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### **The effect of mind mapping instruction on the attitudes toward geometry**

The National Council of Teachers of Mathematics in the U.S.A. introduced the possible answer to the question about so many aspects of everyday life and reported that everyone can use geometric ideas to indicate and solve problems in the real world. Furthermore, the report attaches importance to identifying, projecting and creating connections between mathematics and real-world contexts (NCTM, 2009). This answer is also appropriate with the principles of the constructivism theory, as Sun and Williams (2003) dispatch to the importance of constructivist learning in acquiring knowledge that learner based-centered, goal-directed, and real-life problems in order to find meaningful solutions.

### **Mind mapping**

Mind mapping was developed by Tony Buzan who was born in London 1942. Mind mapping is an alternative method of note taking, one which uses graphical way to represent ideas and concepts by using visual thinking tool that helps structuring information, helping you to better analyze, comprehend, synthesize, recall and generate new ideas. In a mind map, as opposed to traditional note taking or a linear text, information is structured in a way that resembles much more closely how your brain actually works. Since it is an activity that is both analytical and artistic, it engages your brain in a much, much richer way, helping in all its cognitive functions.

“By applying itself to itself it can develop new ways of thinking that are far more flexible and powerful than the traditional modes of thought currently in use throughout the world.”(Buzan 1990) Research on note-making and note-taking conducted by Dr Howe (1970) revealed that key word notes personally made or given to students were far more effective in terms of the understanding and recall they engendered than complete transcript notes or sentence summary notes. Howe, M.J.A (1970)

By encouraging people to link apparently different ideas and concepts in this way, Mind Mapping actually promotes divergent and highly creative thinking. White, R. and Gunstone, R. (1992),

The mind map maintains all cortical capability word, image, number, logic, rhythm, color and spatial awareness –in single, uniquely powerful technique. In so doing, It gives freedom to roam the infinite expanse of brain. (Buzan 1990)

### **Advantages of mind mapping**

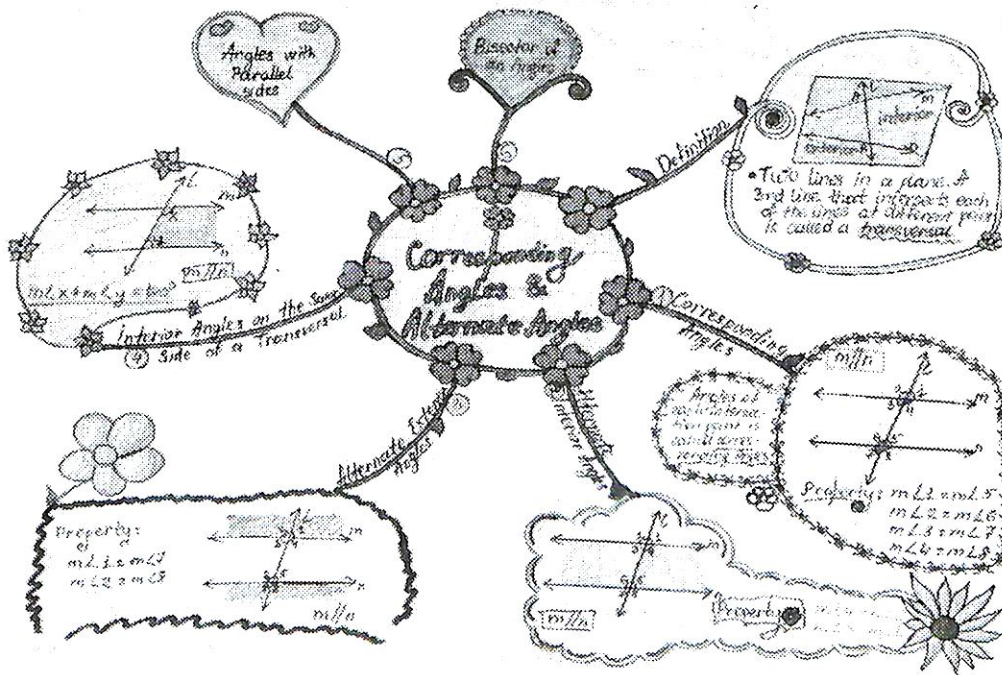
Buzan (mind map Book 1990) described advantages of mind mapping over traditional linear note taking method.

1. Time saved by noting only key word
2. Time saved by reading only key word
3. Time saved reviewing mind maps note
4. Time saved by not having to search for key words amongst unnecessary verbiage.
5. Concentration on real issues.
6. Essential key words made more easily discernible.
7. Essential key words juxtaposed in time and space, thus improving creativity and recall
8. Clear and appropriate associations made between key words.
9. The brain finds it easier to accept and remember visually stimulating, multi colored, multi dimensional mind maps rather than monotonous boring linear notes.
10. While mind mapping new discoveries and realizations – potentially endless of thought.
11. Mind map works in harmony with the brain’s natural desire.
12. By constantly utilizing all its cortical skills, the brain becomes increasing alert and receptive.

13. By using mind map it is easy to create links between related elements through different topics
14. Provide a good overview, quick view of section thus accurate recall of whole section.
15. Gives bright ideas how to use mind and how to think.

### How to Draw a Mind Map

- Start in the middle of a blank page, writing or drawing the idea you intend to develop. I would suggest that you use the page in landscape orientation.
- Develop the related subtopics around this central topic, connecting each of them to the center with a line.
- Repeat the same process for the subtopics, generating lower-level subtopics as you see fit, connecting each of those to the corresponding subtopic.
- Use colors, drawings and symbols copiously. Be as visual as you can, and your brain will thank you. I've met many people who don't even try, with the excuse they're "not artists". Don't let that keep you from trying it out!
- Keep the topics labels as short as possible, keeping them to a single word – or, better yet, to only a picture. Especially in your first mind maps, the temptation to write a complete phrase is enormous, but always look for opportunities to shorten it to a single word or figure – your mind map will be much more effective that way.
- Vary text size, color and alignment. Vary the thickness and length of the lines. Provide as many visual cues as you can to emphasize important points. Every little bit helps engaging your brain



Graph-1 Sample mind map prepared by a student

### Method and procedure

The purpose of study was measuring how does students' attitudes change toward geometry. The study was conducted in Almaty with total of 52 eight grade students in one high school which is control group. Before they have received mind mapping instructions a pre- test is given to all students. Different math abilities and achievements could have different attitudes. This test was of angles and triangles was taught during this period. The duration of study was 8 weeks totally 16 hours. The subject Control group is received instructions as

traditional. Experimental group is firstly received mind mapping instructions during 4 hours. But this time is separated from divided time for issue. During 8 weeks experimental group took notes by using mind mapping method. Some times they prepared group mind maps. How does mind mapping technique was changed attitudes toward geometry. To measure it an attitude scale was used at the end of teaching. Which is named Attitudes Toward Mathematics Inventory (ATMI). This scale was developed by (Martha Tapia, Berry College, GA, 2004) Fennema's theory is based on Tapia's research with the Fennema-Sherman Mathematics Attitudes Scales, which has clearly been the most popular instrument in research about attitudes toward math (Fennema & Sherman, 1976)

The ATMI was originally a 40-item scale. The items were constructed using a Likert-scale format with the following anchors: 1 strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree. Twelve items were reversed, which were given the appropriate value for data analysis.

**Table-1 Sample items**

1	I have usually enjoyed studying geometry in school
2	Studying geometry makes me feel nervous
3	I am willing to take more than the required amount of geometry
4	I am always under a terrible strain in a math class
5	High school geometry courses would be very helpful no matter what I decide to study
6	I am able to solve geometry problems without too much difficulty.
7	Geometry is important in everyday life.
8	I would like to avoid using geometry in college.
9	Geometry is one of the most important subjects for people to study.
10	Geometry is dull and boring
11	I am happier in a geometry class than in any other class.
12	I plan to take as much geometry as I can during my education

### Students' views

To get the views of students some questions were asked. One of the question and answers are like that.

Q-What do you think about mind mapping?

Aynur – *“When I paint, it looks colorful and easy to remember. Because it is good looking”*

Meruert – *“I prepare to examinations very fast with help of mind maps”*

Aydana – *“It helped me to remember some hard properties of angles and triangles”*

Aigerim – *“It is good for remembering”*

### RESULTS

Results are categorized into four main factors. Cronbach alpha and SD was calculated for each factor and compared by ATMI results which are obtained by Martha T.

Table-1 Characterize of Factor

Factor	Characterize of Factor
I	Self-confidence
II	Anxiety and confidence categories
III	Enjoyment of mathematics
IV	Motivation factor

Table-2 Pre-test Results

Group	Test	N	M	S.D	N
EXPERIM	Pre-test	40	21.8	6.4	26
CONTROL	Pre-test	40	22.3	6.2	26

Table-3

Attitude Scale Results

Factor	Item	Mean	Standard D.	Cronbach A.
I	15	50.9	13.2	.94
II	10	37.6	7.2	.91
III	10	33	8.7	0.9
IV	5	14.8	4.4	0.87

The results are compared by ATMI results. Results are close to originated scale however for factor I. Cronbach alpha and mean are slightly lower, factor 2, 3, and 4 are over. All these results show that mind mapping technique is improving attitudes toward geometry. Mind mapping technique could be used in geometry lessons by teachers. To sum up, mind mapping oriented course has positive effects on enjoyment of geometry, motivate students remove anxiety. Therefore, we suggest that such a teaching tool could be used in mathematics courses of Primary Mathematics (Geometry) Teaching Programs.

#### References:

1. Aiken, L.R. (1974). Two scale of attitude toward mathematics. *Journal for Research in Mathematics Education*, 5, 67-71.
2. Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H.Freeman
3. Brinkmann, A.: 2003a, 'Mind Mapping as a Tool in Mathematics Education', *Mathematics Teacher*, National Council of Teachers of Mathematics NCTM, Volume 96, Number 2, February 2003, pp. 96-101
4. Buzan, Tony. 1976. *Use Both Sides of Your Brain*. New York: E. P. Dutton & Co.
5. Buzan, Tony & Buzan, Barry. 1997. [Original English Language Version: 1990]. *The Mind Map Book*
6. Clements, D. H., & Battista, M. T. (1992). Geometry and spatial reasoning. In D. A. Grouws (Ed.), *Handbook of research on mathematics teaching and learning* (pp. 420-464). New York: Macmillan
7. Duatepe, P. -Ubuz, B. Drama-Based Geometry the *Journal of Educational Research* March/April 2009 [Vol. 102(No. 4)]
8. Gur and Butuner (2006) *Elementary Education Online*, 5(2), 61-74
9. Howe, M.J.A (1970), 'Using students' notes to examine the role of the individual learner in acquiring meaningful subject matter'. *Journal of Educational Research*, 64, 61-3
10. Martha Tapia (2004), *GA Academic Exchange Quarterly* Summer Volume 8, Issue 2
11. NCTM. (2009). *Guiding principles for mathematics curriculum and assessment*. Retrieved January, 2010

12. Stillman, G. (2006). The role of challenge in engaging lower secondary students in investigating real world tasks. In E. Barbeau & P. Taylor (Eds.), Proceedings of the ICMI Study 16: Mathematical Challenges, Trondheim, Norway.
13. Sun, L.; Williams, S. (2003). An instructional design model for constructivist learning. Department of Computer Science. University of Reading. UK. Retrieved April, 2008 from: <http://www.ais.reading.ac.uk>
14. Ubuz, B., & Üstün, I. (2003, July). Figural and conceptual aspects in identifying polygons. Proceedings of the 2003 Joint Meeting of PME and
15. PMENA (Vol. 1, p. 328)
16. White, R. and Gunstone, R. (1992), Probing Understanding. Falmer Press, New York

### **Түйін**

*Геометрия математиканың бөлінбес бір бөлігі бола тұра, ол күнделікті өмірде де негізгі рөл атқарады. Бірақ, көптеген оқушылардың геометрия пәніне қызығушылығы нашар. Оқушылардың геометрия пәніне қызығушылығының нашарлығы оқытушыға қосымша жүк жүктейді, әрі математика пәнін оқытуда қиындық келтіреді, мұғалім мен оқушының арасында түсінбеушілік тудырады. Көптеген зерттеулер геометрияны зерттеу мен оны оқытудың дағдыларын көтеруге бағытталған.*

*Бұл зерттеу сегізінші сынып оқушыларының арасында геометрияға өзіндік қызығушылығын арттыруды қарастырады. Зерттеу Алматы қала-сындағы орта мектептің сегізінші сыныптың 52 оқушысының арасында өткізілді.*

### **Резюме**

*Геометрия являясь неотъемлемой частью математики, играет важную роль в повседневной жизни. Однако, многие школьники не доброжелательно относятся к урокам геометрии. Это может доставить дополнительную нагрузку и в конечном итоге образуется порочный круг негативного отношения и трудности в изучении геометрии. Многие исследования направлены на то, чтобы повысить навыки обучения и изучения геометрии.*

*Настоящее исследование рассматривает эффекты самофункционирования отношения к геометрии среди школьников восьмого класса. Исследование проводилось среди 52 школьников восьмого класса в одном из средних школ города Алматы.*

**Ключевые слова:** *Изучение геометрии, самофункционирование*

### **Resume**

*Studies on mathematics teaching have recently focused on affective variables, which were found to play a main role that affecting behavior and learning (Bandura, 1997). In additional other studies have showed that students still have many difficulties in learning geometry and thinking geometrically (e.g. Clements & Battissa, 1992; Mitchelmore, 1997; Mullis et all, 2000; Prescott, Mitchelmore, & White, 2002; Ubuz & Ustün, 2003; Van Hiele, 1986). Similarly to attract students in real-life geometry situations choosing difficulties in geometry and geometric-proof learning as well as improving the attitudes in the direction of these subjects in mathematics classrooms are deficient (e.g., Stillman, 2006; Pierce & Stacey, 2006; Duatepe-Paksu; Ubuz, 2009).*