.

Conclusion

We often encourage or demand teamwork relating to projects, as this is the most realistic manner in which tasks in businesses or industry are conducted. These projects require an amount of creativity and innovation. But our students have been left to their own devices when it came to the gathering and growing of ideas and concepts.

Mind mapping is the tool that allows students an easy way of capturing their thoughts and to assist in their further development. It works very well in a team setting and has added benefits to the student who adopts these techniques for other uses, which are not limited to only one type of course.

From the results of our study, it is clear that today’s students see mind mapping as a useful tool for their learning and project work. The comments from students that are in a classroom where the instructor uses mind mapping for material presentation has also been very positive. Students have commented that they would like to see it used in other courses, and that it has helped them significantly in projects and the further development of ideas and concepts.

Bibliography

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