THE THIRTEENTH ANNUAL SCIENCE AND MATH EDUCATORS CONFERENCE (SMEC 13)

Science and Mathematics Education Center (SMEC)
Faculty of Arts and Sciences
American University of Beirut, Lebanon

SMEC 13 – CONFERENCE PROCEEDINGS

(ENGLISH AND FRENCH SECTION)

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Science and Mathematics Education Center (SMEC)
Faculty of Arts and Sciences, American University of Beirut, Lebanon
April 9th, 2010

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SMEC 13 MISSION STATEMENT

The SMEC Conference is an annual event designed to promote the continued development of a professional community of mathematics and science educators across Lebanon and throughout the region. Specifically, the conference aims to:

- Provide an intellectual and professional forum for teachers to exchange theoretical and practical ideas regarding the teaching and learning of mathematics and science at the elementary, intermediate, and secondary levels

- Provide a forum for teacher educators and researchers to share their findings with science and mathematics teachers with a special emphasis on the practical classroom implications of their findings

- Provide an opportunity for science and mathematics teachers to interact with high-caliber science and mathematics education professionals from abroad

- Contribute to the ongoing development of a professional culture of science and mathematics teaching at the school level in Lebanon and in the region

- Raise awareness of science and mathematics teachers about the array of curriculum and supplemental classroom materials available to them through publishers and local distributors

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Etat des lieux de l'ES dans les établissements privés et publics au Liban

Assad Yammine, Iman Khalil, & Pierre Clement

Résumé

Ce travail tente de tracer un état des lieux de l'éducation à la sexualité dans les divers établissements scolaires libanais : privés religieux, privés non confessionnels et publics. Il présente les résultats d'une enquête dans plus d'une centaine d'établissements divers pour savoir dans lesquels l'enseignement de ce thème est ou non, ou plus ou moins, mis en œuvre, et pour analyser les caractéristiques de cet enseignement quand il existe (classes et matières concernées, thèmes abordés,…).
Des directeurs, des coordonnateurs et des enseignants de 104 établissements libanais répartis selon les diverses zones géographiques du Liban ont répondu à un questionnaire.
L'ensemble des analyses a montré, selon les établissements, une diversité qui porte sur le degré d'implémentation de l'ES, sur sa définition, sur les cadres et les personnes les plus appropriés pour la mettre en œuvre. Cette diversité sans corrélation significative avec le statut de l'établissement peut constituer un obstacle à l'implémentation de l'ES dans le cadre scolaire libanais.

1 – Introduction

L'éducation à la sexualité (ES) est un projet controversé dans le cadre scolaire libanais. Nous avons fait une enquête dans plus d'une centaine d'établissements divers pour savoir dans lesquels l'enseignement de ce thème est ou non, ou plus ou moins, mis en œuvre, et pour analyser les caractéristiques de cet enseignement quand il existe (cadre, classes et matières concernées, formes, supports utilisés, thèmes abordés, intervenants, …). L'ES n'existait pas dans le curriculum 1971 au Liban. À l'instar des recommandations d'organismes internationaux tels que l'OMS, le centre de recherches et développement pédagogiques au Liban (CRDP) a tenté d'introduire l'ES dans les nouveaux programmes de 1998. Cette tentative a suscité des oppositions de la part de plusieurs groupes sociopolitiques et religieux libanais, ce qui a entraîné son allégement total de la classe de EB8 (élèves de 12-13 ans) : circulaire no 35/M/99, décret présidentiel no 2066, et son allégement partiel du curriculum de biologie de la 2ème année du cycle secondaire (15-16 ans), Série Lettre et Humanités et de la 3ème année du cycle secondaire (16-17 ans) (Ministère de l'éducation nationale, circulaire no 95/M/99, décret no 10227/97, Harfouch & Clément 2001, Yammine et al. 2007, Yammine 2008).
Actuellement, dans le cadre d'un projet commun du CRDP, de l'UNFPA (United Nations

Population Fund) et du ministère de l'éducation au Liban, des efforts sont déployés pour une nouvelle tentative de réintroduction de l'ES dans le cadre scolaire. La sexualité humaine n'est pas réduite à la seule transmission de la vie (dimension biologique) et comporte des dimensions biomédicale, sociale, psychologique, affective et relationnelle (Pelège & Picod, 2007).

2- Questions de recherche

Ce travail tente de tracer un état des lieux de l'ES dans les divers établissements scolaires libanais : privés religieux (musulmans ou chrétiens), privés non confessionnels et publics. Est ce que l'ES y est implémentée ? Si oui, quels sont les thèmes abordés ? Est-ce que l'ES est placée sous la responsabilité d'enseignants de biologie ou aussi d'autres acteurs? Peut-on corréler les éventuelles différences entre les établissements libanais au paramètre statut de l'établissement ?

3 – Méthodologie

3.1- L'échantillon

Des directeurs, des coordonnateurs et des enseignants de 104 établissements libanais (96 écoles privées : 22 musulmanes, 33 non confessionnelles, 41 chrétiennes ; et 8 écoles publiques) répartis selon les diverses zones géographiques du Liban ont répondu à un questionnaire (tableau 1).

Tableau 1 - Répartition des établissements enquêtés.

	Beyrouth	Bekaa	Mont Liban	Sud	Nabatiyeh	Nord	Officielles	Total
Effectif	14	14	39	10	4	15	8	104
Pourcentage	13,5	13,5	37,5	9,6	3,8	14,4	7,7	100

3.2- Le questionnaire

Le questionnaire comporte une question ouverte sur l'ES, une partie pour savoir, dans le cas où la sexualité est enseignée, quels sont : les classes et les matières concernées, le nombre de périodes, les intervenants, les formes de cet enseignement, les supports utilisés et les thèmes traités ; une deuxième partie pour connaître leurs idées sur ce qui est souhaitable : les intervenants, les cadres les plus appropriés de l'ES, les thèmes dont l'enseignement est prioritaire et les thèmes qui ne sont jamais à aborder dans le cadre scolaire. La dernière partie du questionnaire a été réservée à des renseignements généraux sur l'établissement enquêté (figure 1).

Université libanaise
Faculté de pédagogie

Enquête réalisée dans le cadre de la préparation d'une thèse de doctorat sur l'éducation à la sexualité et la reproduction humaine dans les établissements scolaires libanais.

1- Qu'est pour vous l'Education à la Sexualité (L'ES) ?

.....
.....
.....

2- L'Education à la Sexualité (humaine) fut, au Liban, introduite dans les nouveaux programmes de biologie du complémentaire et du secondaire, puis allégée (facultative) de la classe de EB8 et en partie du secondaire. Assurez-vous cet enseignement dans votre établissement?

☐ Oui ☐ Non *(si non passez directement aux questions 11, 12, 13, 14 et 15)*

3- Sous quelle forme organisez-vous cette éducation à la sexualité?

☐ Cours ☐ Conférences ☐ Autre, précisez :.....

4- Quelles sont les classes concernées?

.....

5- Quelles sont les matières concernées ?

☐ SVT ☐ Langues ☐ Education civique ☐ Philosophie ☐ Education religieuse ☐ Autres, précisez :.....

6- Combien de périodes (et d'heures) consacrez-vous à l'éducation à la sexualité par année?

.....

7- Qui sont les intervenants en matière d'éducation à la sexualité dans votre établissement?

☐ Enseignant (bio) ☐ Médecin ☐ Psychologue ☐ Infirmière ☐ Assistante sociale

☐ Responsable religieux ☐ Autre, précisez :.....

8- Sous quelle forme est dispensé cet enseignement ?

☐ Cours magistral ☐ Exposé multimédia ☐ Questions-réponses ☐ Brainstorming ☐ Groupe-débat

☐ Questions anonymes ☐ Autre, précisez :.....

9- Quels sont les supports utilisés ?

☐ Livres ☐ Sites Internet ☐ Films ☐ Transparents ☐ PowerPoint ☐ Autre, précisez :.....

10- Quels sont les thèmes abordés ?

	Non	Oui	Si oui, sous quelle forme ?	Combien de temps?
Avortement				
Plaisir et ses organes				
Pédophilie				
Puberté				
Argent et sexualité				
Eveil sexuel				
Lois et sexualité				
Croyances religieuses				

3.3- Analyse statistique des réponses

Les réponses sont soumises à des analyses univariées ou bivariées (SPSS, Chi2) et à des analyses multivariées parmi lesquelles nous avons opté pour l'Analyse des Correspondances Multiples (ACM, Lebart et al. 1995, Munoz & Clément 2007, Munoz et al. 2009).
L'enquête que nous avons réalisée n'est pas exhaustive, mais elle a pour objet d'illustrer une diversité de situations au Liban.

4 – Résultats et discussion

76 % des établissements qui ont répondu au questionnaire, ont implémenté l'ES (Figure 2), 39,4% d'entre eux sous forme de cours, 27,9 % en associant les cours à d'autres formes possibles (conférences…) (Figure 3).

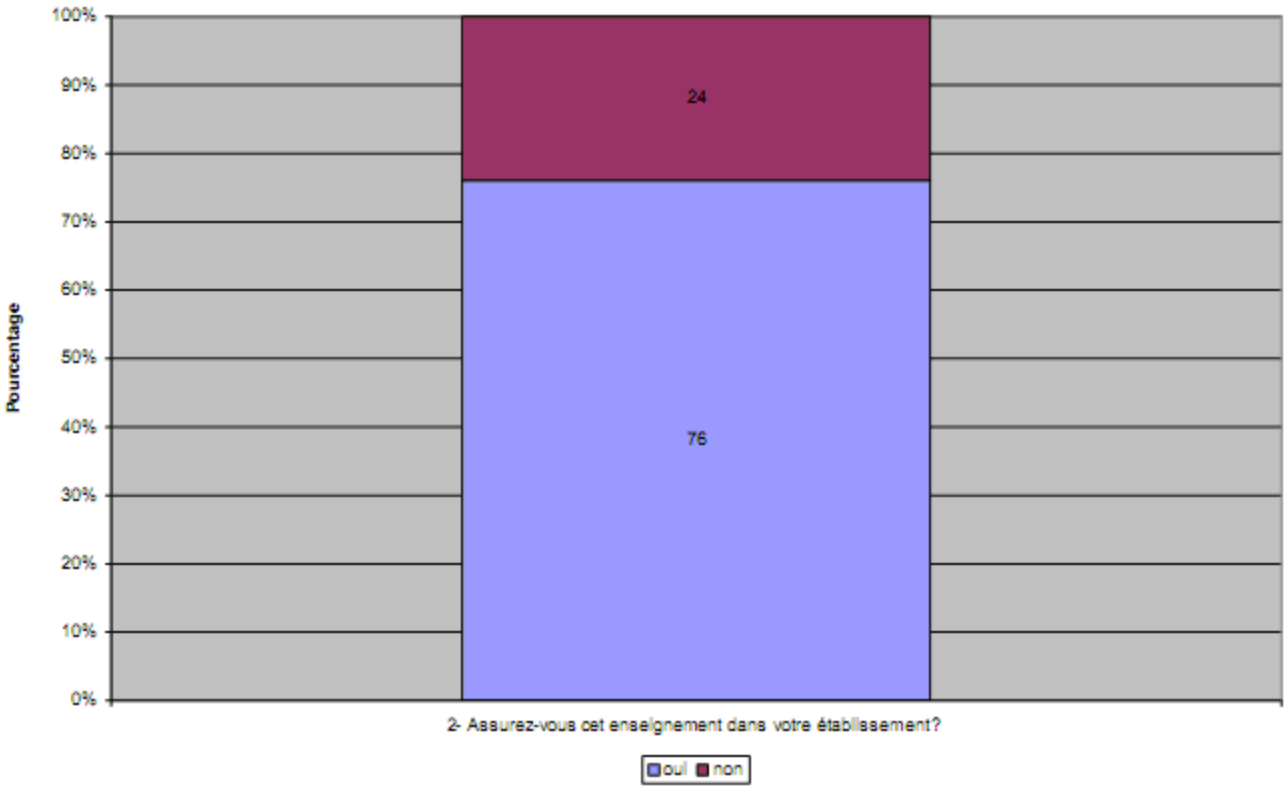

Figure 2- Pourcentages des établissements qui assurent (ou non) l'ES.

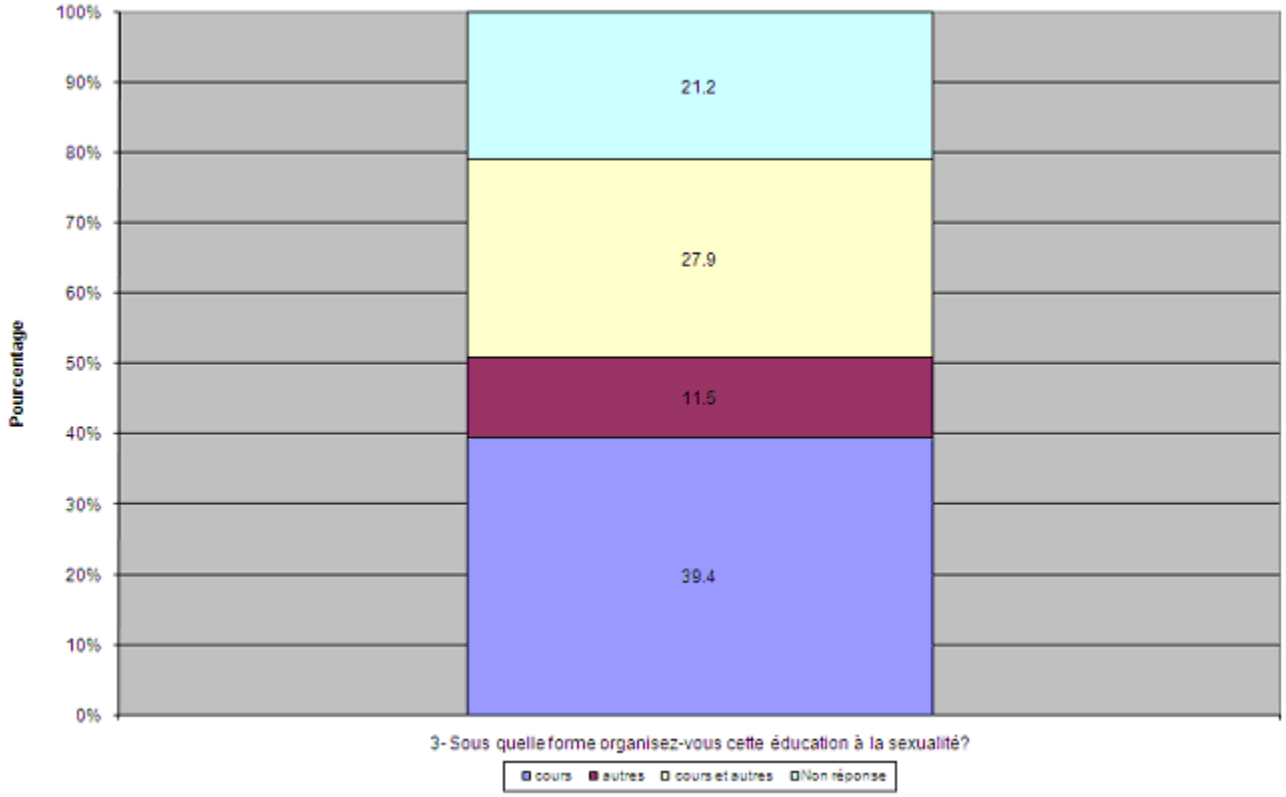

Figure 3- Pourcentages des établissements selon la forme adoptée pour l'ES

18,3% des établissements qui pratiquent l'ES trouvent que les personnes les plus appropriées pour l'assumer dans le cadre scolaire sont les enseignants de biologie contre 17,3% pour qui ce n'est pas l'affaire des enseignants de biologie, 64,4% ayant trouvé que c'est l'affaire des enseignants de biologie associés à d'autres partenaires comme les religieux, les spécialistes de santé et les enseignants d'autres disciplines (figure 4).

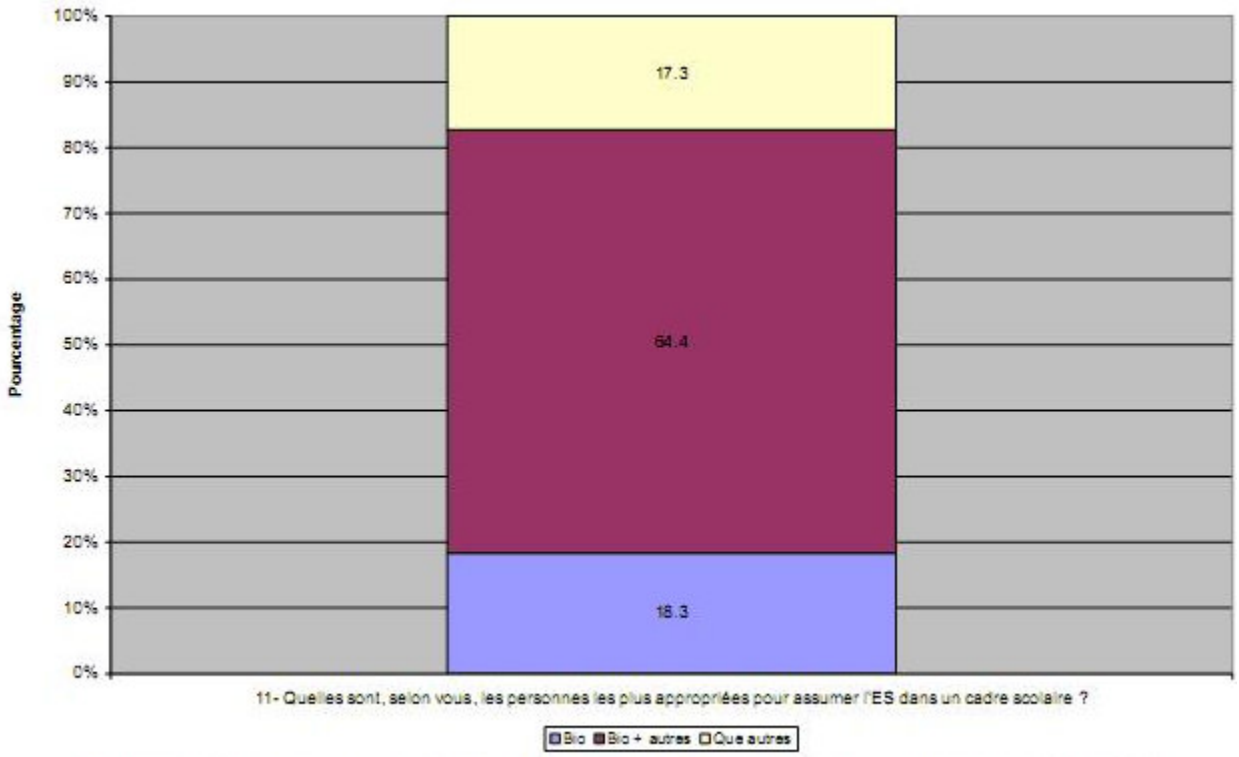

Figure 4- Pourcentages des établissements selon les personnes appropriées pour faire l'ES

Ces résultats montrent que les établissements qui implémentent l'ES se différencient au niveau de la définition, de la forme et des acteurs de l'ES dans le cadre scolaire. Parmi les 24 % des établissements qui n'implémentent pas l'ES, existent aussi des différences au niveau de la définition, de la forme et des acteurs de l'ES dans le cadre scolaire. L'ACM confirme ces résultats : elle oppose une majorité d'établissements qui assurent l'ES à une minorité qui ne l'assure pas.

Dans 67 % des établissements qui n'implémentent pas l'ES, la grande majorité et dans certains cas, la totalité des élèves est musulmane, dans 20 % elle est chrétienne et 13 % de ces établissements sont publics. Ces résultats pourraient suggérer une éventuelle corrélation entre le statut de l'école et la place qu'elle accorde à l'ES.

Cependant, une analyse interclasses différenciant les 104 établissements en fonction de leur statut (figure 5), complétée par un test de randomisation, a montré que le paramètre « statut de l'école » n'est pas significativement corrélé à la diversité des réponses au questionnaire, y compris quant à l'implémentation de l'ES dans le cadre scolaire (figure 6).

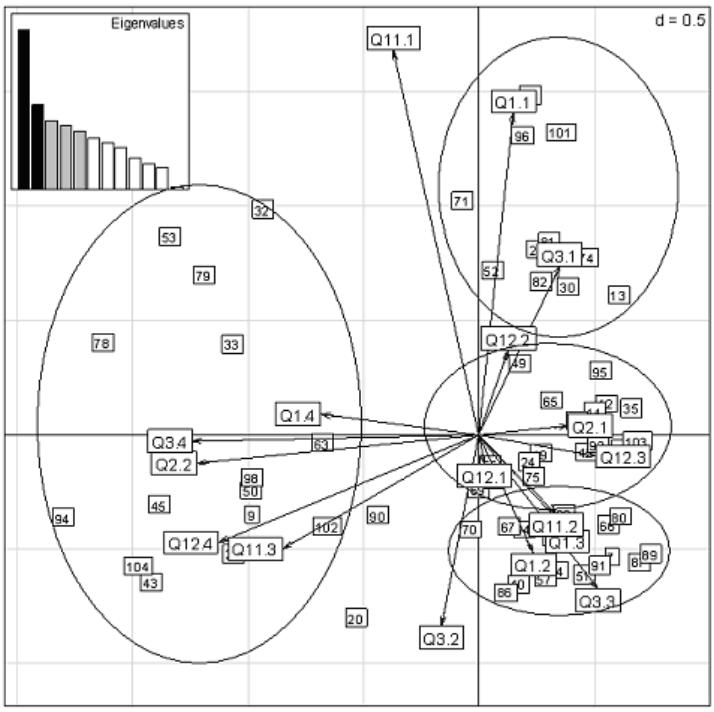

Figure 5- Graphe résumé de l'ACM effectuée sur les 104 établissements scolaires libanais : projections sur le même plan des modalités des questions (flèches) et des individus (établissements représentés par leur numéro de 1 à 104).

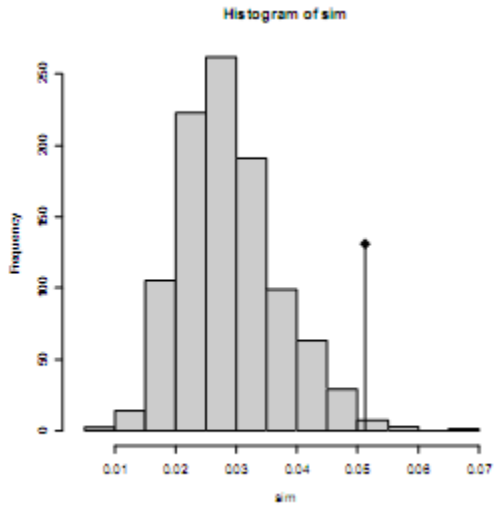

Figure 6- Test de Monte-Carlo sur l'analyse between question Q15 (104 établissements).

Cette analyse interclasses a été complétée par une seconde analyse pour voir si les thèmes traités dans les 78 établissements qui implémentent l'ES, se différencient en fonction du statut (chrétien, non confessionnel, musulman et public) des établissements : complétée par un test de Monte Carlo, cette analyse a montré que dans ce cas aussi les différences en fonction du statut de l'établissement ne sont pas significatives (figure 7).

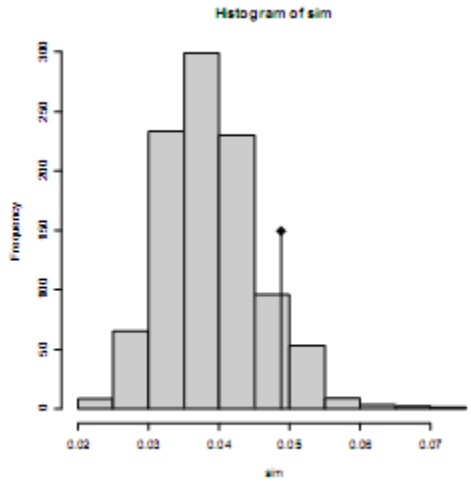

Figure 7- Test de Monte-Carlo sur l'analyse between question Q15 (78 établissements)

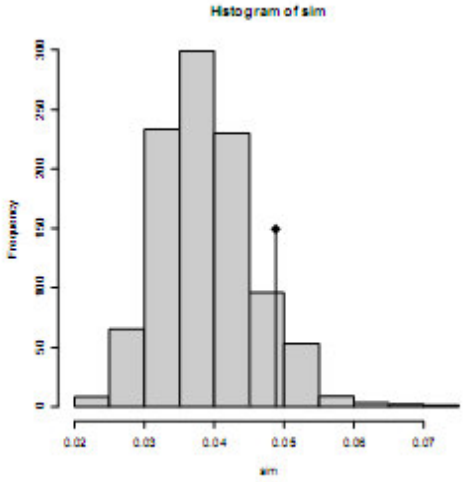

Figure 7- Test de Monte-Carlo sur l'analyse between question Q15 (78 établissements)

Le test de Chi2 sur la question Q2 (pour les 104 établissements enquêtés) : « Assurez-vous cet enseignement dans votre établissement ? », montre toutefois des différences significatives au seuil de 0,01 entre deux groupes d'écoles : les établissements musulmans et publics d'un côté, les chrétiens et les non confessionnels de l'autre. Mais la rareté et le seuil de ces quelques différences peut s'expliquer par un risque de second ordre.
Au total, il apparaît donc que la diversité des réponses au questionnaire n'est pas significativement corrélée au statut de l'établissement. Effectivement, par exemple, tous les établissements chrétiens ne pratiquent pas l'ES et ceux qui le font ne sont pas tous d'accord sur les thèmes abordés ni sur les cadres et les personnes les plus appropriées pour le faire. Au sein d'une même religion, il peut y avoir une grande diversité d'opinions et de pratiques relatives à l'ES.

5 - Conclusions

Plusieurs travaux ont montré le rôle primordial de l'école dans l'ES. Pour Delors et ses collaborateurs (1996), le secteur éducatif a un rôle capital à jouer en préparant les enfants et les jeunes à assumer leur fonction et leur responsabilité d'adulte. Cette importance réside d'une part dans le fait que les écoles ont, concrètement, les moyens d'être en contact répété et

durable avec un grand nombre de jeunes de différents milieux (Gordon, 2008), d'autre part dans le fait que les enfants âgés de 5 à 13 ans, en particulier, passent, dans la plupart des pays, un temps relativement long à l'école.
Notre étude a montré à la fois une diversité de situations selon les établissements, cependant sans corrélation significative avec le statut de l'établissement. Cette diversité porte sur le degré d'implémentation de l'ES, sur sa définition, sur les cadres et les personnes les plus appropriés pour la mettre en œuvre : ce qui peut constituer un obstacle à son implémentation dans le cadre scolaire libanais. Des études plus poussées pourraient être mises en place pour analyser les origines de ces différences, afin d'élaborer des stratégies plus appropriées pour l'introduction de l'ES dans le cadre scolaire libanais.

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A Conceptual Framework of 'Nature of Science' in School Science
Hagop Yacoubian

The primary purpose of this session is to introduce the participants to a preliminary conceptual framework of nature of science (NOS) in school science. NOS is one aspect of scientific literacy that has

received substantial attention not only among science education scholars (e.g. Driver et al., 1994; Kolstø, 2001; Lederman, 2004) but also in many science education policy and curriculum documents worldwide (e.g. CMEC, 1997; NCERD, 1995; NRC, 1996). The development of this conceptual framework derives from a study that is normative in nature and that explores desirable ways of addressing NOS in school science. The conceptual framework primarily aims at (1) targeting both NOS as an educational end and NOS as a means for socioscientific decision making and (2) orchestrating critical thinking and substantive NOS content.

I elaborate the framework with a particular example (relevant to the secondary level) with the purpose of making the framework concrete and appropriate to a diverse audience of science education researchers and practitioners. I justify the framework with two core arguments. First, I draw upon two lines of research, namely studies of NOS in school science (e.g. Abd-El-Khalick, Bell & Lederman, 1998; Bell, Blair, Crawford, and Lederman, 2003; Khishfe, 2007; Osborne et al., 2003) and studies on socioscientific decision making (e.g. Bell and Lederman, 2003; Sadler, Chambers and Zeidler, 2004; Zeidler, Walker, Ackett & Simons, 2002) to argue that school NOS should address explicitly both NOS as an educational end and NOS as a means for socioscientific decision making. Second, based on the literature of critical thinking in philosophy of education (e.g. Ennis, 1989, 1996; Lipman, 2003; Norris, 1984; Paul, 1994; Siegel, 1988, 2007), I argue for the respective place of critical thinking in the foreground of school NOS and its potential for acting as an organizational pillar for the substantive content of NOS.

The session is organized as follows: After a brief introduction (4 min), the conceptual framework will be presented using powerpoint, elaborated with a particular example and justified (18 min), followed by engaging the audience in an interactive discussion on the practical uses of the framework in science classrooms (8 min).

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Interactive Sessions: Developmental Workshops

Mathematics

Integrating Writing with Elementary/Middle School Mathematics

Allen Lambert

The primary purpose of this session is for participants to recognize that writing is an integral part of teaching mathematics and to identify how they can integrate writing into their teaching of elementary

and middle school math. Writing about mathematics helps students comprehend concepts better by thinking through concepts and explaining their understandings. When students feel unskilled or challenged in mathematics, they can be empowered to express their thoughts and experiences through writing. It can also make learning math more enjoyable for those students that dislike the subject. Since mathematics is about ideas, students should be able to write about their ideas in a way which others can understand. This creates a link between reflecting on knowledge and sharing that knowledge with others. Integrating writing into mathematics builds vocabulary, natural and academic language and reasoning skills. Teachers can support students in writing through many learning experiences built into the math lesson, using different writing genres and graphic organizers. This in turn helps educators assess better what the student knows and believes. This session will analyze research on the topic and explore what practitioners have proven beneficial for their students.

This session is planned as follows: a) a brief introduction and session objectives (5min) b) the use of glyphs in mathematics to assess prior knowledge of students (10 min) c) jigsaw reading of the article "Writing in Math – Should it have a Home in today's Curriculums?" by Marcia Frank which summarizes current research on the topic, explores the sensibleness of teaching writing in mathematics and offers insights into how this best can be done; attendees will share reflections on their reading (30 min) d) when and where to integrate writing into math lessons (20 min) e) a model math-writing lesson where attendees participate as students and relate their experience to that of their students (25 min) f) examining sample student work from multiple grade levels, reflecting on the value of the learning experiences and consider how the student work may be used for assessment purposes (30 min)

Materials: "Writing in Math – Should it have a Home in today's Curriculums?" by Marcia Frank

Math Problem Solving: Make it Real and Fun
Dounia Sawan

Problem solving requires tapping higher order thinking skills to help learners interpret the problem, devise a method to solve it, follow mathematical procedures to achieve the result, and then analyze the result to see if it is an acceptable solution to the problem presented. This session will emphasize several interactive activities and focus on a four major step activity: Explore, Plan, Solve, and Examine.

Typical problem solving that we see in math classrooms involve word problems that present the learner with simulated situations which they can correlate to actual real life situations. The goal is for the learner to be able to apply the steps used to resolve the similar situations that he/she encounters in real-life.

The session is planned as follows:

(a) **Introduction:**
Warm Up Activity: Watch the video entitled**, "**Inquiry and problem based learning".
To engage participants and introduce the workshop objectives. **(10 min)**

Build background: "Carousel Brainstorming" Activity

To help participants build enough background about the topic.

Brief summary:

*A series of questions related to the workshop will be distributed.

*Participants will work in groups (four or five members).

*Group members will assign a role for every member (recorder,speaker,…)

*Each group will be handed a single different question and reflect on it.

*Groups will exchange the questions, read the answers of the previous group(s), and then add a new reflection.

* At the end of the exercise, participants do a" gallery tour" to circulate and read what other groups have written for each question. **(15 min)**

(b) **Description of the session:**

The session will be divided into three parts separated by two breaks. It is planned as follows:

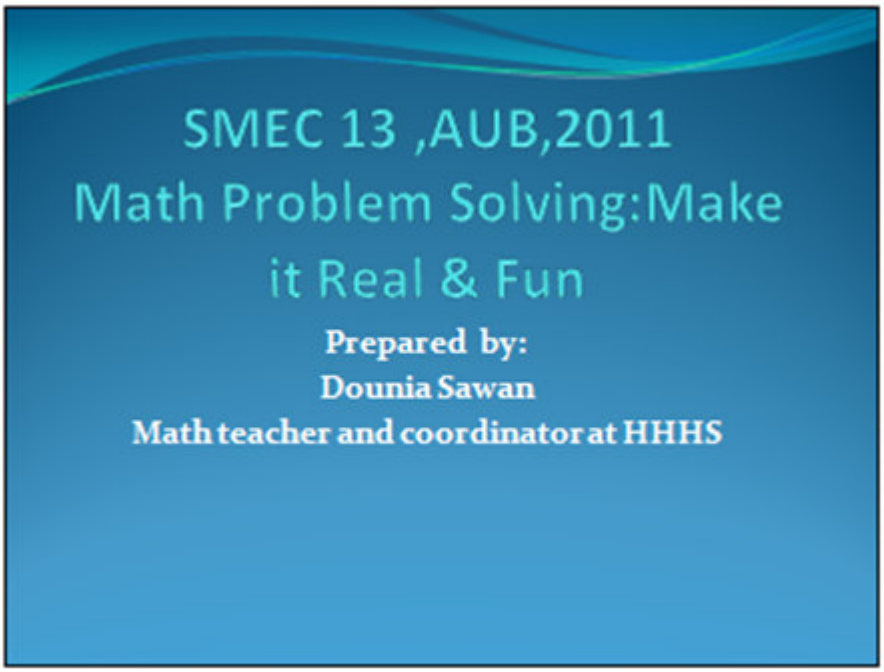
- Start by a definition of problem solving followed by a brief description of the 4-steps plan : Explore , Plan , Solve and Examine. **(10 min)**
- **Activity 1**:
  Through challenge problems, participants will take on the role of learners, discuss the answers and relate them to the 4-steps. This activity will be followed by a brief presentation from each group. Then participants will propose a strategy to help students recall the tips to remember during a math problem solving **(25 min)**

- **Break 1**: "Be Smart and Answer Quickly ":
  To motivate participants and help them to implement the same activity in their classes to make the session more fun. **(10 min)**

- **Activity 2**: "A Real Life Problem":
  Each group has a topic/activity to study and discuss. This activity is designed as a half-day or full-day event which allow students to deepen their understanding of math. All activities are hands-on activities, standards-based lessons which apply mathematical principles in real-world scenarios. A brief presentation for each group will be followed.**(25 min)**
- **Break 2**: "Optical Illusions":
  Participants will analyze a list of real images , try to answer trick questions , and then connect them to math concepts.
  This activity can also be used in the classroom to release the state of boredom during two consecutive sessions. **(10 min)**

  End of the session:
  At the end of the session, participants are invited to write an Action Plan. In groups, they will reflect on: "How can I benefit from this session to motivate my students and solve their problems in mathematics?" The ideas will be posted on the wall for discussion. Groups will read them rapidly then select the most suitable reflection and decide how to use it as an Action Plan in the math class. **(15 min)**

SLIDE 1



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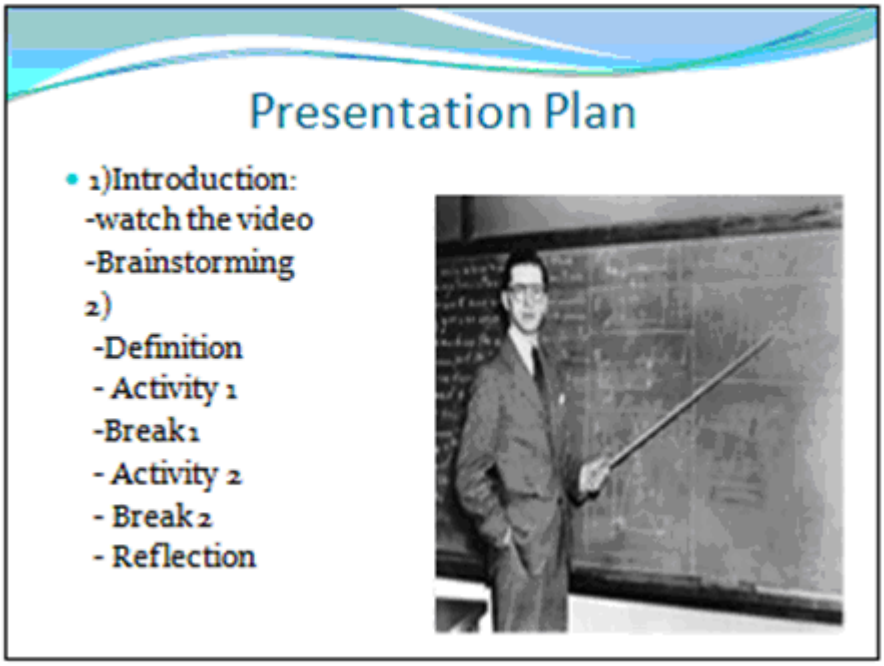

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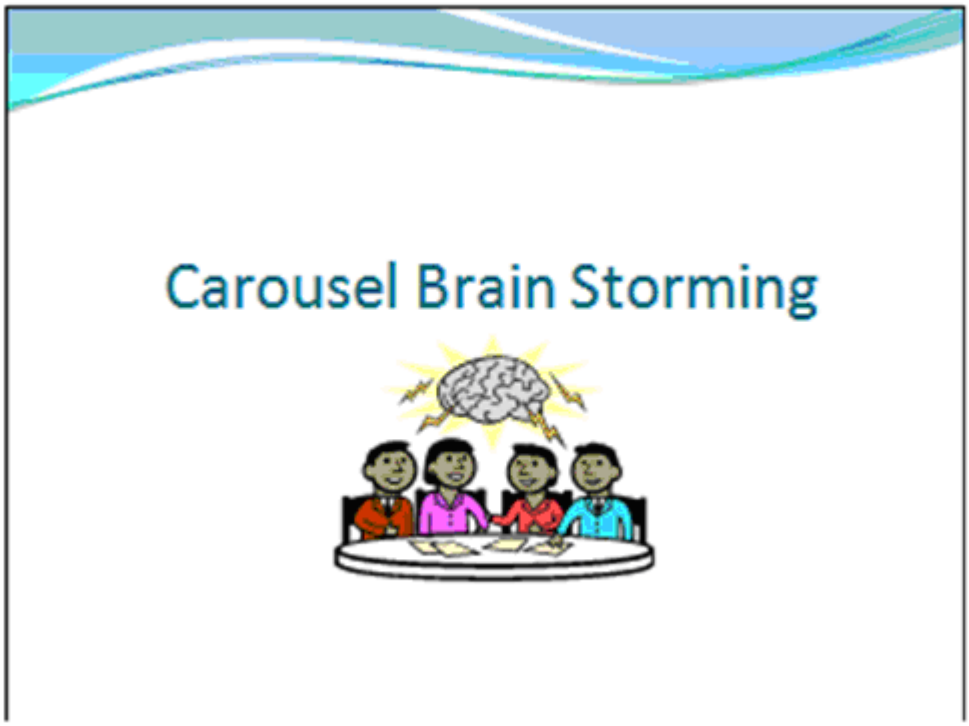

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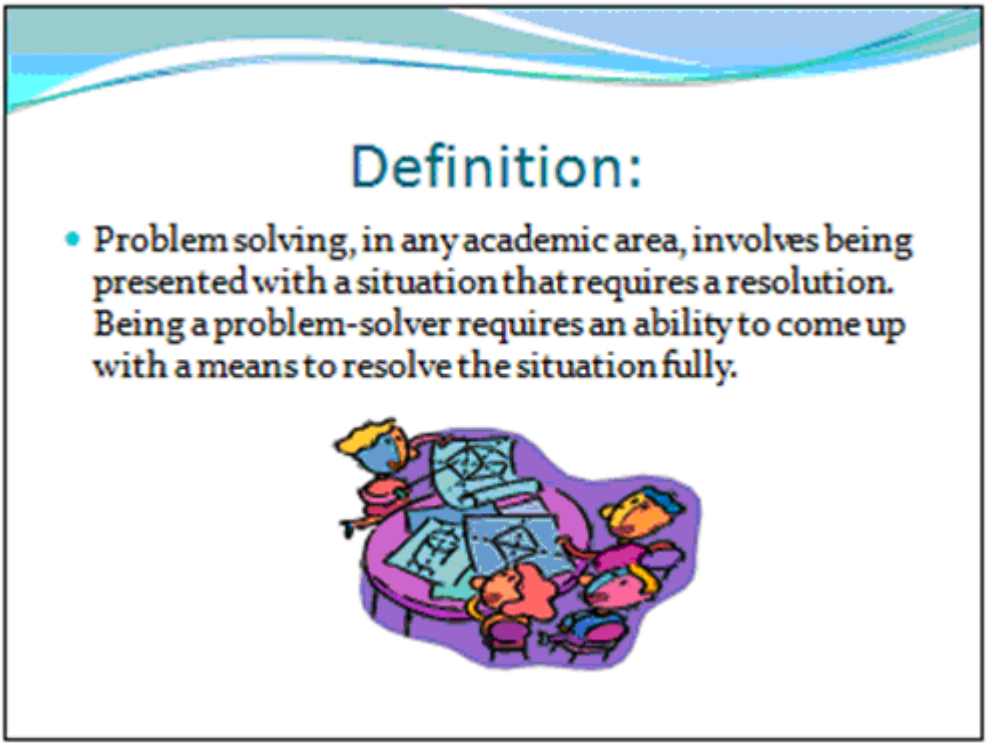

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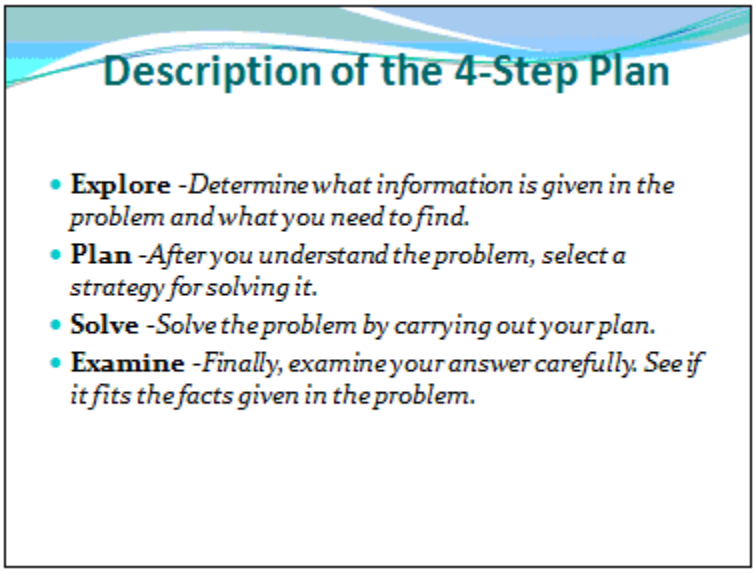

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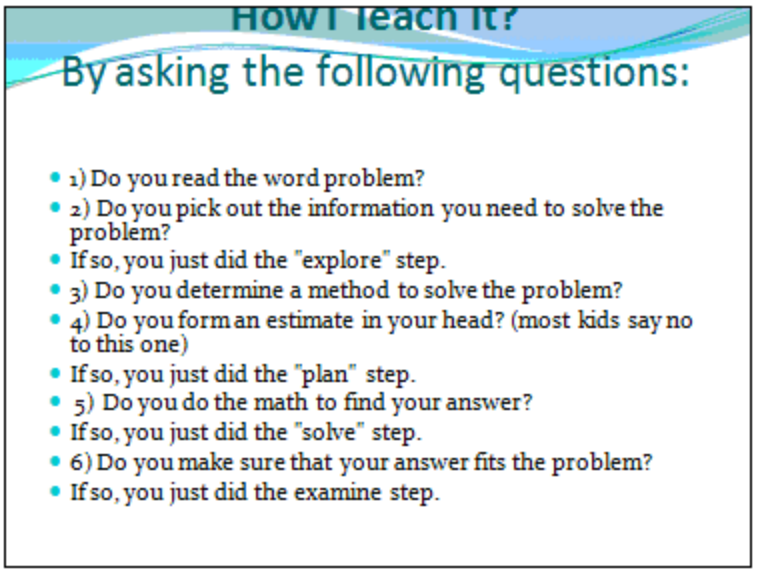

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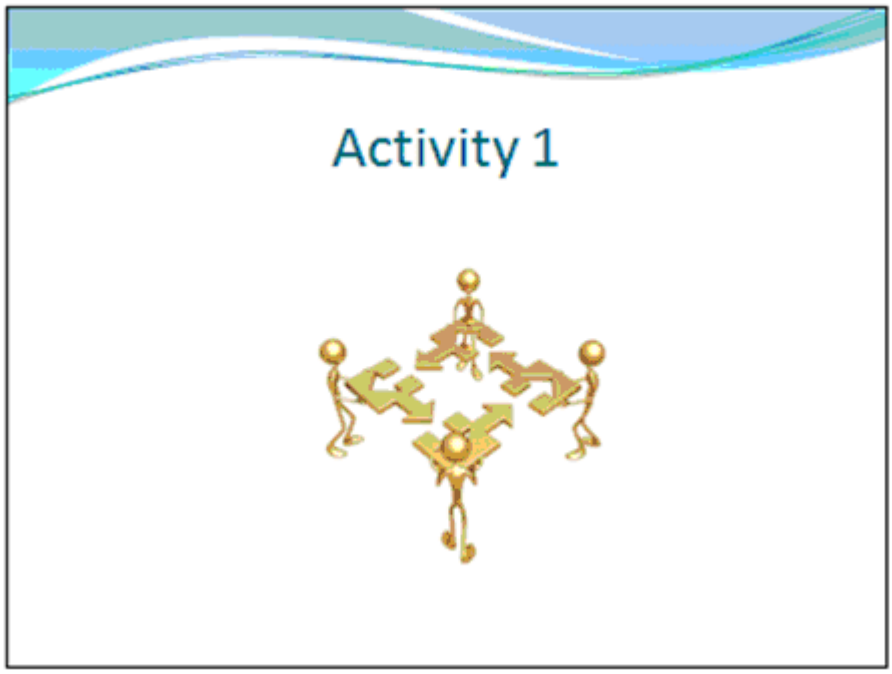


GROUP 1

Activity 1

Problem 1: Laura, Rita, Sam, and Mike each have one car. Each car is a different color. Laura's car is not green. Rita's car is not white or blue. Sam's car is red. Mike's car is not blue. What color is each person's car?

Problem 2: Tom bought a raincoat for 114,000 L.L., a pair of trousers for 49,500 L.L. and a pair of shoes for 109,800 L.L. He had 300,000 L.L. in his wallet.

How much money did he pay?

How much money does he still have?

Problem 3: Amy and April have been selling magazines for their chess club. The club gets $12 from each magazine sale that is made. Amy sold 15 magazines and April sold 24 magazines. How much will the club earn from these two girls' sales?

Problem 4: The fifth-grade classes are having a picnic. They have 294 cans of cola and 120 cans of orange drink. How many 12-packs of both kinds were purchased for the picnic?

GROUP 2

Activity 1

Problem 1: Four planes are waiting to take off. They will fly to four cities; Atlanta, Charlotte, Miami, and Houston. The plane to Atlanta is not the first or the last. The plane to Charlotte is the second. The plane to Miami is not the first. In what order will the planes take off?

Problem 2: Each of the 46 dancers in the group should wear a hat. Hats are sold on packs of 7.

How many packs should be bought?

How many extra hats will there be?

Problem 3: Capital City is preparing for their annual winter festival. They plan to decorate their park with 196 strings of lights and each string of lights has 22 bulbs. It is expected to take 40 hours to decorate over the course of the week.

How many light bulbs are there in all?
How many lights are going to be hung each hour?

Problem 4: Judy's father bought a living room rug. How much did the rug cost if he paid $31.50 a month for 24 months?

GROUP 3

Activity 1

Problem 1: The fifth grade at the Lakewood School is taking a field trip to the zoo. If there are 135 people going on the trip how many buses are needed?

Problem 2: You have to be 12 years old to drive a bumper car. Carol is four years too young to drive. Sarah is older than Carol. Ben is 2 years older than Sara. Ben can drive a bumper car. Is Sarah old enough to drive a bumper car?

Problem 3: Mrs. Smith is planting her garden. She plants 92 seeds in total. Half of them are carrots and half of them are radishes. How many radishes did Mrs. Smith plant?

Problem 4: A club buys a ping-pong table for 498,500 L.L., 5 nets for 22,500L.L., and 8 dozen balls. The sum of 621,500 L.L. is paid for the whole purchases. How much does each ball cost?

GROUP 4

Activity 1

Problem 1: A wholesale merchant buys 3 tons of potatoes at 350,000 L.L. the ton. He sells the potatoes in crates of 33 Kg for 16,500 L.L. the crate. How much profit does he make in all?

Problem 2: Each of the 46 dancers in the group should wear a hat. Hats are sold on packs of 7.
How many packs should be bought?
How many extra hats will there be?

Problem 3: The school is having a book fair. The first book you buy costs $6 and each additional book is half of this price. What is the cost of the 3 books?

.**Problem 4:** There are pictures of horses in two overlapping circles. There are eight horses in circle A and six horses in circle B. Two of the horses are in both circles A and B.
How many horses are in the circles altogether?

Break (1)

LET US do some fun problems!

Direction: Read and solve the following Math problems.

1. How many addition signs should be put between digits of the number 987654321 and where should we put them to get a total of 99?

9 8 7 65 4 3 2 1

2. According to experts the first 4 moves in a chess game can be played in 197299 totally different ways. If it takes 30 seconds to make one move, how long would it take one player to try every possible set of 4 moves?

3. A man has to be at work by 9:00 a.m. and it takes him 15 minutes to get dressed, 20 minutes to eat and 35 minutes to walk to work. What time should he get up?

Use the following link to practice problem solving:
http://www.mathplayground.com/wordproblems.html

SLIDE 8

Tips to Remember:

- *UNDERSTAND the facts in the problem*
- *DECIDE on a strategy for solving*
- *SOLVE*
- *LOOK BACK and check your answer*

SLIDE 9

Strategies that help the student to recall the tips: Mnemonic Devices

- *"**IDEAL**"— (Problem Solving) **I** = identify the problem, **D** = define and represent the problem, **E** = explore possible strategies, **A** = act on the strategies, **L** = look back and evaluate the effects of your actions.*
- *"**My Dear Aunt Sally**": helps students recall the proper order of mathematical operations (Multiply and divide before adding and subtracting).*

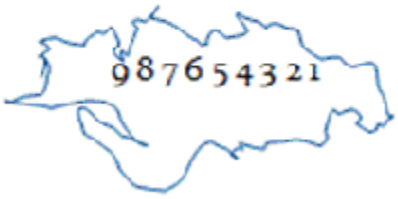
SLIDE 10

Break 1

"Be Smart and answer quickly"

Problem 1:

- How many addition signs should be put between digits of the number 987654321 and where should we put them to get a total of 99?



SLIDE 11

Problem 2:

- According to experts the first 4 moves in a chess game can be played in 197299 totally different ways. If it takes 30 seconds to make one move, how long would it take one player to try every possible set of 4 moves?

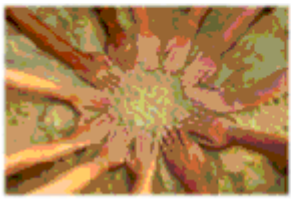
SLIDE 12

Problem 3:

- A man has to be at work by 9:00 a.m. and it takes him 15 minutes to get dressed, 20 minutes to eat and 35 minutes to walk to work. What time should he get up?

SLIDE 13

Activity 2



ACTIVITY 2

Group 1

Read the table below then answer the questions below.

Unit price	Items
$ 2,938	Refrigerator
$ 1,265	Oven
$ 978	Washing machine
$ 234	Microwave
$ 692	Air conditioner

Mr. and Mrs. Eid decided to buy all their kitchen electronics from the TSC Plus.

a. How much does the refrigerator and the microwave cost?

b. Rounded to the nearest hundred, what will be the price of the oven?
c. **About** how much more does the oven cost than the air conditioner?
d. What is the price of **2** refrigerators and **3**ovens?

e. Which item costs the least?
f. What is the price of **5** air conditioners, **4** microwaves and **3** washing machines?
g. If Mr. Eid has only $ 5,000. Will the money be enough to buy all items?
h. After rounding all items to the nearest hundred, what will be the total cost of all items?

i. If Mrs. Eid has $8,000. How many refrigerators can he buy?
j. If Mrs. Eid has $10,000. What items can he buy in this amount of money?

GROUP 2

Activity 2

1. Read the table below then answer the following question.

Items	Price per item
Chocolate bar	**3,500 L.L.**
candies	**1,250L.L.**
chips	**6,750 L.L.**

marshmallows	**2,050L.L.**
juice	**8,550L.L.**
balloons	**1,750 L.L.**

Yara went to the supermarket with a list of items for her birthday party. She bought 4 bags of chocolate bars, 5 bags of candies, 3 bags of chips, 6 bags of marshmallows, 2 boxes of juice, and a bag of balloons.

a.How much does the Chocolate bar and the candies cost?
b. Rounded to the nearest hundred, what will be the price of the juice?
c. About how much more does the juice cost than the chips?
d.What is the price of **2** marshmallows and **3** chocolate bars?
e.Which item costs the least?
f.What is the price of **5** chocolate bars, **4** candies and **3** balloons?
g.If Yara has only 30,000L.L. Will the money be enough to buy all items?
h.After rounding all items to the nearest thousand, what will be

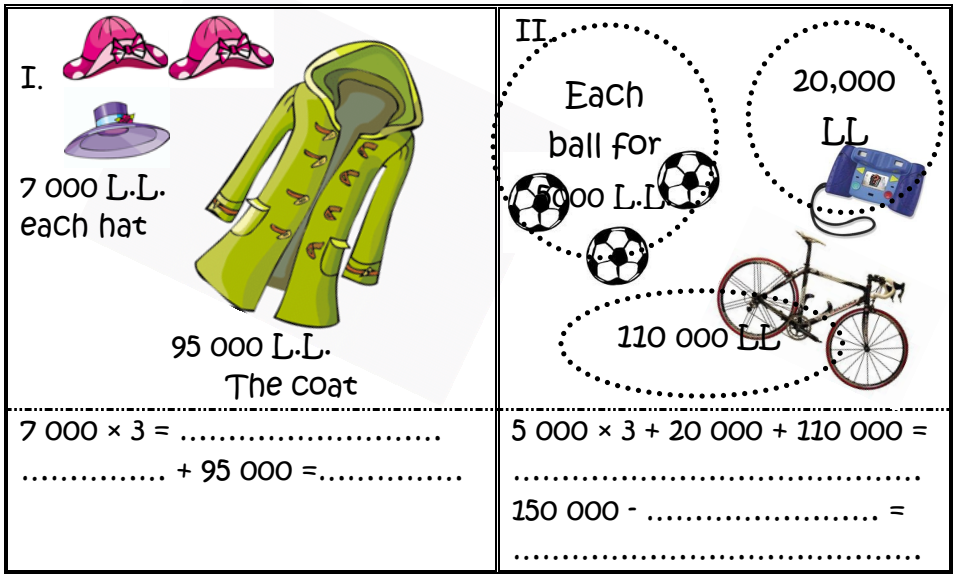
the total cost of all items?

i. If Yara has 8,000L.L.. How many chocolate bars can she buy?
j. If Yara has 10,000L.L. What items can she buy in this amount of money?

GROUP 3

Activity 2

1. Amal started to solve two word problems.



7 000 × 3 = …… …… + 95 000 =……	5 000 × 3 + 20 000 + 110 000 = …… 150 000 - …… = ……

Write the two word problems and **solve** them.

I. ……	**II.** ……
……	……
……	……
……	……
……	……
……	……
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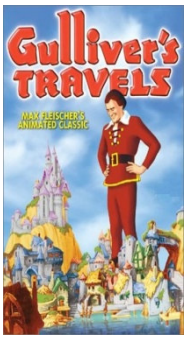
GROUP4

Activity 2

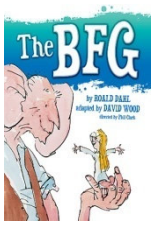
The following is an excerpt of a catalogue which shows some purchases and demands.



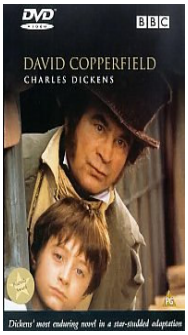
Gulliver's Travels
25 000 L.L.

T
3

the BFG
30 000 L.L.



David Copperfield
35 000 L.L.



Novel	Price	Quantity	Total
		Additional fees	8 000 L.L.
		10 % discount on any 100,000 LL bill	
		Total	

➢ **Use** the information above to **invent** a word problem

……

……

……

……

……

➢ **Solve** the word problem.

……

……

……

2. Invent for each of the following cases a word problem.

a. 578 + 147 = 725

_____

_____

_____

_____

_____

b. 6 × 8 000 = 48000; 10 000 × 2 = 20 000; 48 000 ++ 20 000 = 68 000.

_____

_____

_____

_____

_____

Problem –Based Instruction

WHY?

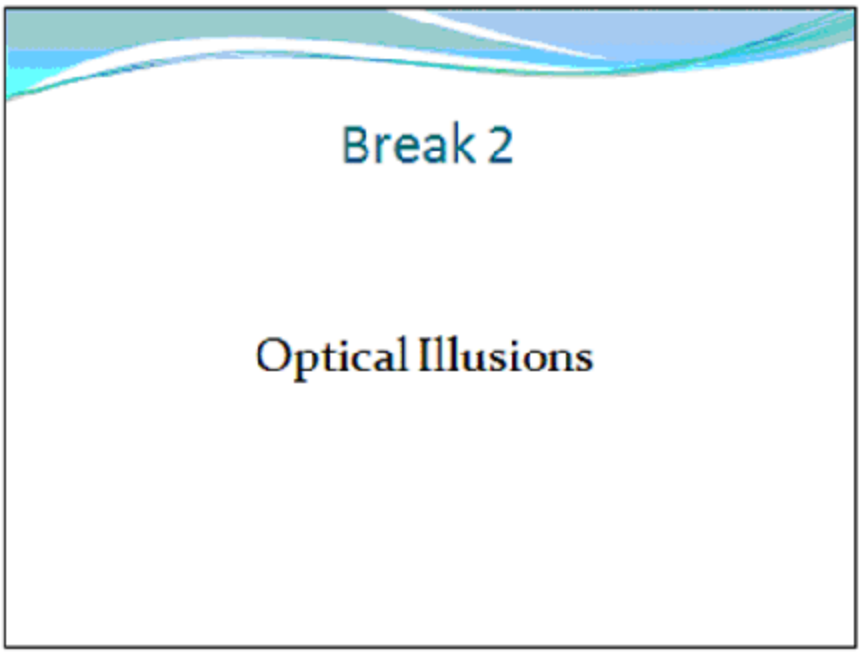
Problem –Based Instruction enables students to learn math content as they solve the same problems that people in the real world (architects, scientists, and engineers) have to solve (Ronis 2006).

When a new math skill is viewed within the context of a problem, English language learners have opportunities to develop language skills through discussion (Coggins et al., 2007).

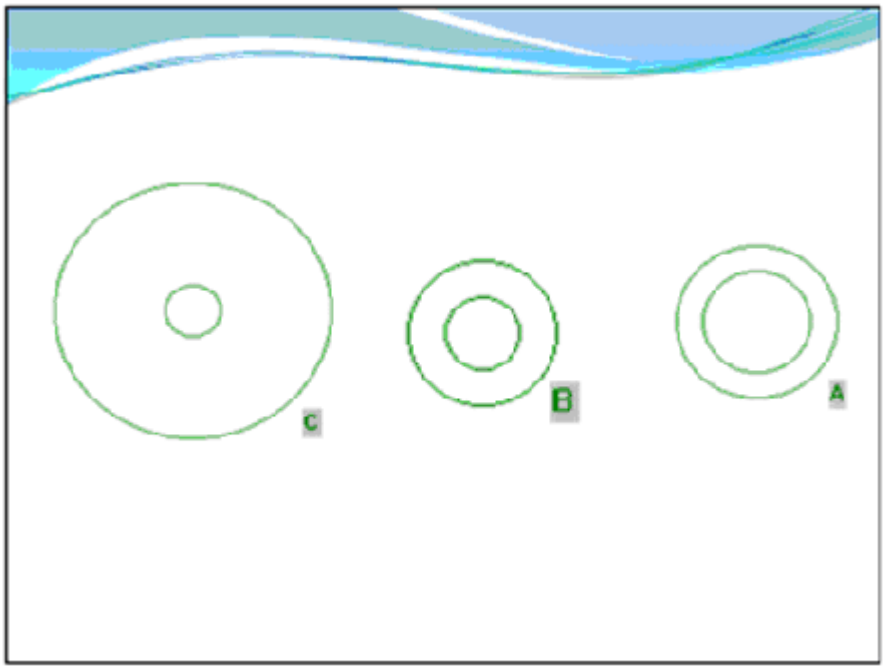
Parents should involve their children in real-world projects that involve reasoning or mathematical skills, such as planning for a birthday party, buying carpeting, or calculating a budget (Wall & Posamentier, 2006).

When students interact with other students in a group while solving problems, both cognitive (basic) and metacognitive (higher-order) thinking skills are stimulated (Posamentier & Jaye,2005).

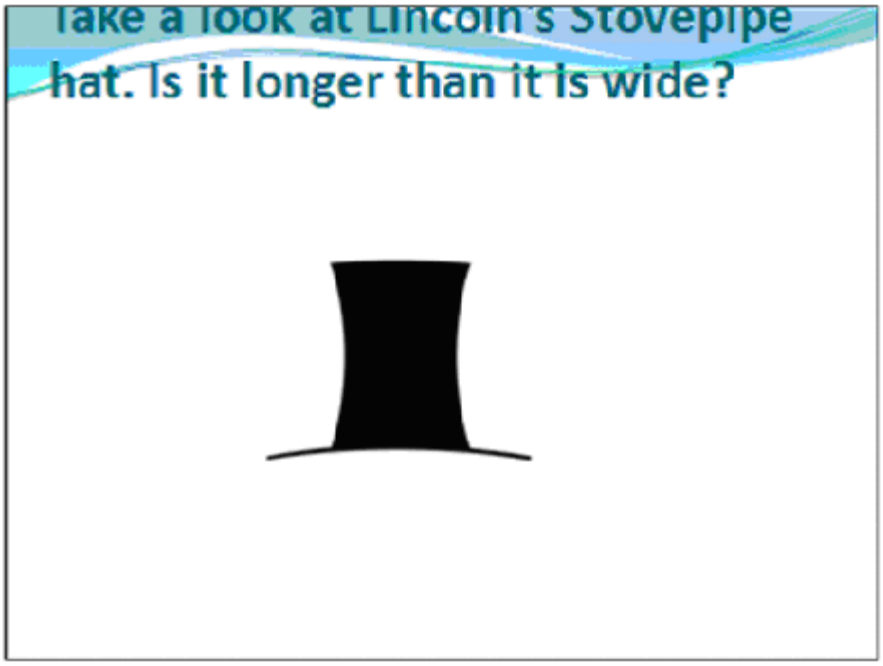
SLIDE 14



SLIDE 15



SLIDE 16



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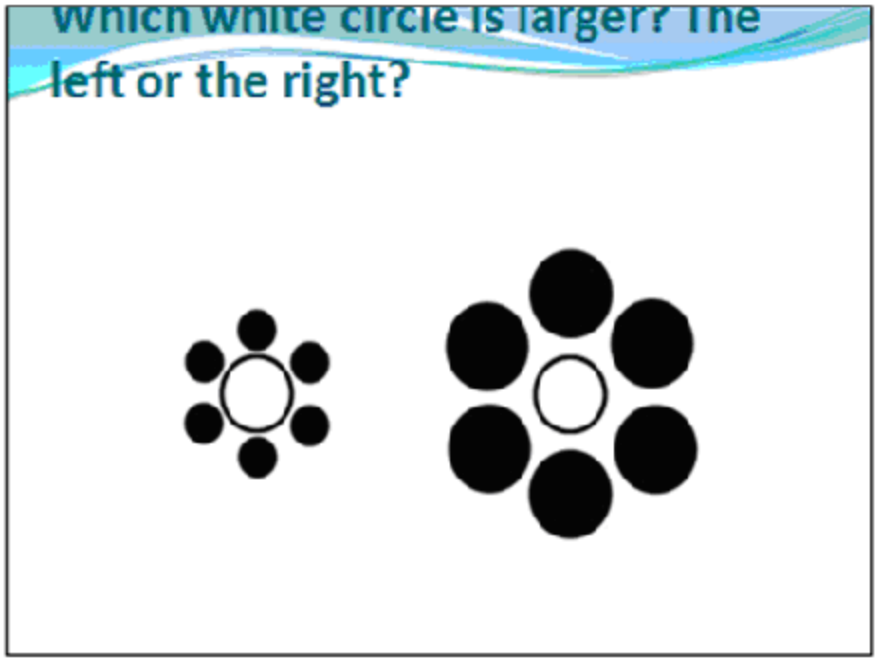
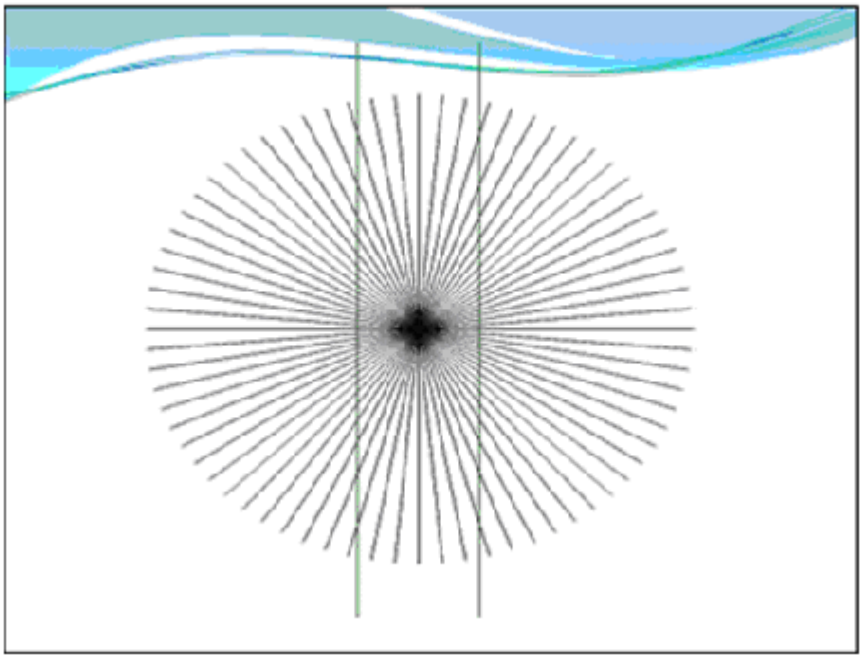


SLIDE 18

SLIDE 19



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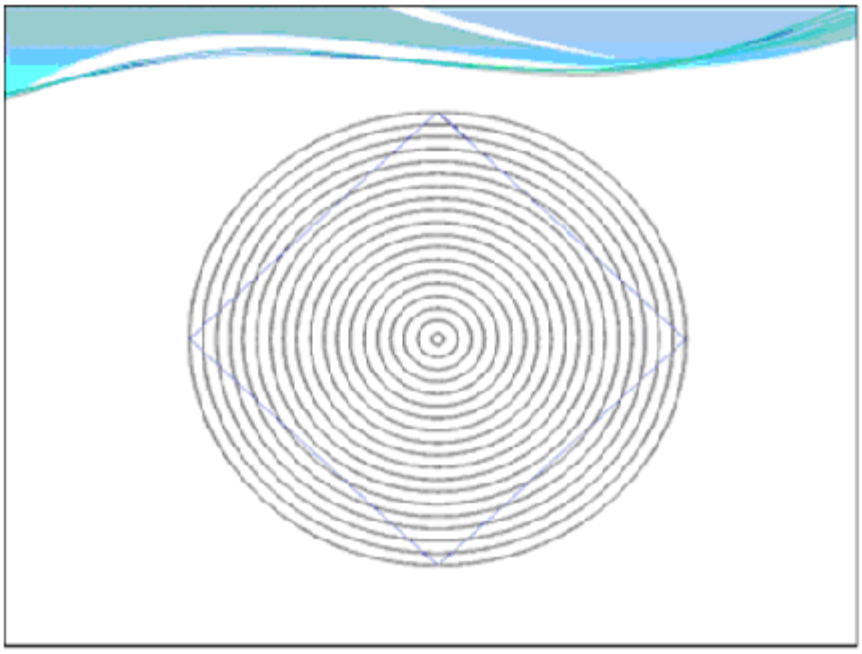

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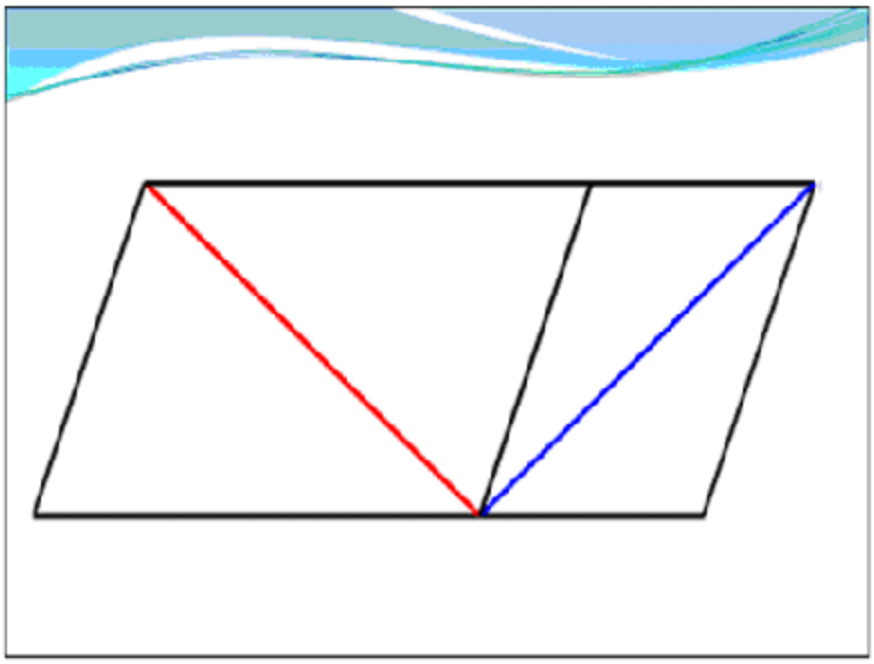

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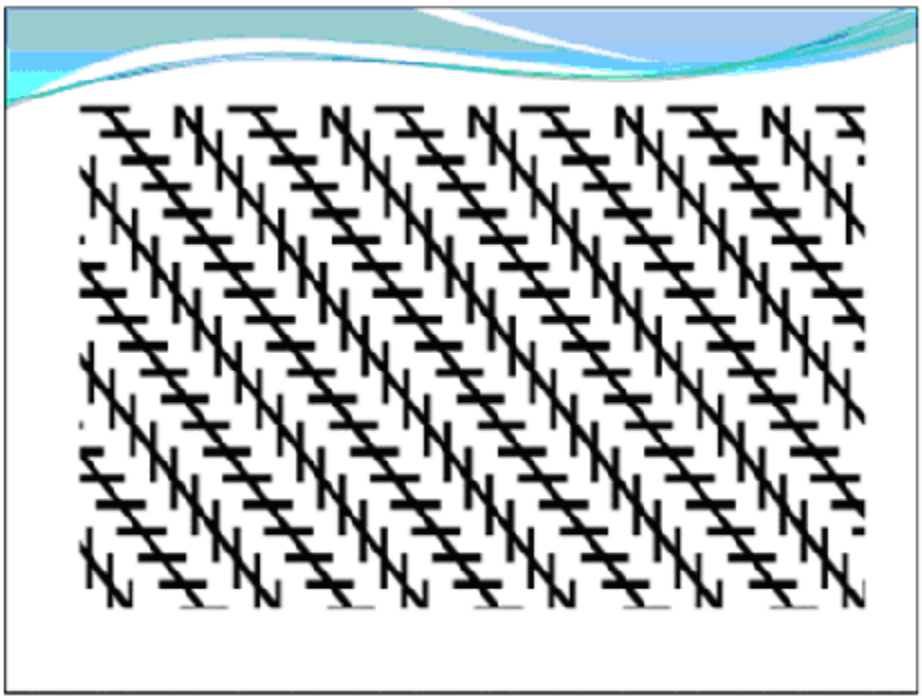

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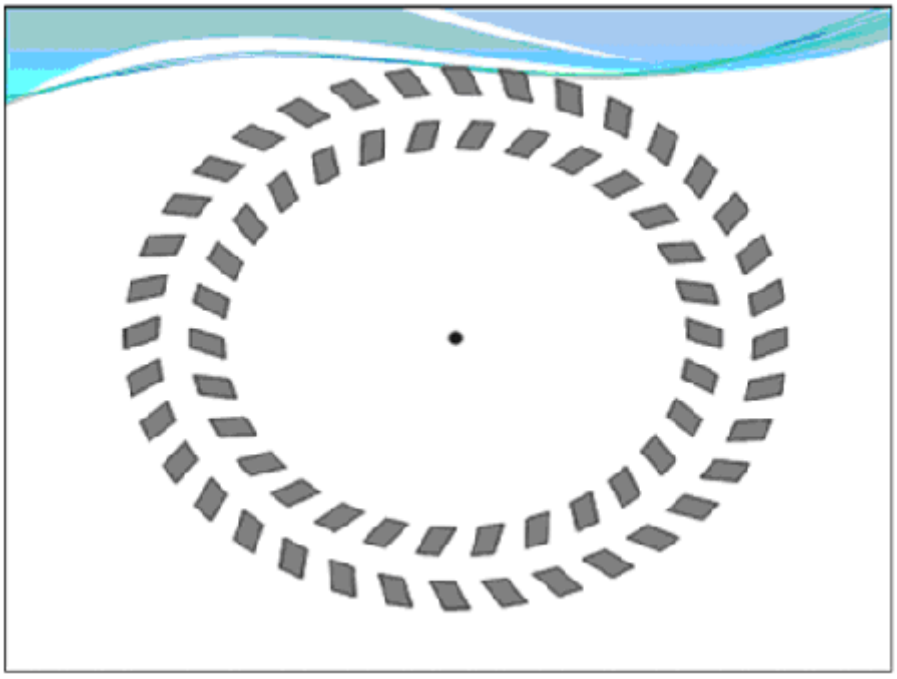

SLIDE 24

Reflection

- What question did you raise after this workshop?

Quickwrite and Think-Pair-Share

SLIDE 25

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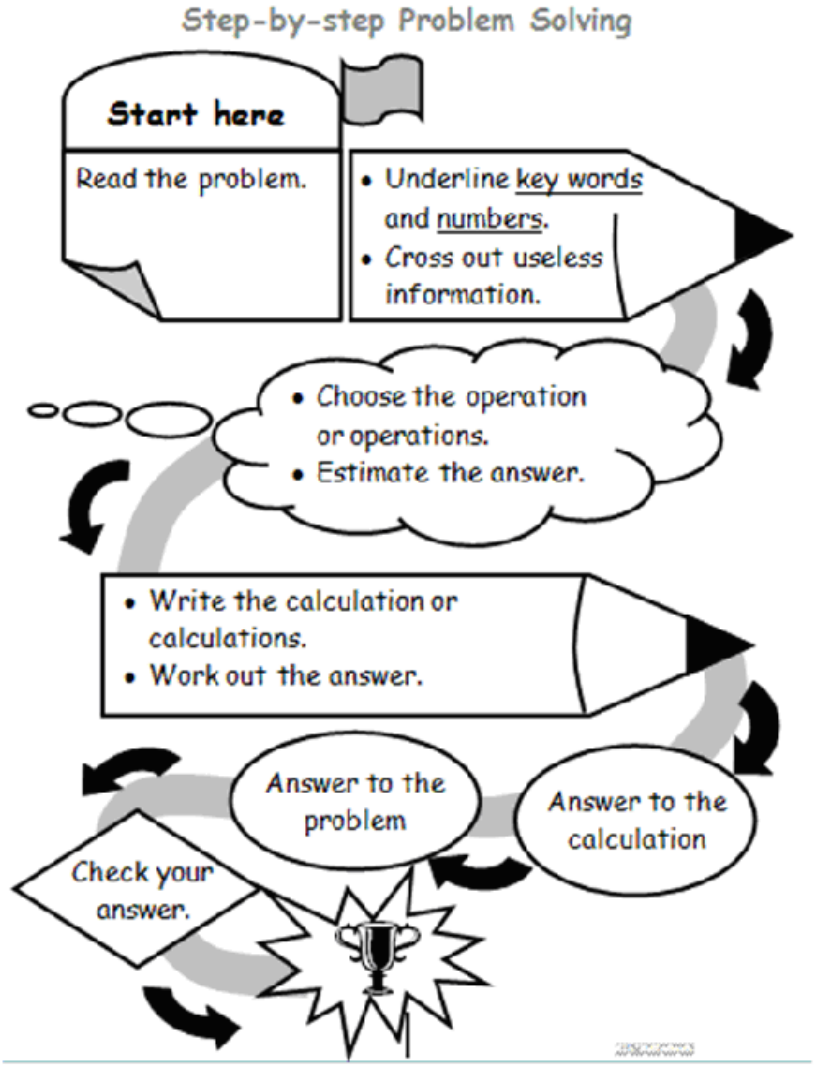
- Houghton Mifflin
- Puissances: Ahlia



Problem Solving with Times Tables

Remember to show all work clearly.

Think carefully how you would

use the boxes to help you answer the questions.

1) My family went to Centre Parcs for a holiday. There were five of us who decided to rent a bicycle each. At the bicycle centre each person who rent a bicycle had to

also rent a helmet and a padlock too. How many things did we rent in total from the bicycle centre?



2) For the month of December, three children were given an Advent calendar each. For every day there were two treats. How many treats would they have had altogether by the 8th of December?
(Hint: First work out how many treats just one child gets by 8th December)

3) There are four friends playing a card game called SNAP. In the first game, each person is given nine cards to play with. How many cards are there altogether?

4) In the second game they were given two more cards each. Now how many cards are there altogether?
(Hint: each person has two more than nine.)

5) For the last game, they decided to make the game shorter. So five cards were taken away from each person. Now, how many cards were there altogether?
(Hint: each person has five less than the second game.)

Using the Art of Cutting & Folding Papers to Develop the Third Dimension Concept for the Students

Madiha Mohammad

The main purpose of this workshop is to increase participants' understanding of how to use the art of cutting and folding papers to develop the third dimension concept for the students in elementary, middle and secondary stage. Participants will take on the role of the learner during the session by actually using the cutting and folding papers activities to produce pop-up cards. The pop-up cards are hard paper cards with movable parts. We do some cutting and folding then these cards becoming three dimensional when opened (appear unexpectedly).

The session is planned to ask the participants to do some activities. These activities should firstly be completed by teachers to understand the theoretical ideas and then to modify the activities for their own classrooms.

During this workshop the following activities will be completed:

Activity (1): (5 minutes)

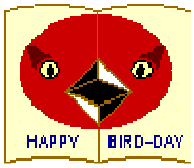
- What are your expectations about this workshop?
- I will write all their expectations on the board.

Activity (2): (5 minutes)

- Demonstrate the aims of this workshop.
- Make a comparison between the aims of workshop and the expectations of the participants.
- Explain the system of working during this workshop.

Activity (3): For elementary stage (10 minutes)

Ask the participants to do the bird beak pop-up card.

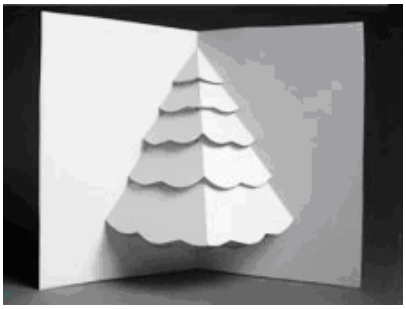


Activity (4): For elementary stage (15 minutes)

Ask the participants to do this pop-up frog card.

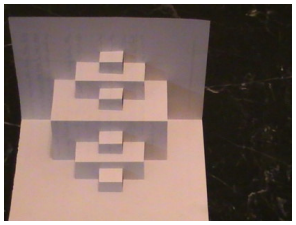
Activity (5): For elementary stage (15 minutes)

Ask the participants to do the Christmas tree pop-up card.



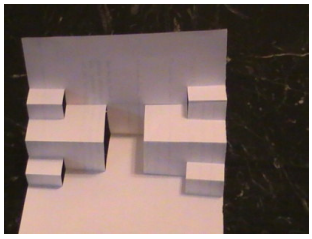
Activity (6): For middle stage (10 minutes)

Ask the participants to do this pop-up card.



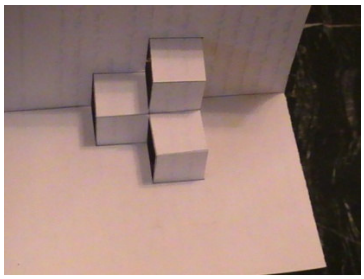
Activity (7): For middle stage (10 minutes)

Ask the participants to do this pop-up card.



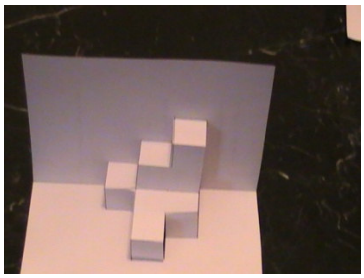
Activity (8): For secondary stage (10 minutes)

Ask the participants to do this pop-up card



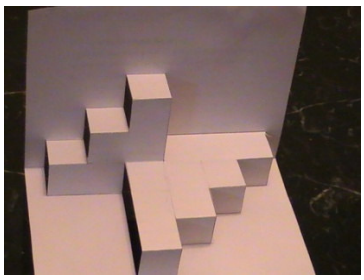
Activity (9): For secondary stage (20 minutes)

Ask the participants to do this pop-up card.



Activity (10): For secondary stage (20 minutes)

Ask the participants to do this pop-up card.



Misconceptions As Tools to Improve Mathematics Learning
Maha El Hariri

Abstract

Misconceptions in mathematics lead to students 'difficulties in learning and consequently to mistakes and errors due to their interference with the learning concepts. In this session, participants will reflect on the nature and causes of some misconceptions and mistakes in mathematics in the elementary and intermediate levels. They will also explore ways in which such misconceptions can be invested as tools to improve learning.

Introduction

Students always make mistakes. Some of these mistakes are due to: hasty reasoning, students' carelessness, or an over load in the working memory (Swan, 2001; Lemaire, Abdi, & Fayol, 1996). Another reason for students' mistakes is the failure in developing correctly a mathematical concept. If such a failure is gone unnoticed, then it will continue with the students through the successive grades, thus hindering the process of development of other mathematical concepts and leading to serious learning difficulties. Hence, it is an urgent need in the mathematics learning process to identify students' misconceptions and help students to correct their mathematical thinking and reconstruct correct conceptions.

There are several reasons that lead to students' misconceptions such as:

- generalizations based on an early mathematical experience, and prior existing misconceptions,
- the way in which a mathematics curriculum organizes and presents a mathematical concept,
- representations of concepts that teachers' use in class,
- learners' cognitive abilities,
- adequacy of examples and practices used in concept development.

Applied Strategy

Almost all teachers are capable of identifying misconceptions whenever they exist. However, some of them try to avoid the discussion of such misconceptions in class because they feel that some students will pick up these incorrect ways of thinking. A contradictory approach to the previously mentioned one is presented in this session. Teachers are encouraged to face misconceptions and use them as tools to improve mathematics learning.

Session Description

The session started by exposing the participants to a real-life non mathematical situation that led to a misconception. Then, participants were provided with several examples of students' mistakes and they had to identify the type of mistake as a mistake related to a misconception or not. Based on their findings, a comparison between types of mistakes based on misconceptions and other types of mistakes took place.

The session continued by providing participants with seven examples of students' work involving misconceptions. Participants had to work in groups to identify the reasons behind such misconceptions. Discussion took place, and several reasons were provided.

After that, participants had to answer the following question: "How my teaching creates misconceptions?". Some participants provided some examples that were discussed and the presenter shared with the teachers seven instructional practices related to algebra and geometry that teachers apply and lead to misconceptions.

Then, the affect of the way in which the mathematics curriculum organizes the development of a concept across different grades on students' misconceptions was discussed. An example that compares the development of the concept of the circle between two different mathematics curricula was shared with the participants.

Teachers' attitudes towards students' misconceptions were discussed. Most of the participants agreed that teachers should not avoid misconceptions.

Participants were provided with additional examples of students' work showing students' misconceptions. Participants were asked to work in groups and propose strategies that should be adopted to correct such misconceptions.

Handouts showing an example of a method that can be used to detect students' misconceptions were distributed.

Towards the end of the session, the presenter shared with the participants' strategies that help them to use misconceptions as teaching tools such as: the conflict teaching approach, classroom discussions and the usage of different representations of a concept. Examples about each teaching strategy were concluded from previous examples provided during the session.

Questions and discussions had dominated the session. Different teachers' experiences with misconceptions were shared. After the session, many of the participants changed their attitude towards misconceptions and showed a sincere will to use the proposed strategies to correct possible misconceptions in class.

References

Lemaire, P., Abdi, H., & Fayol, M. (1 996). The role of working memory resources in simple cognitive arithmetic. *European Journal of Cognitive Psychology,8, 73-103.*
Swan, M., (2001). Dealing with Misconceptions in mathematics. In S. Capel, J. Davison, J. Arthur & J. Moss (Eds), *Issues in Mathematics Teaching.*(pp.147-165). London and New York : Routledge, Falmer Publishers.

Science

Guided Internet Usage

Rabab Heteit & Joseph Saleh

SLIDE 1

GUIDED INTERNET USAGE

SLIDE 2

Overview

• Scientific information is evolving very fast
• Scientific resources available over the Internet are constantly developing …

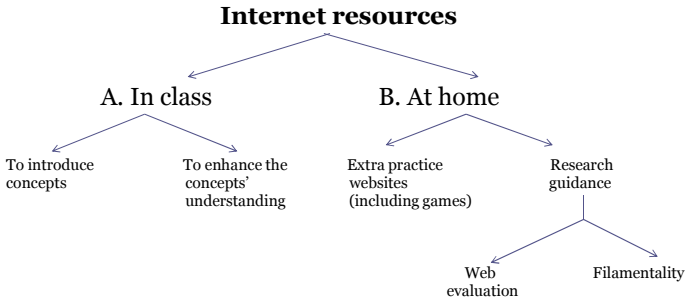
This proves that archives & books do not always help as practical resources for daily evolving scientific information.

We aim to integrate Internet skills as a part of every science curriculum…

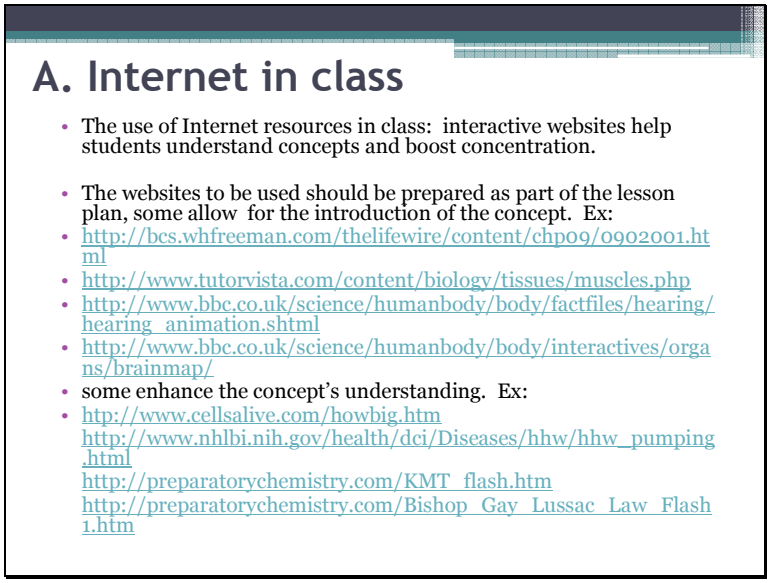
However, Internet usage can sometimes be misleading and time consuming… when not used wisely…

SLIDE 3

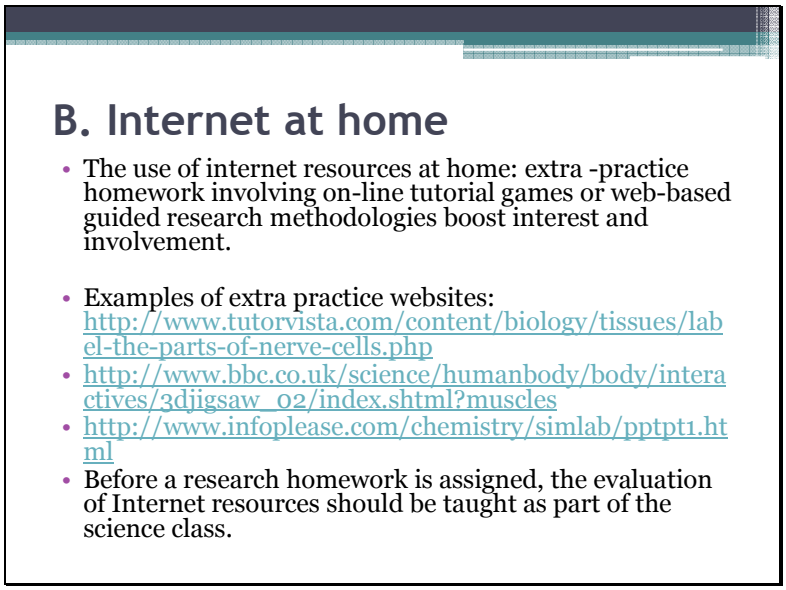
Outline:



SLIDE 4



SLIDE 5



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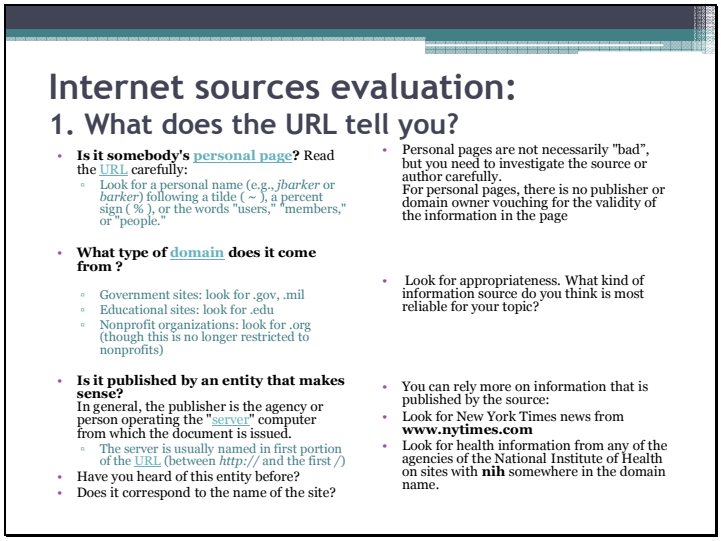
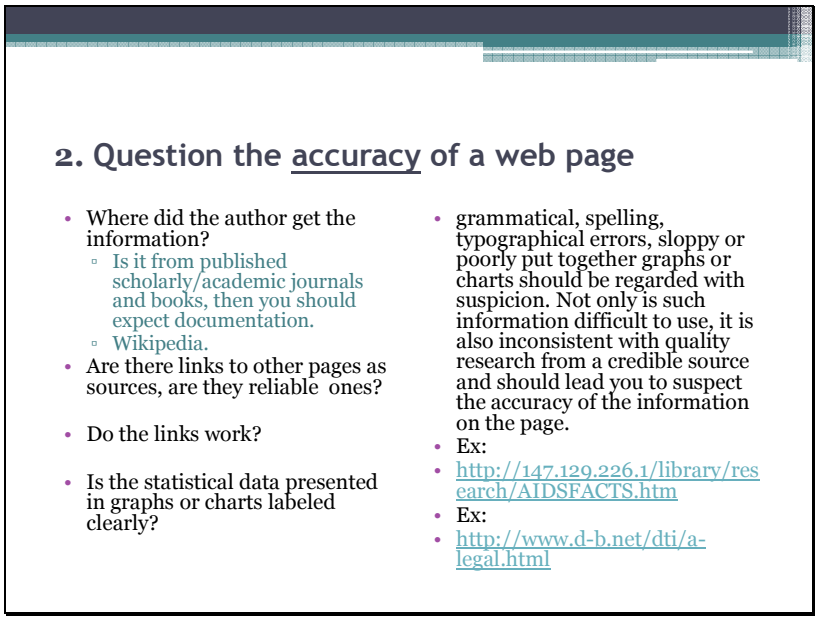
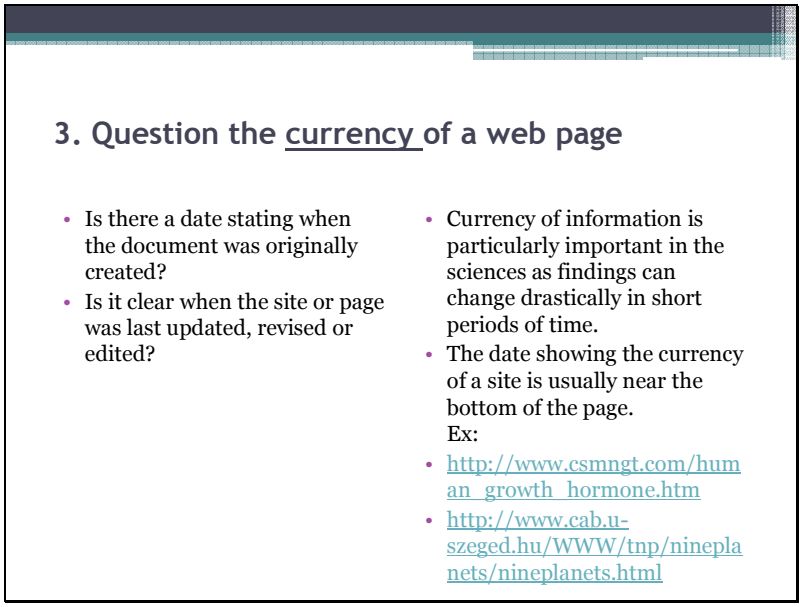


SLIDE 7



SLIDE 8



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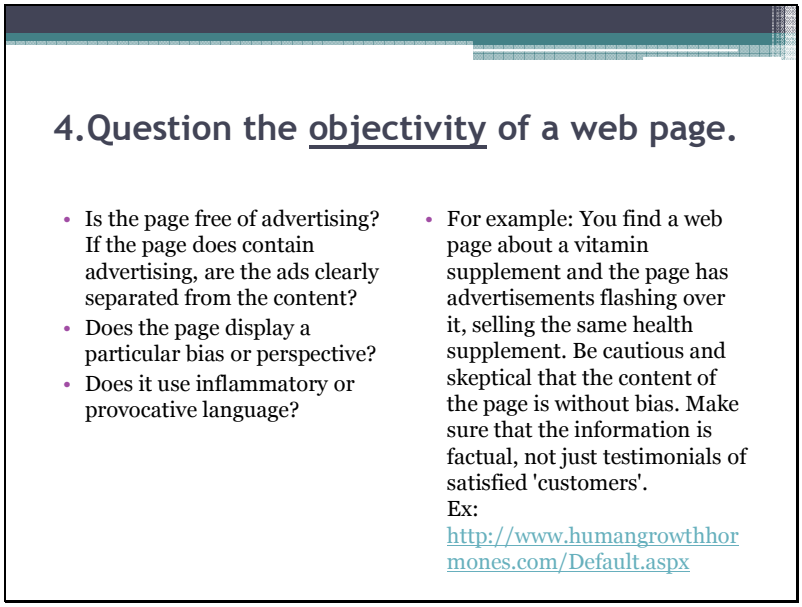
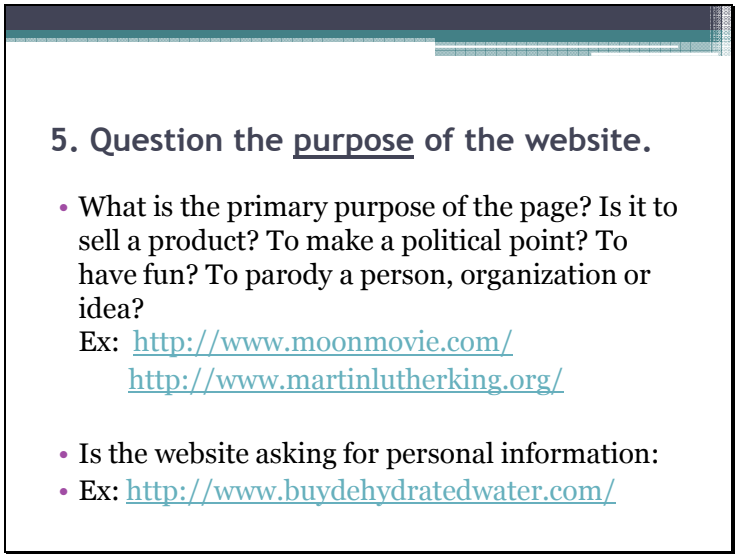
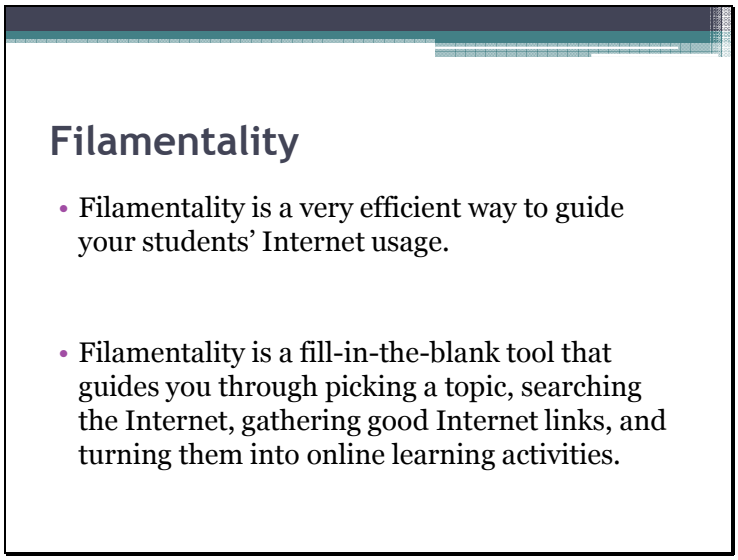


SLIDE 10



SLIDE 11



Filamentality is a fill-in-the-blank tool that guides you through picking a topic, searching the Internet, gathering good Internet links, and turning them into online learning activities. Support is built-in along the way through Mentality Tips. In the end, you'll create a web-based activity you can share with others even if you don't know anything about HTML or serving web pages.

The steps to create your own hotlist:

1. www.filamentality.com
2. Click on filamentality
3. If you want to create a new list, click on ***start a new page***, or if you have already a list and you want to change it, click on ***Edit existing page.***
4. If you select ***start a new page*** answer the following questions:

What's the main topic of your page?

KEEP IT SHORT. This is not your Title. This is the subtitle and will be used to identify the subject of your online activity.

Type a username. See notes below.

Choose your username and password carefully. They cannot be changed once you click the Spin This Thing button below. There is a 20 character maximum. Use numbers and letters only!

Type a password. Pick something you'll remember.

There is a 7 character maximum. Use numbers and letters only! Use "temp" only if you intend to make a temporary page. We delete temp files periodically.

Enter your e-mail address:

Use an address that you won't mind having your students and the rest of the world see.

What's your school or library name? (optional)

Your school's Internet location (optional):

http://

Your Personal Homepage location (optional):

http://

5. Click on ***spin this thing!***
6. Click on ***Add link***
7. Add the links in the following page:

Add Links

You can add more links by cutting and pasting in the Title, URL (web address), and Description in the blank fields below. We have included some search engines to help you. You may add as many links as you like--in sets of three--by continuing to click on "Add Links" on the Navigation Menu at the bottom of this page. Make sure you include the **http://** part of the URL or the link won't work! If you aren't sure about how to fill in these blanks, try our Copy and Paste Mentality Tip.

Location: http://

(required!)

Title:
(required!)

Description:
(recommended)

Location:
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Title:
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Description:
(recommended)

Location:
(required!)

Title:
(required!)

Description:
recommended)

8. Click on ***Hotlist***
9. Add Your Title

   Your title can be creative, descriptive, or simply the subject/grade you teach. You can come back and edit this later
10. Categorize Links

    You can organize your links into 6 different categories or subsections. Type your categories into the boxes below. If you don't categorize your links, they will appear under the default heading "Internet Resources." Categorized links will appear underneath.

    1.
    2.
    3.
    4.
    5.

6. 

11. You can customize your page by choosing background, text, link, and visited link colors. Or you may skip to the next part.
12. Finish Your Hotlist
    Click on ***Hotlist*** below to save your changes and post your Filamentality page on the Internet.
13. If you've already used Filamentality to create a page and you'd like to edit**...**
14. Type in your username and password below then click on the "Spin this Thing" button at the bottom of the page.
15. You can edit the information as needed, then use the menu at the bottom to start making your web page.

Why is Science Difficult to Learn?
Zeina Hajo

Abstract
Many students find school science more difficult to learn than other subjects. But is science really difficult to learn? And if the answer is 'yes', why is it difficult?
It was claimed that science is hard to learn because it is not well taught. Expending effort on applying different teaching techniques without asking questions about how students learn and without understanding the characteristics of formal science taught in school is time wasting. For successful science teaching the nature of learning and the nature of science are two sides that should be taken into consideration. If science teachers are aware of these two sides, they will be more able to teach science in the way that students learn best.
The main purpose of this session is to help science teachers: (a) understand how people learn from a constructivist perspective, (b) discover the nature of formal science taught in schools (e.g. the nature of scientific concepts and scientific theories), (c) be aware of the conflict between the nature of science and the nature of learning, and (d) apply some teaching strategies to reduce this conflict and make science less difficult to learn.

Synopsis

The session was planned as follows:

Phase one: How people learn (25 min) (see slides 2-6 below)

The presenter provided an explanation of the information processing model of memory and engaged participants in some illustrative activities.

Samples of activities:

The participants: (a) watched a video centred around 'attention', (b) were shown pictures to understand 'perception', (c) repeat a seven digit number after 20 seconds to experience the limited capacity of the short term memory, (d) were shown two schemas of the same topic constructed by two students (novice and expert) to understand how information is meaningfully encoded in Long Term Memory (LTM).

Phase two: The nature of science as taught in schools (5 min) (see slide 7 below)

The participants were asked to answer the question 'Why is science difficult to learn?' The answers were filtered and important points concerning the nature of learning and the nature of science were identified.

Phase Three: The nature of science concepts (30 min) (see slides 8-10 below)

Activity 3.1 (science concepts are not easy to identify): A group of science concept and another group of non-science concepts were presented. The participants explained which group of concepts is easier to identify.

Activity 3.2 (how learners construct concepts): The participant worked in group to construct a concept.

The activities were followed by a whole group discussion led by the presenter to clarify (a) the nature of the scientific concept and (b) the conflict between the nature of the science concepts and the nature of learning. A suggested teaching strategy to reduce the conflict is using concept maps.

Activity 3.3 (how to construct a concept map): Participants took on the role of the learners by working in group to construct a concept map after a clear explanation provided by the presenter about how a concept map is constructed (see Handout A).

Phase four: The nature of the scientific theories (25 min) (see slides 11-16 below)

Activity 4.1 (a discrepant event used to identify participants' alternative conceptions and to apply a model of conceptual change): Participants were asked to sit on a wooden square where 200 nails were fixed, explain their prediction before sitting on the nails, provide a scientific explanation why the experience of sitting on the nails was not so painful as was predicted, then relate the scientific law to daily life applications.

The activity was followed by a whole group discussion led by the presenter to focus on (a) the nature of the scientific theories and (b) the conflict between the nature of the scientific theories and the nature of learning. A suggested teaching strategy to reduce the conflict is to use the 'Conceptual Change Instructional Sequence' model developed by Rosalind Driver (Driver, 1988) (see Handout B). The presenter discussed the model with the participants referring to Activity 4.1.

Phase five: Summary (5 min)

The presenter closed the session by summarizing it and encouraging science teachers to apply teaching strategies particularly effective to bridge the gap between the nature of science and the nature of learning such as the strategies adopted in this session.

THE THIRTEENTH ANNUAL SCIENCE AND MATH EDUCATORS CONFERENCE (SMEC 13)

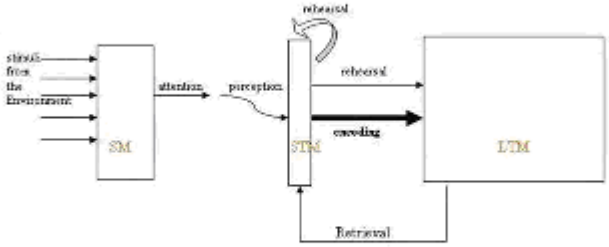
American University of Beirut
Beirut, Lebanon
April 9, 2011

Why is Science Difficult to Learn?

ZEINA HAJO
PhD Education
University of Leicester, England

1

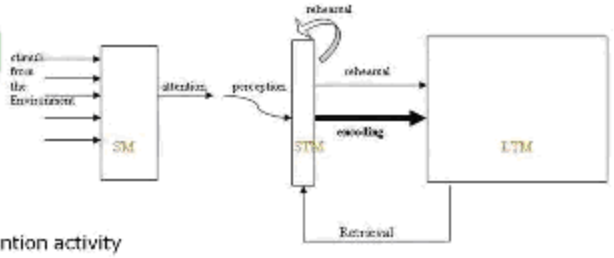
INFORMATION PROCESSING MODEL OF MEMORY



INFORMATION STORES The conceptual representation of the mind	COGNITIVE PROCESSES that move information through the different stores of the mind
• Sensory Memory (SM) • Short-Term Memory (STM)/Working memory • Long Term Memory (LTM)	• Attention • Perception • Rehearsal • Encoding • Retrieval

2

COGNITIVE PROCESSES
ATTENTION

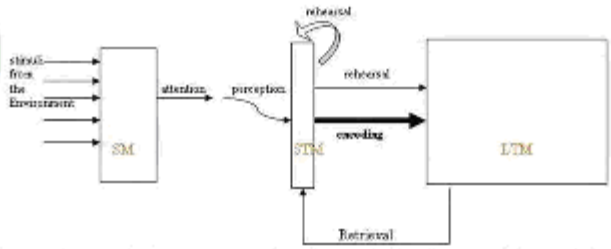


Attention activity

- Attention is the process of selecting a subset of stimuli to focus on it. Selective attention determines what information moves from sensory memory to short-term memory.

3

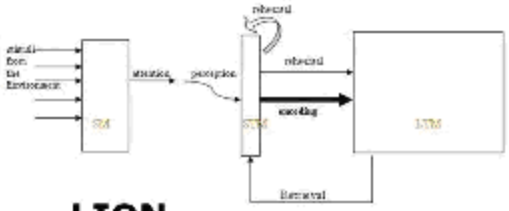
COGNITIVE PROCESSES
PERCEPTION



- Perception is influenced by the learner's background knowledge. It actually, doesn't involve copying the stimulus that enter sensory memory, but rather perceiving the meaning of this stimulus, interpreting it and transfer it to working memory.
- Therefore, information in working memory represents the perceived reality, which may not always be identical to the true reality.

4

COGNITIVE PROCESSES
ENCODING

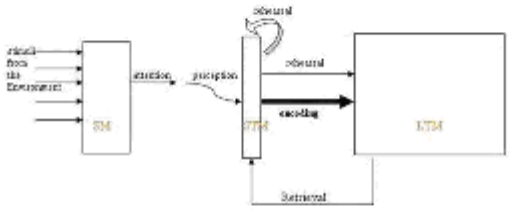


LION

- When you read the word *"lion"* a mental image of a lion is formed. This transformation process from word to image is a form of encoding.
- Encoding is developing a code as a mental representation of information in memory.
- However, knowledge is not always simple information.

5

COGNITIVE PROCESSES
ENCODING



Meaningful encoding is integrating new information arriving to STM with old information already present in LTM.

6

The Nature of Science Taught in Schools

- **The science concepts**
  - •The nature of science concepts
  - •Conflict between the nature of science and the nature of learning
  - •Suggested teaching strategies to reduce the conflict
- **The scientific theories**
  - •The nature of scientific theories
  - •Conflict between the nature of science and the nature of learning
  - •Suggested teaching strategies to reduce the conflict

7

The Nature of Science Concepts

Group A	Group B
Cat	Force
Girl	Energy
Triangle	Covalent bond
House	Oxidizing agent

- Concepts form from our senses by noticing common factors and regularities and by establishing examples and non-examples.
- This direct concept formation (using senses) is possible for concepts in group A but quite impossible for concepts in group B.
- The psychology for the formation of most science concepts is quite different from that of the 'normal' world.

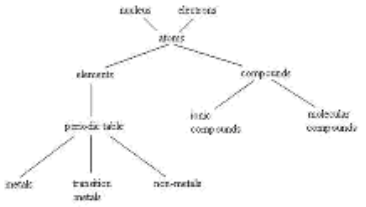
8

The Science Concepts

Conflict between the nature of science and the nature of learning

Knowing that learners construct meanings by connecting new concepts to prior knowledge present in Long term Memory, the problem is that when a new science concept is introduced, students can find neither anything to pull out from LTM to match with, nor a way to anchor the new science concept into LTM.

Polyatomic ions



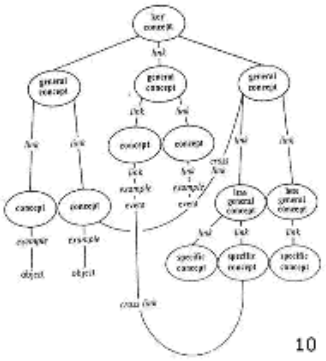
9

The Science Concepts

Suggested teaching strategies to reduce the conflict

Concept mapping

- Formed of Concept words and Linking words
- Linking words are used together with concept words to construct sentences that have meaning
- Most concept maps are hierarchical



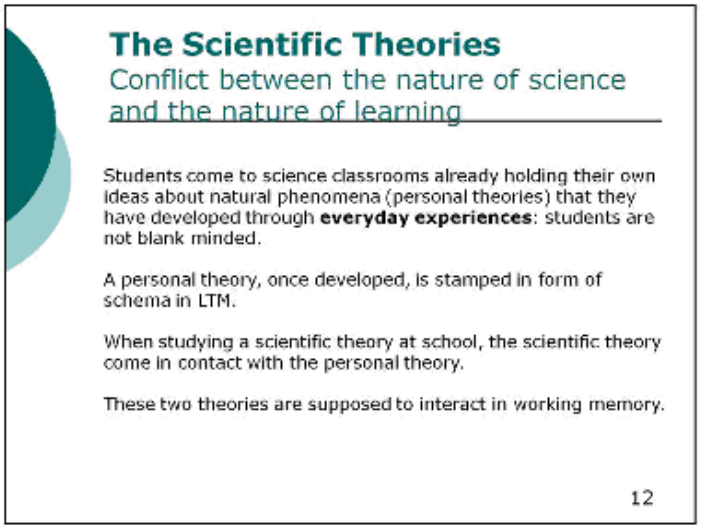
10

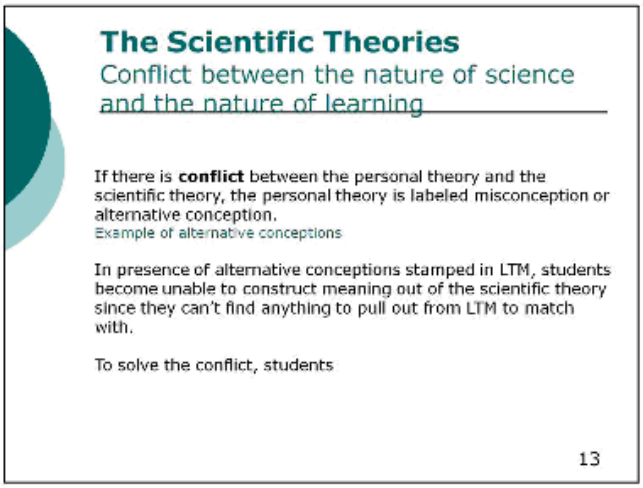
The nature of scientific Theories

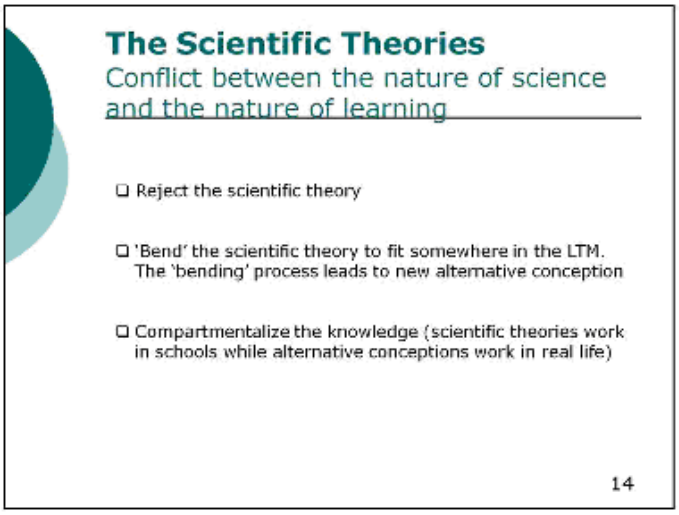
Activity

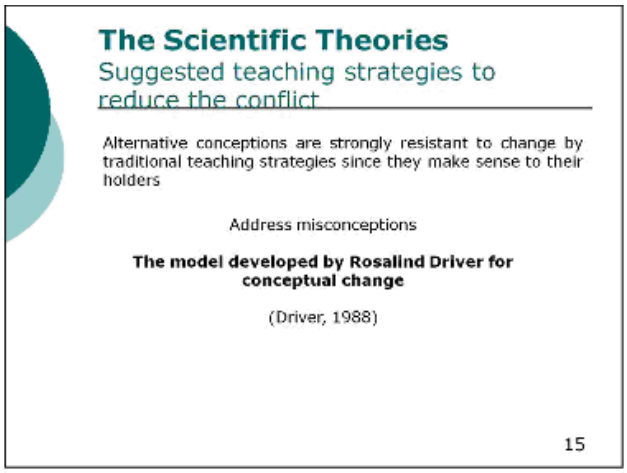
- Who wants to sit ?
- What do you expect?
  Explain your prediction before sitting.
- Where this prediction come from?
- Provide a scientific explanation.
- Relate the scientific law to daily life applications.
- Does your idea change?

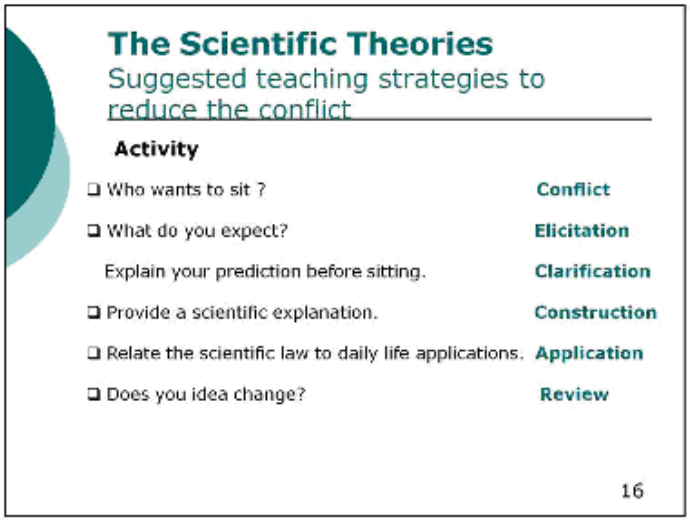
11


The Scientific Theories
Conflict between the nature of science and the nature of learning
Students come to science classrooms already holding their own ideas about natural phenomena (personal theories) that they have developed through **everyday experiences**: students are not blank minded.
A personal theory, once developed, is stamped in form of schema in LTM.
When studying a scientific theory at school, the scientific theory come in contact with the personal theory.
These two theories are supposed to interact in working memory.
12


The Scientific Theories
Conflict between the nature of science and the nature of learning
If there is **conflict** between the personal theory and the scientific theory, the personal theory is labeled misconception or alternative conception.
Example of alternative conceptions
In presence of alternative conceptions stamped in LTM, students become unable to construct meaning out of the scientific theory since they can't find anything to pull out from LTM to match with.
To solve the conflict, students
13


The Scientific Theories
Conflict between the nature of science and the nature of learning
Reject the scientific theory
'Bend' the scientific theory to fit somewhere in the LTM. The 'bending' process leads to new alternative conception
Compartmentalize the knowledge (scientific theories work in schools while alternative conceptions work in real life)
14





Handout A

Concept map construction

Please use List I, list II or List III to construct your concept map.

List I	List II	List III
Atom	Sex cells	Wires
Colloids	Egg	Series
Compounds	Meiosis	Voltage
Elements	Zygote	Electric current
Gas	Genetic continuity	Single pass
Liquid	Mitosis	Continuous loop
Matter	Asexual reproduction	Battery
Mechanically separated	New organism	Parallel
Mixtures	Sperm	Electrical circuit
Molecules	Identical offspring	Intensity
Solid	Sexual reproduction	Light bulbs
Solutions		Separate loop
Suspensions		

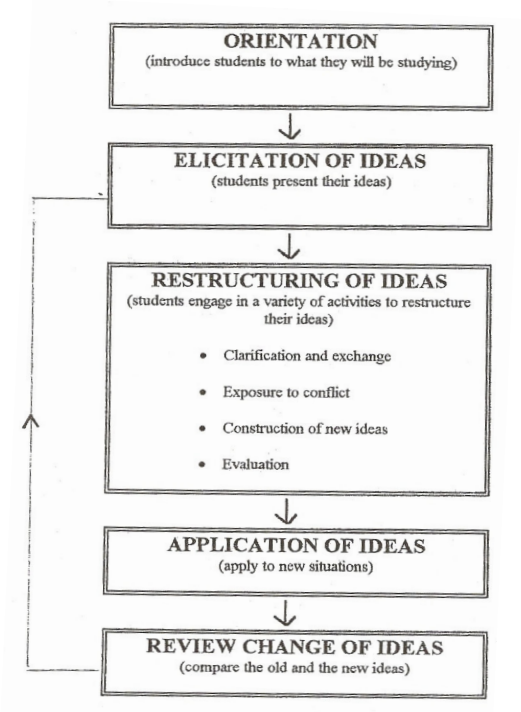
Handout B

Using Motion Detectors to Help Students Develop Meaningful Understanding of Velocity, Time and Acceleration

Tamer Amin

Abstract

Translating everyday subjective intuitions about speed and acceleration into objective and abstract



graphical and symbolic representations of displacement, time, velocity, and acceleration is challenging for many students. In this workshop, participants were introduced to ways of using motion detectors together with Vernier Logger Pro software to help students develop more meaningful understanding of these concepts and their representations.

Synopsis

Students have a variety of problems in developing meaningful understanding of the concepts of displacement, time, velocity, and acceleration and the relationships between them. Some of these problems are conceptual and some have to do with the interpretation of graphs. Overall, it can be argued that the difficulties have to do with the challenge of translating relevant subject everyday experiences of motion and of the visually presented graphs representing the technical concepts into meaningful abstract understanding.

In this workshop, participants were introduced to how to use motion detectors together with Vernier Logger Pro Software to help students develop understanding of these concepts and their graphical representations. All of the activities presented involved the same basic structure: presenting students with a displacement/time or velocity/time graph, asking them to write in words a description of the changes in motion represented by the graph, and then having them try to reproduce the graph by walking in front of a motion detector. This kind of activity is very useful in bringing to the fore student misconceptions of the concepts and their misunderstanding of the graphical representations and in

helping students connect their subjective experience of motion to the abstract concepts and the graphical representations.

This workshop involved the participants in the activities described and in some cases exposed some misconceptions of the participants themselves and helped them improve their own understanding. This illustrated both the challenge of this domain (especially velocity/time graphs and how they represent displacement) and the ability of these activities to expose and improve understanding. There was also an opportunity during the workshop to discuss some further extensions of the use of motion detectors in other areas (e.g. mechanics not just kinematics) and some of the difficulties faced with graph reproduction activities such as the sensitivity of the detectors resulting in complex graphs that can be complex and difficult to interpret.

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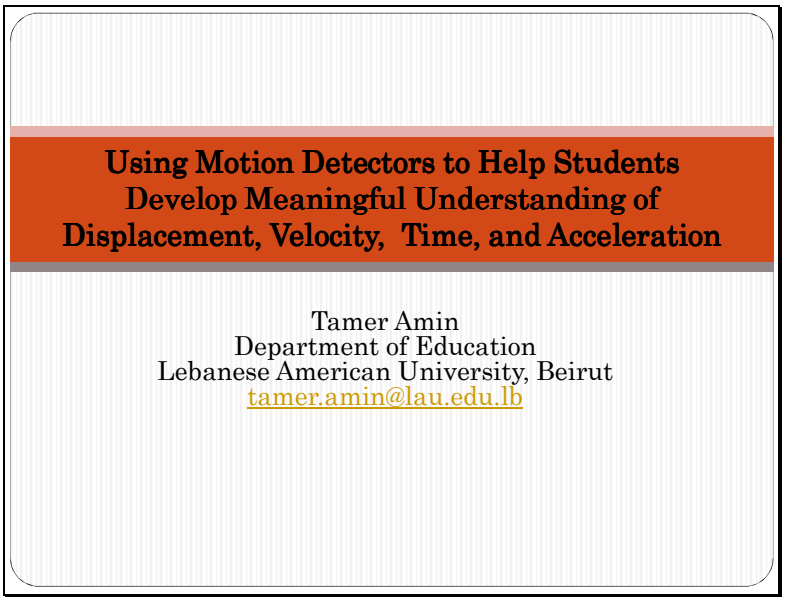

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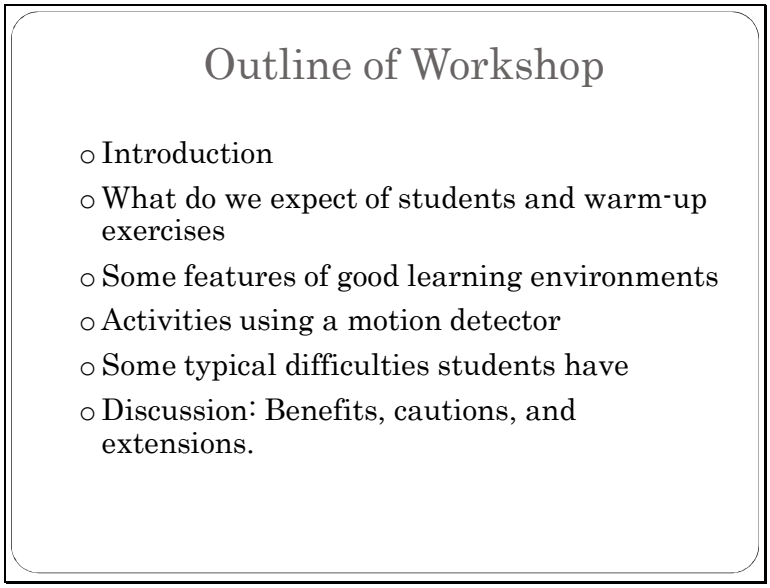

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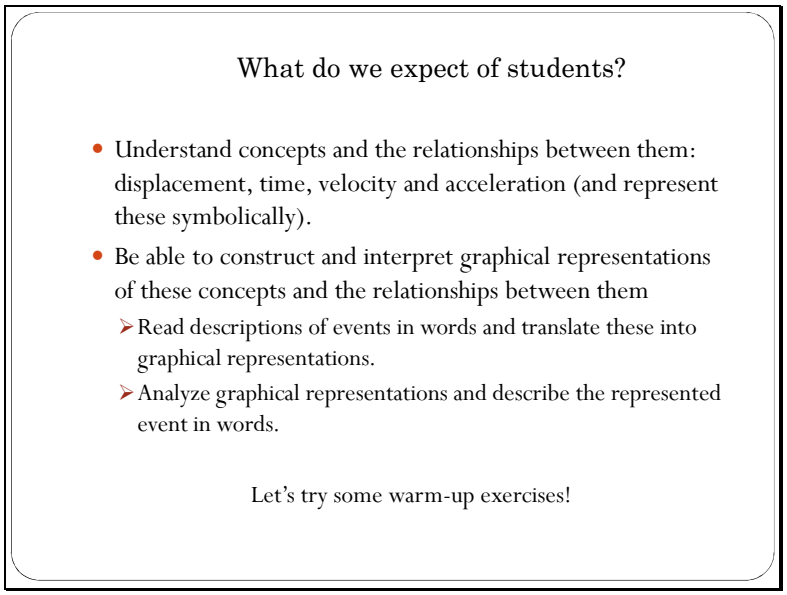

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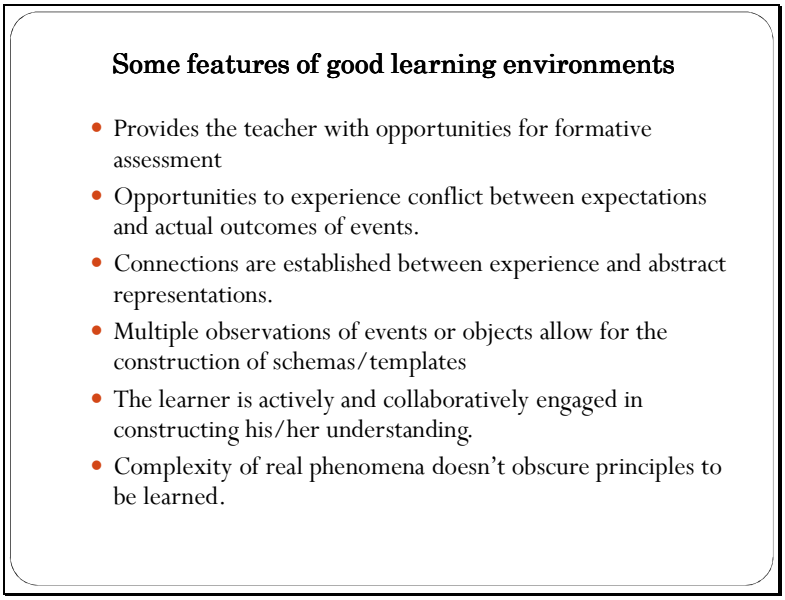

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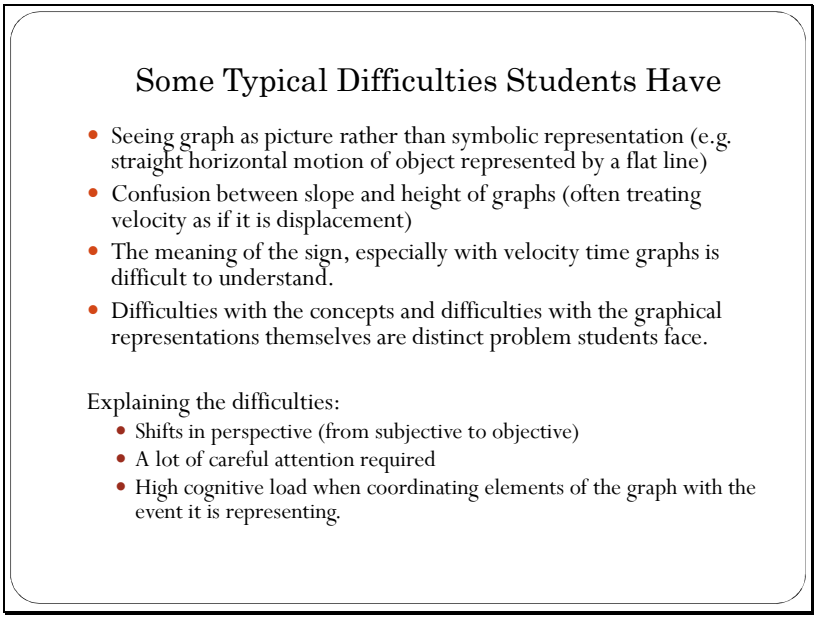

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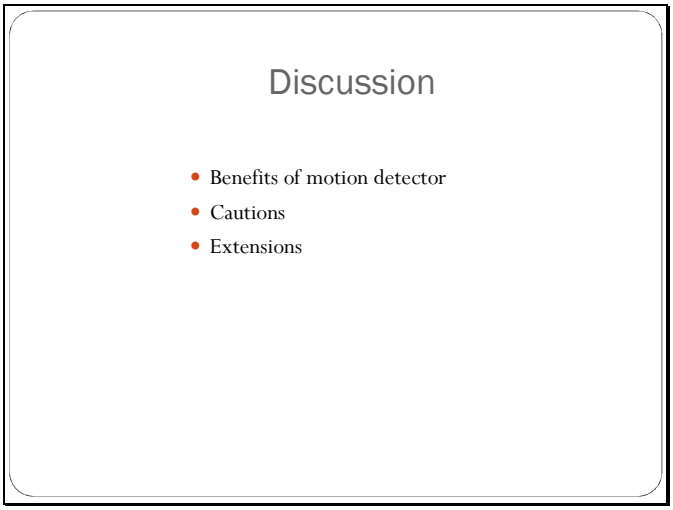

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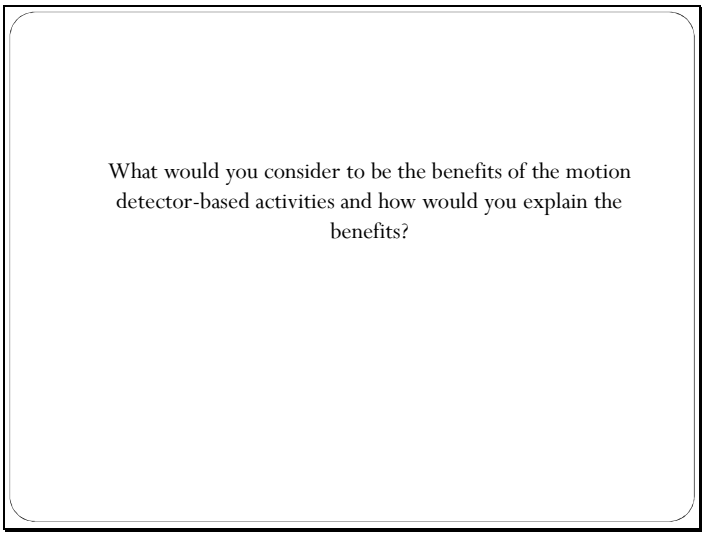

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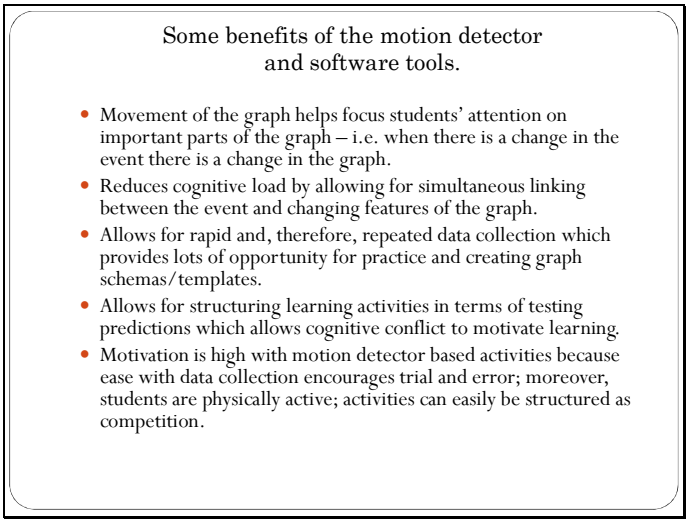

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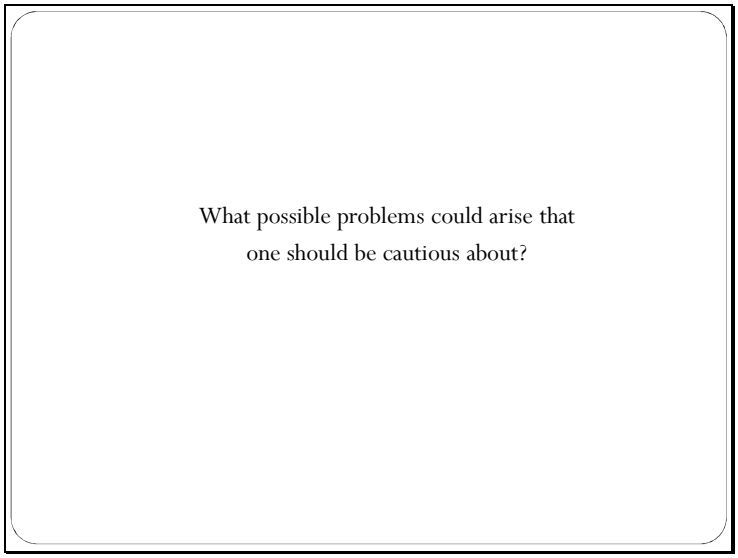

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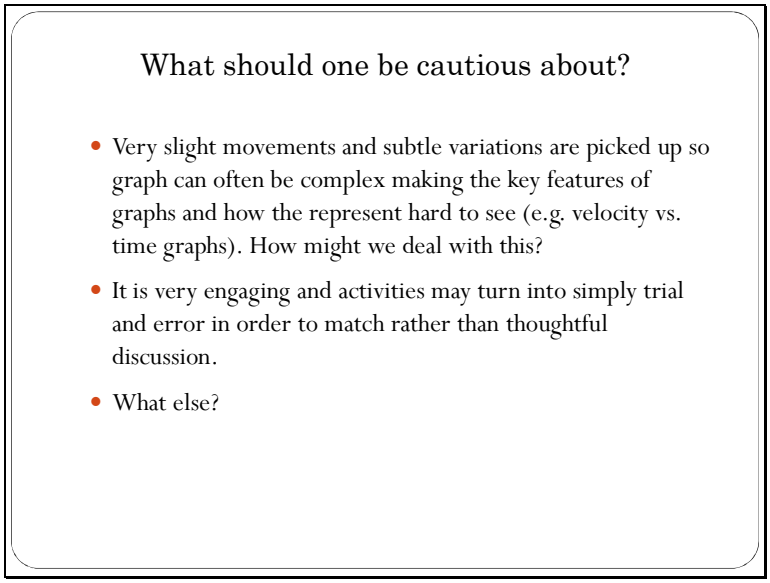

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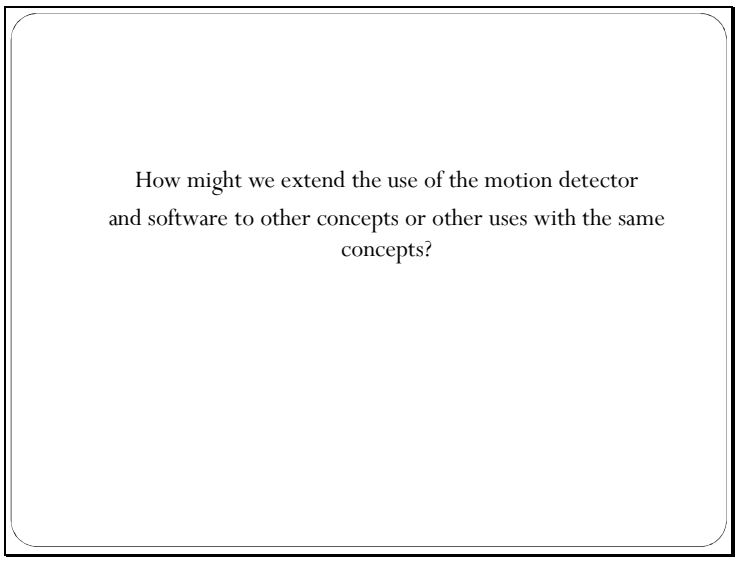


Outline

1. Introduction
2. What do we expect of students? (Warm-up)
3. Some features of good learning environments
4. Activities using a motion detector
5. Typical difficulties students have
6. Discussion: Benefits, cautions, and extensions

Warm Up Exercises

Sketch the position *vs.* time and the velocity vs. time graphs for as many of the following situations as you can in 5-10 minutes. Draw a simple yet clear coordinate system. Try to

align the two graphs for each situation so that you show how the changes in one correspond to changes in the other.

An object at rest	**An object moving in the positive direction with a constant speed**
Position vs. time	*Position vs. time*
Velocity vs. time	*Velocity vs. time*
An object moving in the negative direction with a constant speed	**An object that is accelerating in the positive direction, starting from rest**
Position vs. time	*Position vs. time*
Velocity vs. time	*Velocity vs. time*
An object decelerating in the positive direction	**An object accelerating in the negative direction, starting at rest**
Position vs. time	*Position vs. time*
Velocity vs. time	*Velocity vs. time*

Activity 1 - Position *vs.* Time Graph Matching (a)

1. Consult the position *vs.* time graph that appears on the screen. Write down as clearly as you can how you would walk to produce this target graph.

2. Two volunteer will be invited to discuss and then test their predictions by walking in front of the motion detector. If you are not one of the volunteers, your task will be to listen carefully to the discussion of the volunteers and analyze it in terms of the following themes.

Theme	Example
Misunderstandings revealed	
Specific connections between experience and aspect of graph	
Novel insights (e.g. basic understanding; schemas)	
Conflict between expectation and outcome	
Complexity of phenomenon obscuring principle	

Activity 2 - Position *vs.* Time Graph Matching (b)

1. Consult the position *vs.* time graph that appears on the screen. Write down as clearly as you can how you would walk to produce this target graph.

2. Two volunteer will be invited to discuss and then test their predictions by walking in front of the motion detector. If you are not one of the volunteers, your task will be

to listen carefully to the discussion of the volunteers and analyze it in terms of the following themes.

Theme	Example
Misunderstandings revealed	
Specific connections between experience and aspect of graph	
Novel insights (e.g. basic understanding; schemas)	
Conflict between expectation and outcome	
Complexity of phenomenon obscuring principle	

Activity 3 - Velocity *vs.* Time Graph Matching (a)

1. Consult the velocity *vs.* time graph that appears on the screen. Write down as clearly as you can how you would walk to produce this target graph.

2. Two volunteer will be invited to discuss and then test their predictions by walking in front of the motion detector. If you are not one of the volunteers, your task will be to listen carefully to the discussion of the volunteers and analyze it in terms of the following themes.

Theme	Example
Misunderstandings revealed	
Specific connections between experience and aspect of graph	
Novel insights (e.g. basic understanding; schemas)	
Conflict between expectation and outcome	
Complexity of phenomenon obscuring principle	

Activity 4 - Velocity *vs.* Time Graph Matching (d)

1. Consult the velocity *vs.* time graph that appears on the screen. Write down as clearly as you can how you would walk to produce this target graph.

2. Two volunteer will be invited to discuss and then test their predictions by walking in front of the motion detector. If you are not one of the volunteers, your task will be to listen carefully to the discussion of the volunteers and analyze it in terms of the following themes.

Theme	Example

Misunderstandings revealed	
Specific connections between experience and aspect of graph	
Novel insights (e.g. basic understanding; schemas)	
Conflict between expectation and outcome	
Complexity of phenomenon obscuring principle	

SPICE Up Your Science Classroom Instruction with STSE Strategies using the 5E Learning Style
Rana Iskandarani & Amal Zaatari

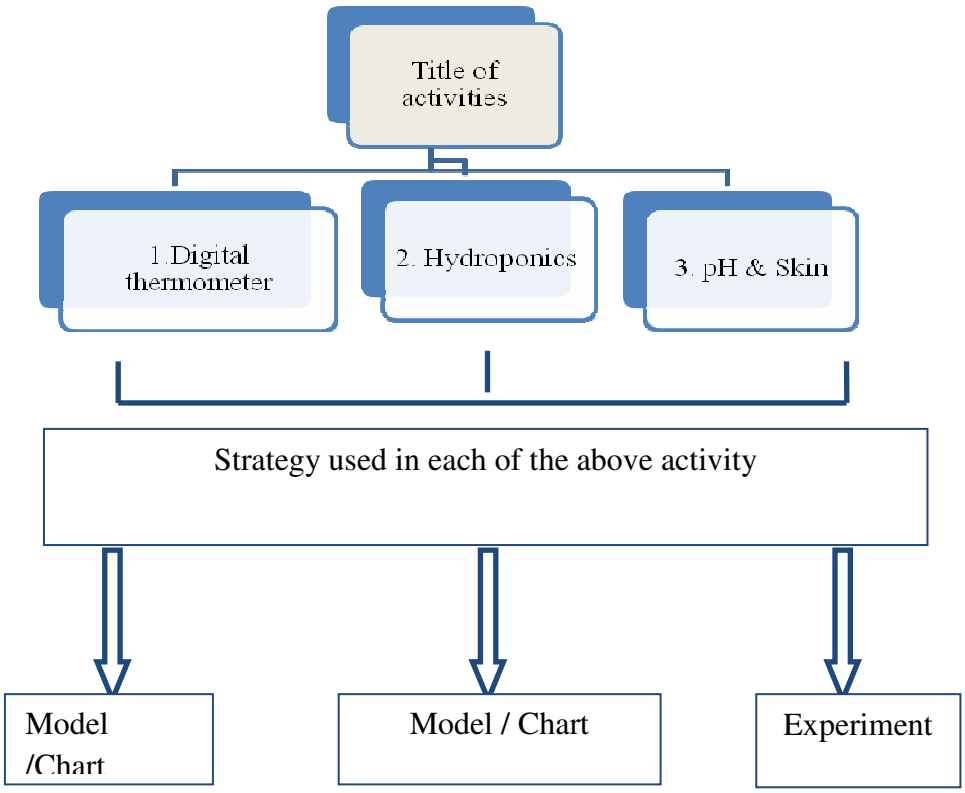
Abstract:
IGNITE your classroom with sparks of curiosity, deep understanding of scientific concepts and theories, interests and collaboration by implementing issue- based Science, Technology, Society and Environment (STSE) Education. The fundamental aim of STSE education is to equip students to understand and apply scientific and technological developments in their cultural, environmental, economic, political and social contexts. The STSE education can be enhanced by applying the 5E learning style that engages students in issues pertaining to the impact of science on everyday life and prepares them to be active citizens in their community, problem solvers and decision makers who take responsible actions.

We believe that the adoption of issue-based STSE education by science teachers would lead to a profound transformation in the traditional image of a science teacher and science instructional ideologies.
In this workshop, upper elementary and middle school science teachers will participate in a variety of STSE activities that enhance their skills and competencies in applying such strategies in their classrooms.

1. Introduction:

Science, Technology, Society and Environment Education (STSE) aims to advance scientific awareness and help students apply science to their environment and society.
This educational approach aims to develop the student's interest in social responsibilities and the moral issues related to science. Teachers use real life events in the science classroom, to show their students the connection between society, the environment, and scientific evaluations.
Moreover, this approach would guide the students to be scientifically and technologically literate. Students would recognize the technological environment they live in as well as the dimensions and facilities of technology, and be aware of the fact that they can make use of these opportunities. In light of this realm, this workshop involves the participants in various activities by applying the 5E learning style that engages students in issues pertaining to the impact of science on everyday life and prepares them to be active citizens in their society.

2. Strategy:



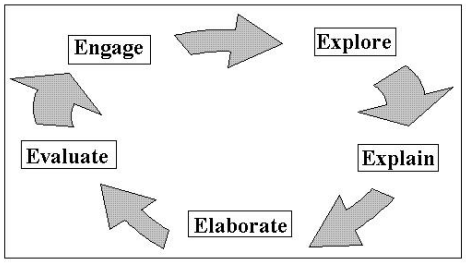
3. Description of session:

- Brief introduction about 5E
- Divide participants into three groups, each is given 30 minutes to finish it.
- Presenter from each group is given 10 minutes to present his / her activity using 5E learning model and answer questions related to it.
- Discuss the impact of STSE activities and 5E learning style on students' ability of in depth understanding of science concepts.

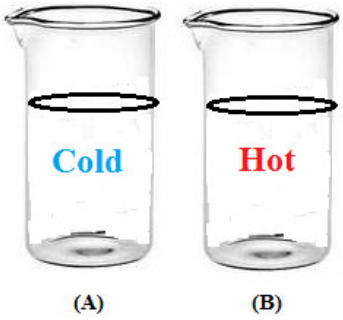
Digital Thermometer

Objective

In this activity, students use 5E learning strategy to design and calibrate a homemade integrated circuit (IC) digital thermometer.



- Engage



Pass two 250 ml glass beakers A and B filled with water around the classroom. (**Safety note**: Students and instructor must wear safety goggles for this demo).

Ask students to:

- Distinguish the hot beaker from the cold one
- Estimate the temperature of water in beaker B

Students may disagree about the estimated temperature and suggest that we use a glass thermometer to **accurately** determine it.

Ask students to:

- Identify different types of thermometer and their usage.

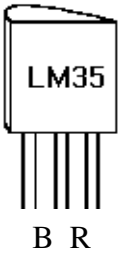
- Explore:

- Purpose:

Design and calibrate simple digital thermometer

- Materials:

- 40cm of telephone cable
- Two pieces of alligator clips
- 9V battery lead
- 9V battery
- LM35 sensor
- Glue gun
- Cutting pliers



- Procedure:

Students are asked to work in pairs and build simple integrated circuit digital thermometer.

1. Remove the main plastic shielding of the telephone cable and remove 0.5cm of the inner plastic insulation from the blue (B), red (R), and green (G) wires.
2. Solder each wire to the LM35 sensor's power (Vs), output (Vout), and ground (GND) leads as in Figure 1.
3. Using glue gun, cover the soldered joints and the base of the sensor.
4. Connect and solder the blue wire of the telephone cable to the positive terminal of the battery lead as in figure 2.
5. Connect and solder the green wire of the telephone cable to the negative terminal of the battery lead as in figure 2.
6. Attach the red positive of the DVM to the red wire of the telephone cable using alligator clip as in figure 2.
7. Attach the black DVM ground lead to the black wire of the battery lead using alligator clip as in figure 2.
8. The complete apparatus will be as shown in figure 3.

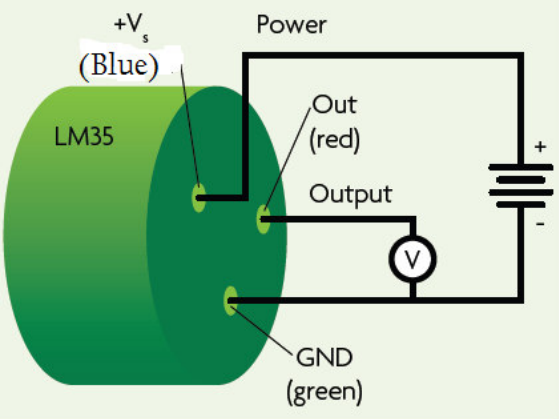
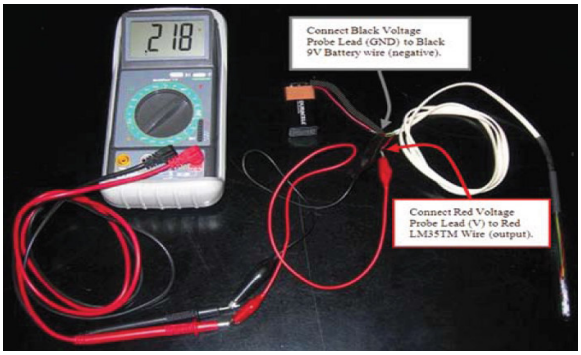


Figure 2



Figure

Students are then asked to design an experiment to calibrate their apparatus. Some decide to calibrate with freezing or boiling water; others decide to measure water baths of various temperatures with both their digital thermometer and a glass thermometer as in figure 4.

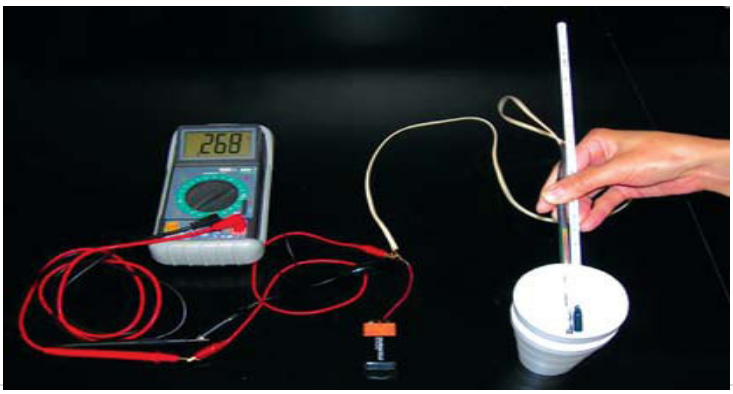


Figure 4

four Students are asked to collect at least pairs of data (x = V, y = °C). Figure 5

shows six ordered data pairs.

Temperature data obtained using LM35 sensor.

Water bath descriptions	Reading from LM35 sensor in volts (*x*)	Reading from thermometer in °C (*y*)
Ice–water slurry	0.035	1.0
Below room temperature	0.123	11.0
Room temperature	0.224	22.0
Slightly above room temperature	0.321	32.0
Above room temperature	0.417	41.0
Well above room temperature	0.476	50.0

Figure 5

Students plot their data on graph paper where *y* represents degrees Celsius and *x* represents voltage, and draw a best-fit line between the points figure 6.

Relationship between voltage (V) and temperature (°C)

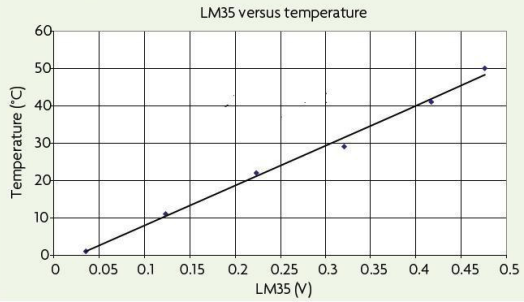


Figure 6

- Explain

Post students' graph on the board. Students will recognize that everyone's data appeared to be linear. Ask students if they can determine the temperature of a solution by using their constructed digital thermometer.

- Evaluate

Evaluation can be done by simply asking student's questions: using checklist or rubrics
The following site would be a helpful resource:
http://school.discoveryeducation.com/schrockguide/assess.html

- Elaborate

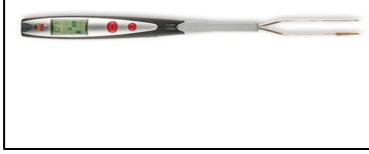
Think how you can improve your digital thermometer.

- Picture of Digital Thermometer

Mouth digital thermometer

Tong digital

Laser Digital



Maverick-Redifork - Grill Thermometer

Forehead Digital

Ear Digital

Cooking Digital

Probe Digital

CDN Sugar

Hydroponics

Objective

Using 5E learning strategy, students will be able to:

- Identify the different items needed to construct hydroponic system
- Build simple hydroponics system
- Grow basil hydroponically

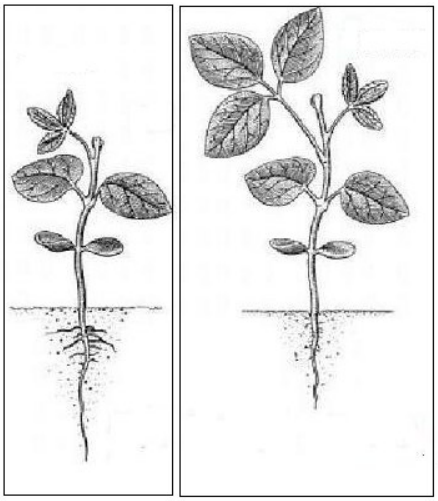
➢ Engage

Show students pictures (A) and (B) of the same kind of plant growing in different media.

Ask students to:

- Observe pictures (A) and (B).
- State the differences between plants in picture (A) and (B).
- Identify the functions of roots
- Why do you think that the roots of the plant in picture (A) are longer than that in picture (B)?

Write students' answers on the board. One of the answers might be because the soil in picture (B) is richer in nutrients than that of (A).



(A) (B)

Ask students if we provide the plant with the necessary nutrients, can we grow plant without soil?

Introduce the word "Hydroponics"; what it means, show them a chart about history of hydroponic and let them watch a movie about different hydroponic systems.

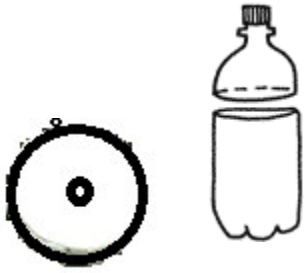
➢ Explore

- Purpose:
Build a Soda Bottle Passive Hydroponics System

- Introduction:
These bottle systems are:
  - Passive (no pumps or electricity)
  - Closed (the nutrient solution remains in the system)
  - Liquid/Aggregate (Roots can grow initially in the aggregate then directly into the solution)

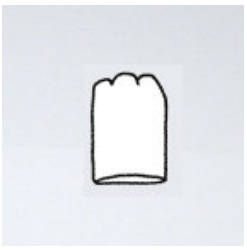
- Materials:

2 liter soda bottles
Scissors or cutter
Cotton wick Material such as yarn, kite string, etc. about 16 inches per bottle
Styrofoam sheet
Water and hydroponic specific fertilizer
PH meter
Small basil plant with roots
Brown paper
Coloring pens



- Procedure:

1. Cut the soda bottle using cutter at 1⁄3 distance from the top.
2. Discard the upper part.
3. Invert the bottom part of the soda bottle over the Styrofoam board
4. Using a pencil, trace on the Styrofoam sheet the perimeter of the opening of the bottle.
5. Use cutter to cut the circular traced piece of the Styrofoam.
6. Make a hole in the center of the circular piece
7. Prepare the nutrient solution and check its PH (5.8 -6.5)



8. Insert the basil plant with roots into the hole of the circular Styrofoam (be careful not to damage the roots).
9. Wet the cotton wick with nutrient solution.
10. Wrap the wet cotton wick around the basil roots.
11. Half fill the cut bottle with nutrient solution.
12. Introduce the circular Styrofoam piece into the opening of the bottle. Make sure that the wick is in the nutrient solution.
13. Cover the bottle with decorated brown paper.
14. Put your hydroponic system near window.
15. Check pH of nutrient solution every two weeks.

- <u>Explain</u>

After planting basil in their hydroponic model, students will start to discuss with each other how to provide the basil plant with its needs (light, temperature, nutrients and air for roots).
Each group should make a journal which includes dates, detailed observations and notes, problems and questions, pictures or drawings, measurements, and pH readings. So that they can be able to keep track of the development, condition, problems and needs of their plant for example, each group needs to record when and how much nutrients and water is added to their system, weather changes, changes in plant development, etc.

- <u>Elaborate</u>

Students can do research or make poster or brochure on these topics:
Is hydroponics environment friendly?
What are the advantages and disadvantages of hydroponics?
Can we use hydroponics to solve hunger in poor countries?

- Evaluate

Evaluation could be done by:
Asking students direct questions/ drop quiz /short test / using checklist or rubric.

Hydroponics journal

Student Name: _____

Starting date: _____

Name of plant: _____

- Week Number: _____

Name of nutrient: _____
PH of nutrient solution: _____
Reservoir temperature: _____
Length of plant: _____
Number of leaves: _____ Size of leaves: _____ Color of leaves: _____
Room temperature: Day _____ Night _____
Mold/ Fungi: _____ Description: _____ Date sighted: _____
Insects: _____ Description: _____ Date sighted: _____
Observations/ Comments: _____
_____

- Week Number: _____

PH of nutrient solution: _____ Adjusted up or down _____
Reservoir temperature: _____
Length of plant: _____
Number of leaves: _____ Size of leaves: _____ Color of leaves: _____
Room temperature: Day _____ Night _____
Mold/ Fungi: _____ Description: _____ Date sighted: _____
Insects: _____ Description: _____ Date sighted: _____
Observations/ Comments: _____
_____

❖ Week Number: _____
PH of nutrient solution: _____ Adjusted up or down _____
Reservoir temperature: _____
Length of plant: _____
Number of leaves: _____ Size of leaves: _____ Color of leaves: _____
Room temperature: Day _____ Night _____
Mold/ Fungi: _____ Description: _____ Date sighted: _____
Insects: _____ Description: _____ Date sighted: _____
Observations/ Comments: _____
_____

Technology Grading Rubric

Name of Activity: ----------

Name of Group members: ----------

Scoring Rate: Very good (4 pts) Good (3 pts) Fair (2 pts) Poor (1 pt)

Activities	Score
A- Scientific Knowledge & Practices	
Scientific Concepts and related content	
a- Understand relevant scientific concepts, principles and theories	
b- Use scientific terminology precisely and appropriately	
Scientific Communication	
Give clear, effective explanation on how the task was carried out	
Scientific Procedure & Reasoning Strategies	
a- Apply scientific method accurately(doing good observation, raising questions, explaining data, drawing conclusion)	
b- Complete the task without teacher's intervention	
c- Able to apply learned concepts to real life settings	
d- Submit the task/ written assignment in a neat, clear, organized, interesting way with no errors	
B- Scientific Tools and Technologies	
a- Show understanding of using equipment and materials	
b- Use accurately and proficiently all tools and technologies	
c- Take safety precautions when using equipment and materials	

C- Behavior and Team Work	
a- Share ideas and help each others to complete the task	
b- Show respect and listen to each other	
c- Work quietly without disturbing others	
d- Show enthusiasm and motivation during work	
D- Time Management	
Are always on task, actively involved in the task and complete the task within the time limit	

Total Score out of 60 ----------

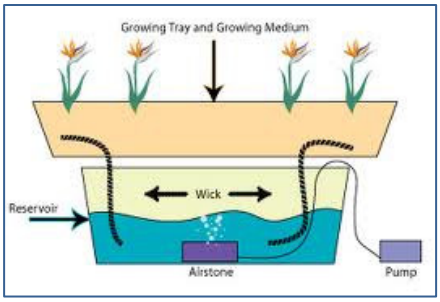
Remarks: Please record special feature(s) for any group member observed during the activity. What you record would be considered when assigning the final grades.

Name of student	Behavior/ Feature e.g	Comments
	Enhances group work through sharing and helping others	
	Assists others in accomplishing tasks	
	Works carefully in a highly organized way and completes the work with excellent quality	
	Completes task/ assignment on time or ahead of time	
	Integrates given information with one's own information	
	Asks for help in understanding unclear tasks	
	Can be easily distracted by both oneself and others	

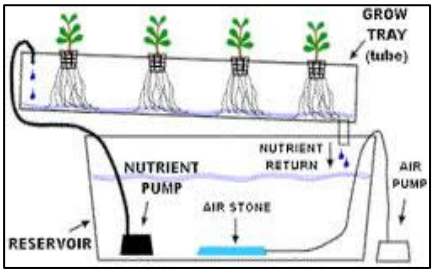
	Is disruptive	
	Very shy and seldom completes the task on time	
	Has difficulty in interpreting information	

❖ Picture of Hydroponics

Homemade Hydroponics



Wick Hydroponics System



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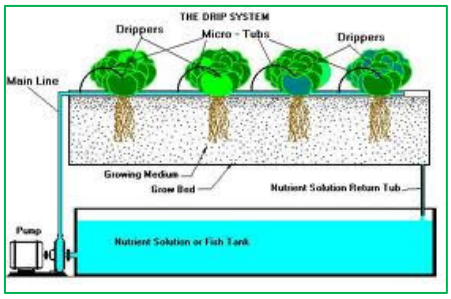
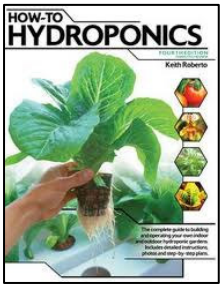
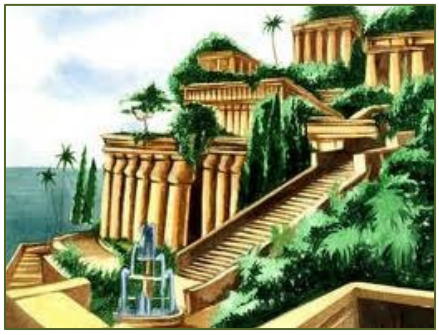
Ebb N hydroponics system

Flood and Drain Hydroponics



Drip Hydroponics System





Hanging Garden of Babylon

Hydroponic in Greenhouse

Floating Garden of Aztecs

Hydroponics Equipment

Introduction to How Hydroponics Works

Perhaps you'd like to start a garden so that you can grow your own vegetables, but you don't have the space in your yard, or you're overwhelmed by pests and insects. This article will arm you with the knowledge you need to successfully set up a hydroponics garden in your home and provide suggestions of plants that will grow readily without a big investment.

As the population of our planet soars and arable land available for crop production declines, hydroponics will offer us a lifeline of sorts and

allow us to produce crops in greenhouses or in multilevel buildings dedicated to agriculture.
Already, where the cost of land is at a premium, crops are being produced underground, on rooftops and in greenhouses using hydroponic methods.
If you've ever placed a plant clipping into a glass of water in the hopes that it will develop roots, you've practiced in a form of hydroponics. Hydroponics is a branch of agriculture1 where plants are grown without the use of soil. The nutrients that the plants normally derive from the soil are simply dissolved into water instead, and depending on the type of hydroponic system used, the plant's roots are suspended in, flooded with or misted with the nutrient2 solution so that the plant can derive the elements it needs for growth.

Why Use a Hydroponic System?
So why go through all the trouble of setting up a hydroponic system? After all, people have been growing food just fine for thousands, if not millions of years using good old fashioned dirt. Hydroponics offers some significant benefits over traditional farming, and as word about these benefits spreads, more people will turn to hydroponics for their agricultural needs.
First, hydroponics offers people the ability to grow food in places where traditional agriculture simply isn't possible. In areas with arid climates, like Arizona, hydroponics has been in use for decades.
We also must consider the significant environmental benefits to hydroponics use.
Hydroponics systems require only around 10 percent of the water that soil-based agriculture requires. This is due to the fact that hydroponic systems allow recycling and reuse of water and nutrient solutions, and the fact that no water is wasted. Similarly, hydroponics requires little or no pesticides and only around 25 percent of the nutrients and fertilizers required of soil-based plants. This represents not only a cost savings but also benefits the environment in that no chemicals are being released into the air.

Finally, we must consider the environmental impacts of transportation. As hydroponics allows produce to be grown locally there is a reduction in both price and greenhouse gas emissions due to reduced transportation requirements [source: Jensen].
Next, hydroponics offers us the benefit of a shorter harvest time. Plants grown in this manner have direct access to water and nutrients and therefore, are not forced to develop extensive root systems to allow them to find the nutrients they need. This saves time and produces healthier, lusher plants in about half the time as traditional agriculture [source: Jensen].

The Science Behind Hydroponic Nutrients
Before we can take a look at how hydroponics works, we must first understand how plants themselves work. Generally speaking, plants need very little to grow.
They can subsist on a simple blend of water, sunlight, carbon dioxide and mineral nutrients from the soil. Notice that the soil itself is not required for plant growth: the plant simply needs the minerals from the soil.
This is the basic premise behind hydroponics -- all the elements required for plant growth are the same as with traditional soil-based gardening. Hydroponics simply takes away the soil requirements.

The different types of hydroponic systems are explained below. Each is based on the same initial concepts. Different kinds of plants respond best to each method.

Ebb and Flow Systems
Ebb and flow systems include a tray in which the plant is placed in a medium; below the tray in a separate container is a reservoir containing water and mineral solutions. The water from the reservoir is periodically pumped up into the tray. Ebb and Flow systems work best with small plants like herbs and are typically used in the home.

Nutrient Film Technique (NFT)
They're built using wooden channels, which support plastic liners. Plants such as tomatoes and cucumbers are placed on the channels, and the nutrient enriched water is pumped to the high end of each channel. The channels slope down, and water is collected at the end to be pumped back through the system and reused. Only plants with large established root systems will work with this technique.

Drip Systems
These systems are set up almost identically to an ebb and flow system, although instead of water being pumped through one large tube, it's pumped through many small tubes and drains onto the top of the plants. This system is ideal for plants that don't yet have a developed root system, and like an ebb and flow system, works best with smaller plants.

Aeroponics
Plants are suspended on a tray, with their roots freely dangling below. The entire tray is placed into a box that has a small amount of water and nutrient solution in the bottom. A pump system is used to draw the water up, where it's sprayed in a fine mist onto the entire plant and root in a continuous manner. This system is the most difficult to set up and manage, but it has great potential for large commercial uses.

Wick Systems
Plants are placed into a tray filled with a medium such as perlite or rockwool. At the base of each root, a nylon rope is placed, which is allowed to dangle freely, extending beyond the bottom of the tray. The entire tray is then placed on top of a reservoir. The nylon ropes absorb the water and nutrients, wicking them up to the plant's roots. This system is desirable because it requires no pumps or other equipment to be purchased [source: Roberto].

Hydroponic Equipment
Now that we've looked at the different type of hydroponic systems, let's take a look at some of the tools and accessories that work to complement the various systems. The most important part of any hydroponic system is, of course, the nutrient solution used. Different nutrient solutions are used depending on what type of plants you're trying to grow, what system you're using and what mediums, if any, you're working with.
As we've seen, hydroponics can be done with or without mediums. In cases where a medium is to be used, there are several choices available, each with its own benefits and drawbacks. One of the most popular mediums used in hydroponic gardening is rock wool, due to the fact that it's both affordable and offers easy drainage. Other popular mediums include clay, perlite, vermiculite, sand and gravel. While gravel, clay and sand are both cheap and easily available, they're heavy and don't provide the same level of water circulation as perlite and vermiculite, which are more expensive but also more effective.
Another critical aspect of hydroponics is the use of light. As we discussed earlier, plants require light in order to perform photosynthesis. In areas where natural light is not available or plentiful, High-intensity

Discharge (HID) lights are used instead. There are two main types of lights used for gardening, and each provides light over different parts of the spectrum. Metal Halides (MH) offer light from the blue end of the spectrum and are used with young plants and green, leafy vegetables. High Pressure Sodium (HPS) lights are at the opposite end of the spectrum and are used for fruits or flowered plants [source: Green Coast Hydroponics].

Finally, any successful hydroponic system must be monitored so that PH levels are regulated. PH is a measure of hydrogen ion concentration, and gives us a value as to how acidic or alkaline the growth environment is. It must be kept within a certain range, depending on the plant and the medium used. The value can be measured using a PH testing kit, available at any gardening supply center.

DIY Home Hydroponics

Are you excited about what you've read so far about hydroponic gardening? Ready to start you own hydroponic garden and put theory into practice? Here, we'll compare the benefits and drawbacks to the different types of hydroponics system.

When designing a home hydroponics system, it's generally recommended that a medium be used. This tends to support the use of either an ebb and flow or wick system. While a wick system is incredibly cheap and simple to use, it's hard to modify over time, and thus may produce poor results. There is concern over whether the plants are getting the right balance of nutrients, and if they're not, it can be difficult to adjust the nutrient flow. For these reasons, many at-home hydroponic systems tend to be of the ebb and flow variety. Any hydroponic gardening center, and in fact, most traditional nurseries carry all of the equipment required for setting of a home system.

To begin building your ebb and flow system, you first must obtain the required materials. A basic system will require:

- A plastic tray capable of holding the weight of the medium, the plants and the water/nutrient solution
- A support structure to place the tray on (it can be as simple as a spare table)
- Container to be used as a reservoir (can be an aquarium, a plastic storage container or a garbage can)
- Aquarium pump capable of pumping 132 gallons per hour (500 liters per hour)
- Plant containers (make sure they have holes in the bottom to allow drainage)
- Growing medium
- Drainage tubing
- 24 hour timer
- Seeds or plant cuttings
- Nutrient solutions

If you're willing to use some materials you already have on hand, this system can be set up for as little as $50 [source: Bareroots Hydroponics].

To build your ebb and flow system, simply place the cuttings or seeds into the plant containers, stabilize them using the chosen medium, set the containers into the plastic tray and set it on the support structure. Fill the reservoir with three teaspoons of nutrient solution diluted in three gallons of water (11.36 liters). Install your tubing so that it runs from the top tray to the reservoir, and then set the aquarium pump in place.

The timer should be set so that the pump causes the top tray to flood twice a day.

Monitor PH levels every two weeks, and you should have no trouble growing your own hydroponic plants [source: Roberto].

The easiest plants to grow at home hydroponically are salad greens, such as lettuce and spinach. Herbs are fairly simple also, with basil, mint and parsley being popular choices. Tomatoes, cucumbers and peppers are possible, too, though these items require either a great deal of natural sunlight or the addition of grow lamps. Finally, any small plants and flowers can be grown using this system.

Certain plants can be difficult to grow using an ebb and flow system. These include potatoes, berries and bulb-based flowers, such as daffodils. While these items can be grown hydroponically, they work better in water-based systems, such as NFT or aeroponics, which are better suited for larger commercial applications.

Hydroponics Growing and the Future of Agriculture

Hydroponics is the fastest growing sector of agriculture, and it could very well dominate food production in the future. As population increases and arable land declines due to poor land management, people will turn to new technologies like hydroponics and vertical farming to create additional channels of crop production.

Currently, arable land comprises only around 3 percent of the Earth's surface, and the world population is around 6 billion people, resulting in around 1/5 hectare (2,000 square meters) of arable land per capita. By 2050, scientists estimate that the Earth's population will increase to 9.2 billion, while land available for crop and food production will decline. To feed the increasing population, hydroponics will begin replacing traditional agriculture [source: Chamberlain].

Skin & pH

Objectives

By the end of this activity, the students will be able to:

- Identify actions and health practices that protect their skin
- Test pH of various body hygiene products.
- Deduce the best cleansing product for the skin

➢ Engage

The teacher taps into students' previous knowledge and identify misconceptions before proceeding with the learning process. This is done with brainstorming ideas and activities that grab students' attention and help them make connections between the new information and the world they know.

Samia went to a beauty clinic to buy some lotions and soaps. She wondered which products she should buy to help her take care of her skin. What **science** concept should she use to help her decide?

- Materials

- pH paper
- Common household materials(lemon ,yogurt ,vinegar ,fairy, toothpaste, shampoo, distilled water, baking soda solution, skin)
- pH scale

- Procedure

Students test the pH of every substance, compare the color change to the pH meter and record the pH in the table below; then deduce whether the substance is an acid or a base.

Materials	pH	Acid/Base
Lemon		
Yogurt		
Vinegar		
Distilled water		
Baking soda solution		

What about your skin?

Is your skin acidic or basic?

Use the same pH paper to test the acidity of your skin.

The pH of my skin is _____; therefore my skin is _____.

- Explore:

Students interact directly with the materials, concepts or phenomenon. The teacher provides a focused activity to direct students' interactions.

- Materials

pH paper or universal indicator
Different kinds of cleansers and beauty products
Different kinds of facial soaps
Shampoo
Washing bottle

- Procedure

1. Students test the pH of different items (soap, beauty products and cleansers) and record their observations in the table below.

Name of the item	Kind of the item (soap, lotion, shampoo etc….)	pH

2. Students sort the items (lotion, shampoo, soap, cream) that are suitable to be used on our skin and those that are not.

➢ Explain

The explain phase is recognized as the "lecturing" or interactive phase, where the teacher give students information they may not be able to know on their own .At this point in the 5E model, teachers help students understand scientific explanations and introduce terminology to provide students with a common language about the content.

- Discussion

Students read the selection below and:

- indicate the role of skin.
- suggest some ways to help keep our skin healthy.
- explain why our skin is acidic.
- identify the purpose of this activity

- Background information

Skin regulates our body temperature when we have a fever or we're physically working hard, we tend to sweat. In this way the body attempts to lower the temperature.

Another important role of our skin is to protect us from harmful substances entering our body and in eliminating toxins. This takes workload off our Liver and Kidneys to filter out by-products from our body's metabolism.

The acid mantle is a thin oily film that sits on top of the outmost layer of our skin. For most people, the pH of the acid mantle is about 4.5 to 5.5. Why is our skin naturally acidic at the surface? Our slightly acidic skin helps to fight off harmful bacteria. Many of the contaminants that might enter our skin, such as chemicals from the atmosphere and harmful bacteria, are alkaline in nature (i.e., they have a pH of higher than 7). Our skin's natural acidity neutralizes these chemicals and bacteria much the same way the milk of magnesia neutralizes stomach acid when we have heartburn. Neutralizing these harmful

contaminants is part of the body's defense system. Maintaining the skin pH at the proper level is vital to protecting ourselves from harmful bacteria which can lead to acne, infection, or irritation.

At birth, the pH of children's skin is closer to neutral (pH 7), so it is virtually sterile and is up to ten times thinner than adult skin. Baby skin is easily damaged as it has not yet formed the protective acid mantle which at a pH of 5.5 can effectively fight its own infections.

In the late teens to early 20's, our Acid Mantle is well developed and provides good protection against potentially harmful, external environmental factors. Our skin usually looks healthy, heals quickly when injured and seems to take care of itself.

With increasing age, however the skin's pH becomes more and more neutral and thus more susceptible to bacterial growth. This reduced acidity kills fewer bacteria than before, leaving the skin susceptible to bacterial growth and infections. The skin weakens as a result and begins developing problems with increasing age.

Most of us use soap and water to clean our faces without realizing that this may not be beneficial to us. Soapy water is highly alkaline (with a pH of 12) while our skin is naturally acidic (with a pH of approximately 5). Soapy water is commonly used to clean our faces because it removes the natural oils from the skin. While this leaves our skin with that "clean feeling," soap is actually neutralizing our skins acid pH, thereby stripping away our natural defense systems. Particularly for those of us that wash our faces 2, 3, or 4 times a day because of a problem condition like acne, stripping away the acid mantle can actually worsen our condition. Similarly, it is important for us to know the pH of any cleansers, moisturizers, makeup and other products we use so that we don't remove the protective oils and acid mantle from our skin.

- Elaborate

The elaboration phase of the 5E model allows students to apply knowledge they have gained to new situations so they can expand their understanding.
For example:

- Strict airport rules across Europe, the UK and the US can mean packing headaches for air travelers. Forbidding large liquids and gels may be the most problematic of the airport rules facing travelers these days.
  Research the causes of such decisions and find out tips that help passengers cope with such situations during their travel.

- Most deodorants contain $Al(OH)_3$ compounds which might harm your skin and threaten your environment. Research the effects of such products on your skin and the environment and find ways to reduce their effects.

- Evaluate

Although "evaluation" is presented as the final stage of the 5E model, it can and should occur at each stage of the instructional unit. Evaluation of students' understanding does not need to be formal; it can be a quick question from the teacher to assess students' appropriate decisions; for example: chose from the tested items the best ones to be used on she different types of skin below.

How to prepare a home made pH paper?

Baby skin	Face with acne	Dry skin of an old women
Type of lotion:	Type of lotion:	Type of lotion:

Materials

- Distilled water
- Earthenware dish or plate
- Chosen vegetable or mineral matter
- Paper strips
- Clean, dry drying area
- It works best with red cabbage

- **Preparing cabbage juice**

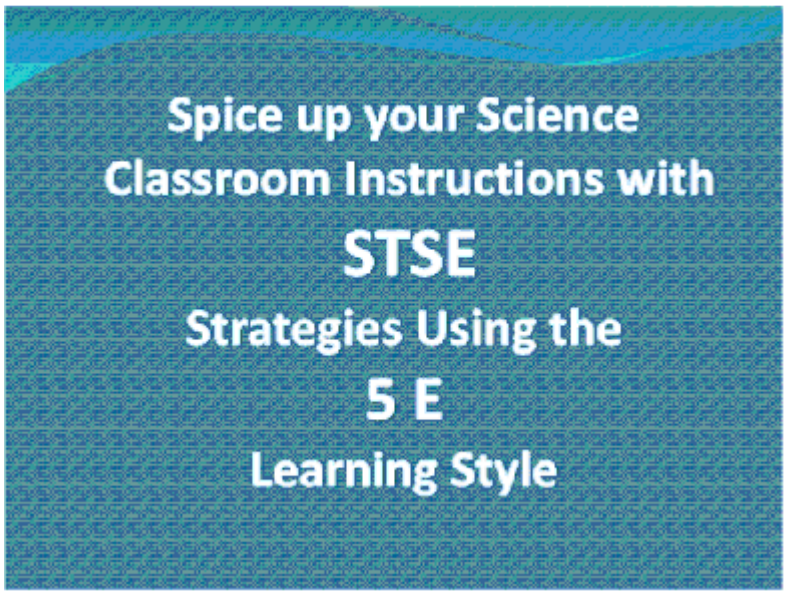
1. Cut the red cabbage leaves into small pieces.
2. Boil the leaves with distilled water.
3. Make a strong infusion of red cabbage leaves.

4. Strain the infusion.
5. Allow it to evaporate with a gentle heat until it is considerably reduced.

- **Procedure**

1. Use only distilled water when preparing the pH paper test strips.
2. Use only acid-free "art" paper.
3. Obtain an earthenware plate or dish. Fill with the cabbage solution that has been prepared using distilled water.
4. Immerse the paper into the dish carefully. Ensure that you wet the paper uniformly.
5. Allow to dry. It must dry in a place that has no acidic, ammoniac or other vapors that might affect the paper and its ability to work.
6. Store paper that has been made in bottles, jars or cases.

SLIDE 1



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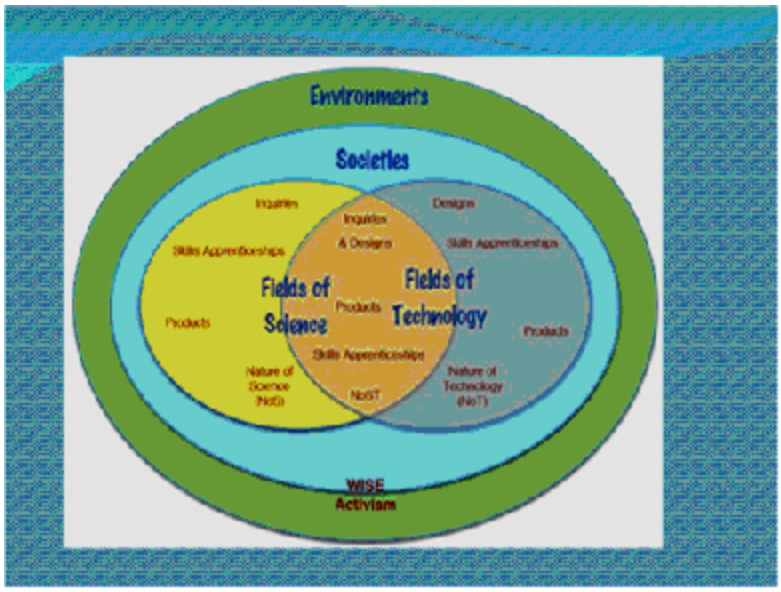

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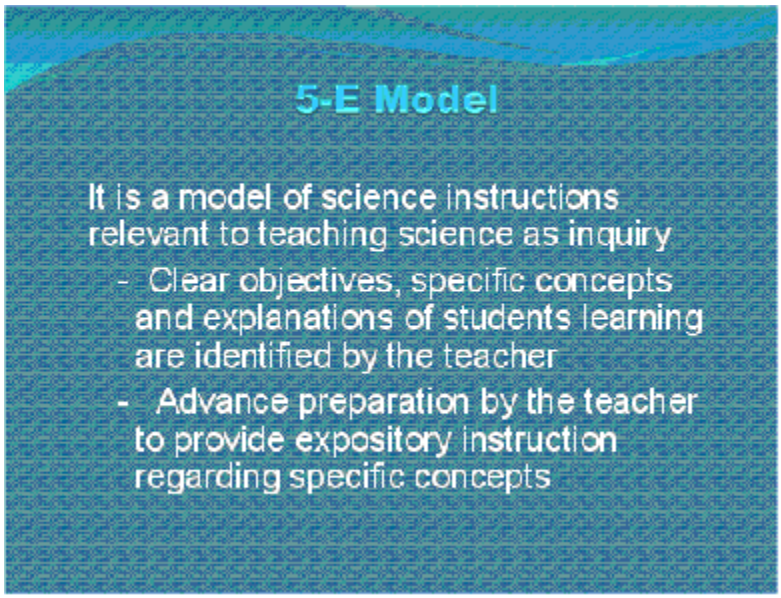

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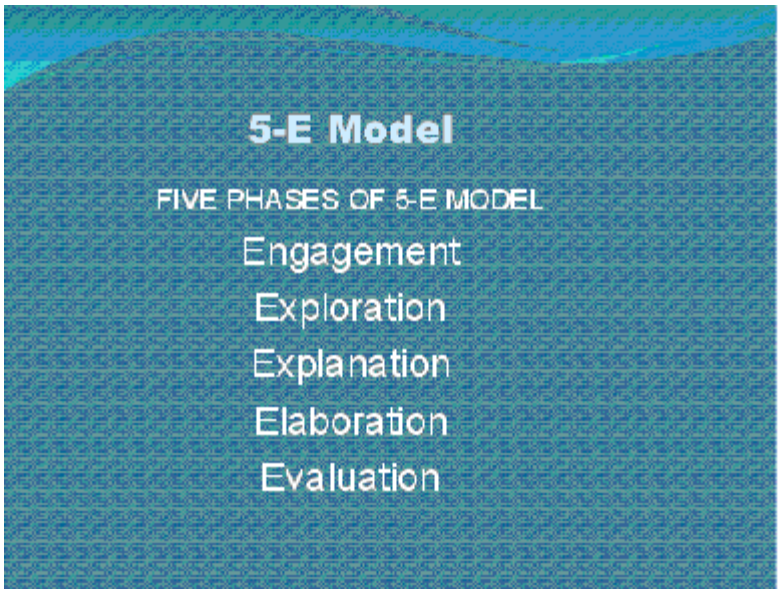

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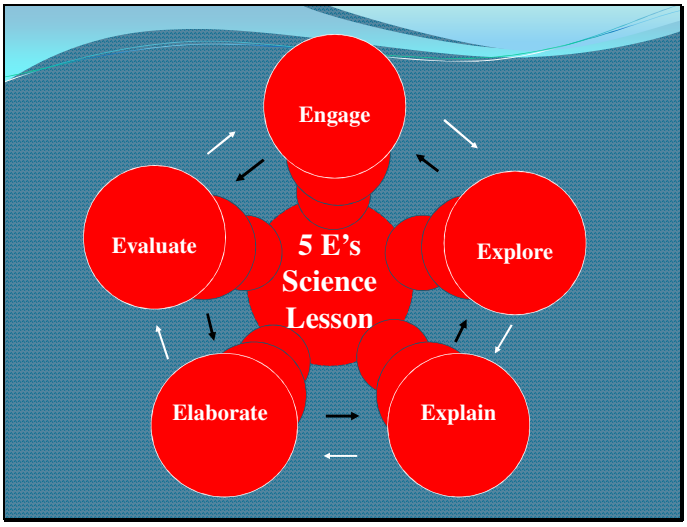

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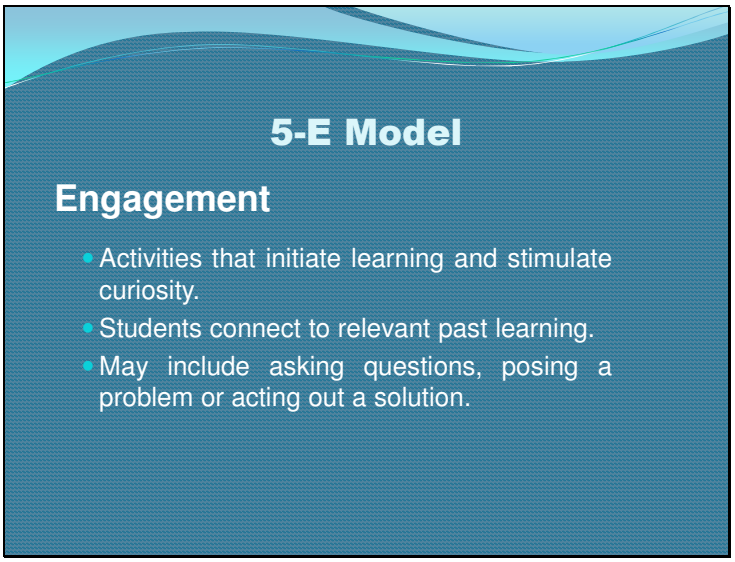

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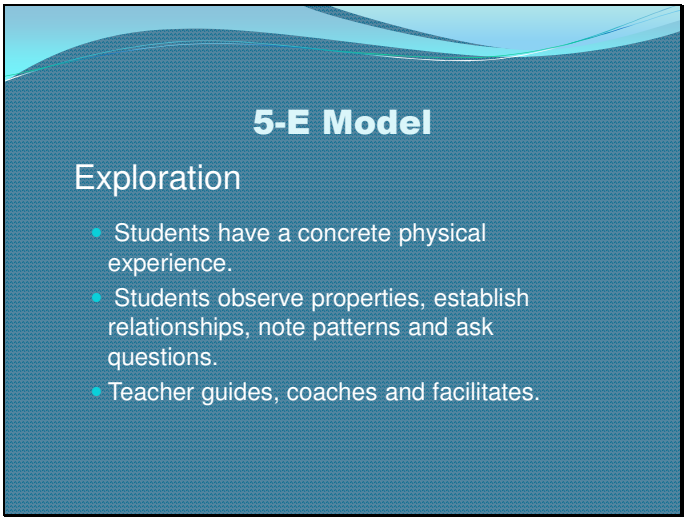

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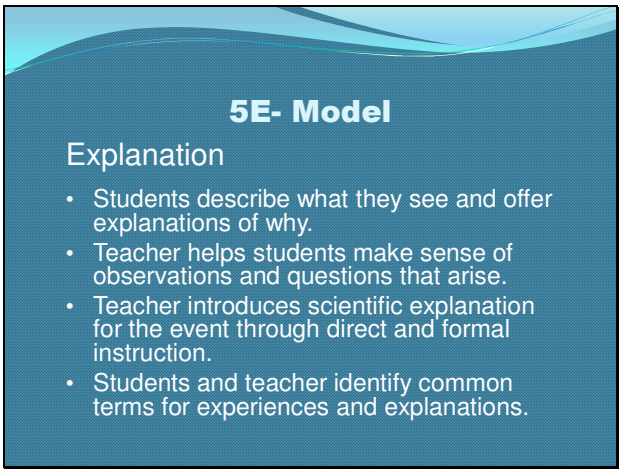

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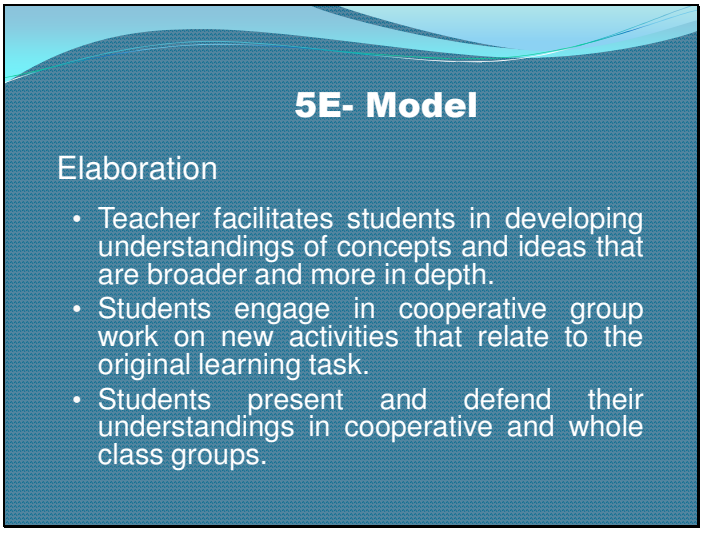

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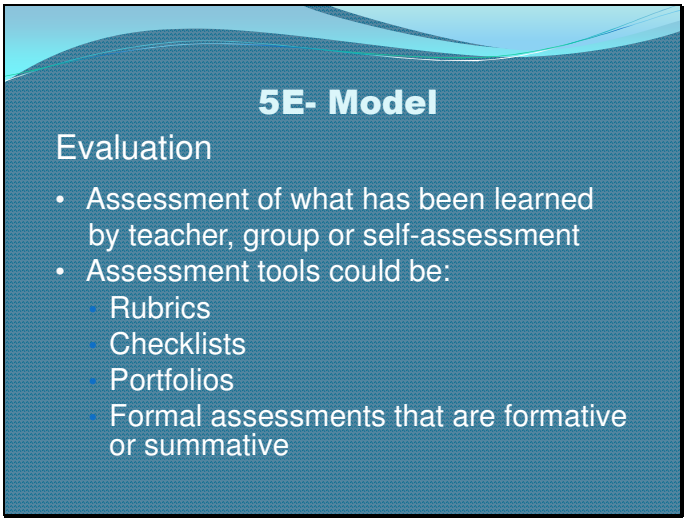

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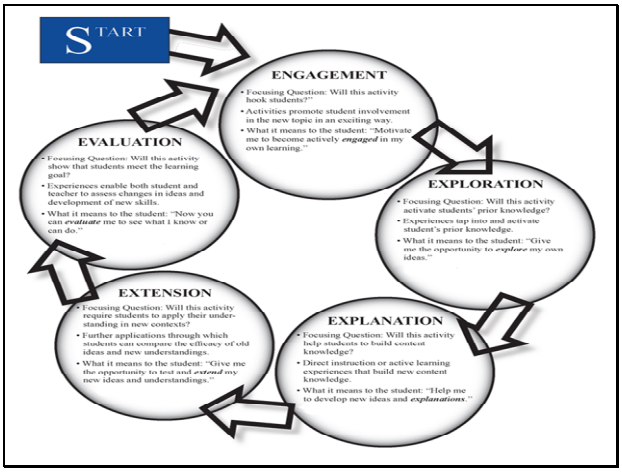


Attracting Students to Chemistry
Samar Yaman & Maha Shebly

Some students perceive chemistry as irrelevant to their lives. Others consider learning it as too difficult and boring. The best way to engage students is to utilize authentic tasks where they become active participants in the teaching learning process. This workshop aims at increasing the awareness and understanding of the use of different strategies that will improve the students' overall attitudes towards learning chemistry and its importance in daily life. Taking out the role of young learners, participants will be engaged in different activities that foster learning and understanding the different types of chemical reactions. Enough time will be given to the participants to share their reflections.

This session is planned as follows:
a) Get familiar with each other. (5min)

Brief introduction to the objectives of the workshop. (5 min)

b) Strategies Application

Strategy 1: visual – auditory Activity

Activity: Watching a video about the types of chemical reactions (20 min)

1) Participants will fill pre and post assessment.

2) Using colored cards, participants will write what skills could be acquired by students throughout this activity and then display them on the wall of the workshop arena.

Strategy 2: Cooperative learning (50 min)

Activity:

After a brief discussion about this strategy, participants will be handed a summary sheet about the types of chemical reactions. They are required to read and discuss the information in this sheet, and then they have to work cooperatively to solve the application exercises provided by the presenters.

To promote self-directed learning, participants will be handed rubrics to guide them accomplish the task.

Participants will reflect on the activity.

Strategy 3: Lab Reports as Summative Assessment : (20 min)

1) Discuss some types of summative assessments that can be made at the end of the lesson, particularly Lab reports.

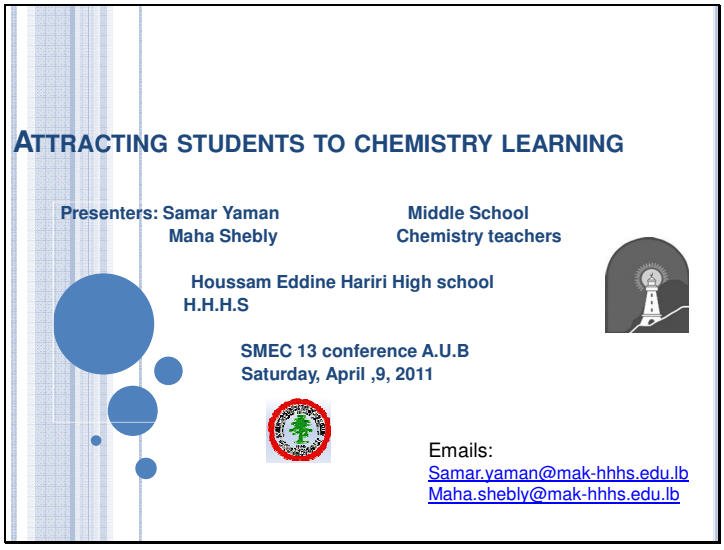
2) Using a slide show presentation, participants will get familiar with prepared manual, rubric, and the lab report template that students usually fill in during lab experiments.

c) Ending this session: (20 min)

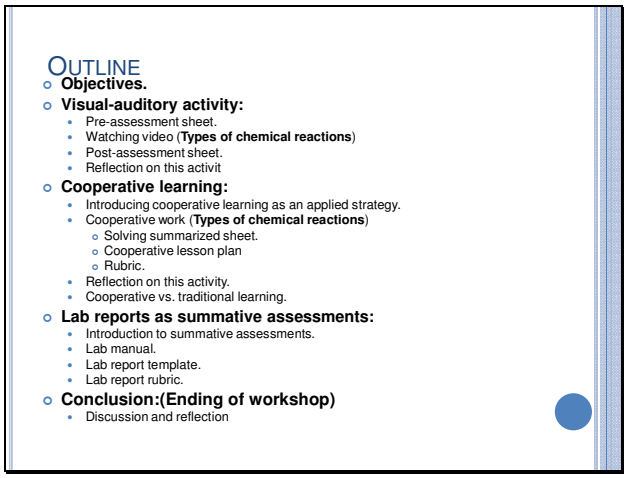
1) In groups, refer to the colored cards and select the best strategy. After a five minutes discussion, share reflections.

2) Workshop evaluation.

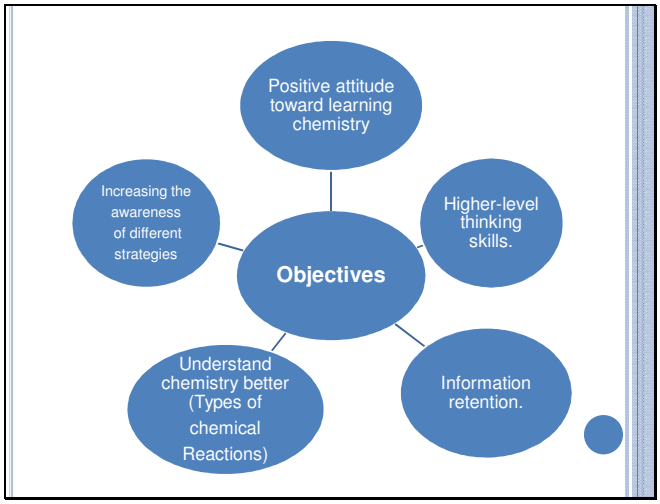
SLIDE 1



SLIDE 2



SLIDE 3



SLIDE 4

VISUAL-AUDITORY ACTIVITY

SLIDE 5

VISUAL-AUDITORY ACTIVITY

- Pre-assessment sheet.
- Video (Types of chemical reactions).
- Post assessment sheet.
- Reflection on this activity using cards.

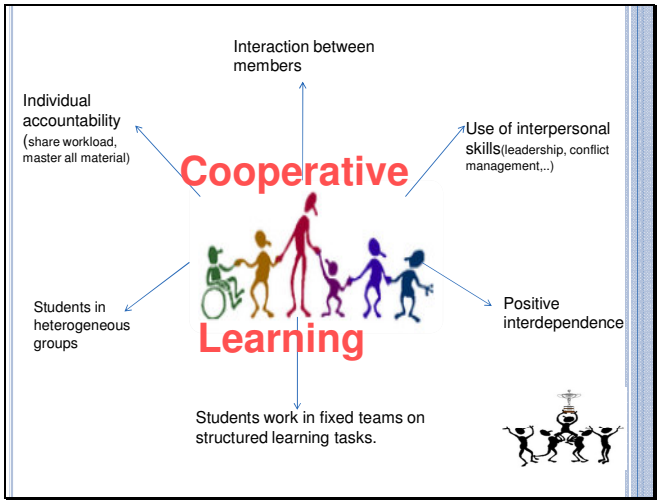
SLIDE 6

STUDENTS' PHOTOS DURING VIDEO SESSION

SLIDE 7

COOPERATIVE LEARNING STRATEGY

SLIDE 8



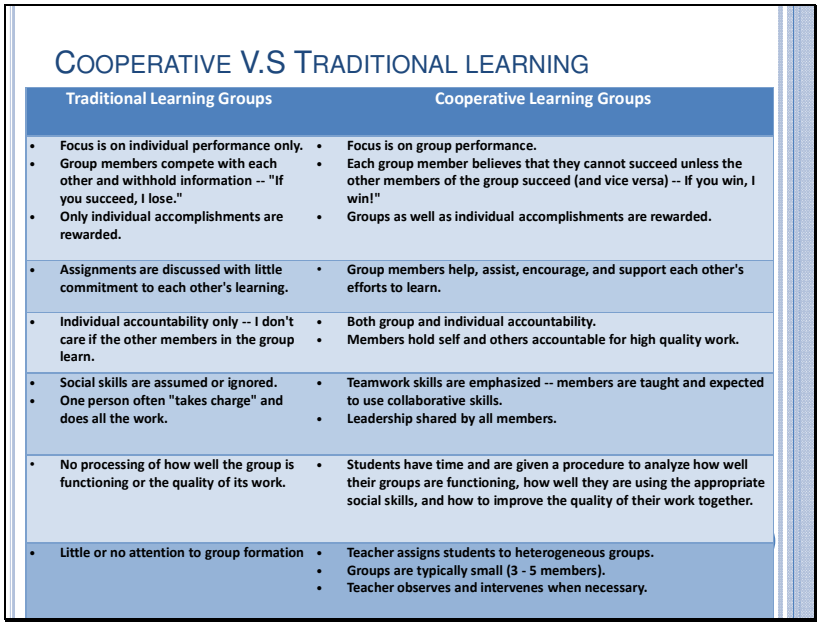
SLIDE 9

COOPERATIVE WORK (TYPES OF CHEMICAL REACTIONS)

- Cooperative learning lesson template.
- Cooperative learning lesson (Types of chemical reactions).
- Summarized sheet:
  - Acquired information.
  - Applications (group work)
  - Question assessment for the group
- Cooperative learning group checklist.

SLIDE 10

SLIDE 11



SLIDE 12

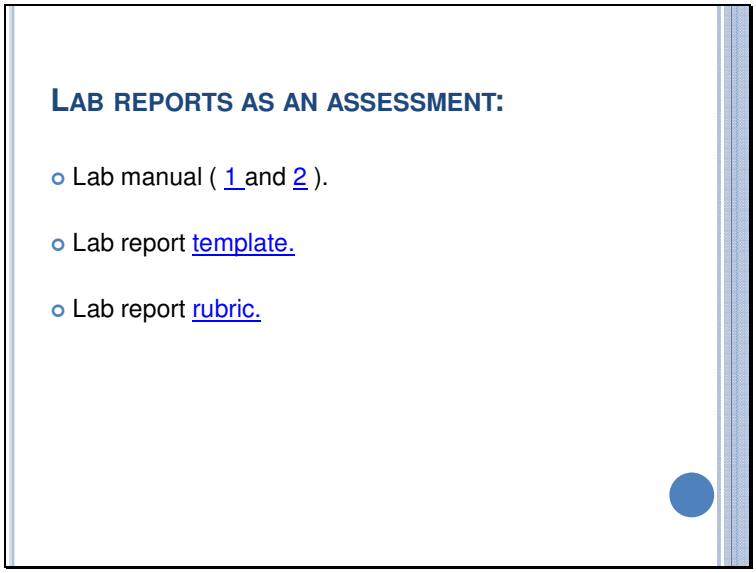
STUDENT PHOTOS DURING COOPERATIVE WORK

SLIDE 13

- We already discussed Two applied strategies in our classroom which are **Visual-auditory strategy** and **cooperative learning.**
- Can an **experimental Lab Report** be used to assess students' knowledge?

SLIDE 14

SLIDE 15



The Scientists Writes a Poem: Success through Integrated Instruction
Nisreen Awarke & Amina Harbali

The primary purpose of the workshop is to increase the participants' understanding of integrated instruction and suggest ways to integrate science and language acquisition to enhance learning in both domains. The integrated approach is required for both language and science classrooms to bridge the gap that has often separated these two disciplines The science process skills-including observing, predicting, communicating, classifying, and analyzing-are similar to language learning skills-seeking information, comparing, ordering, synthesizing, and evaluating .These skills are important keys to integrating science instruction with language acquisition. Motivating and engaging students to speak, ask questions, learn new vocabulary, and write down their thoughts comes easily when they are curious and engaged in science or science inquiry. Similarly, integrating literacy activities within teaching of science helps clarify science concept and can make science more meaningful and interesting to students.

The session is planned as follows:

a. Brief introduction
b. Ask participants to write a description of a flower. This activity aims at letting participants realize that they can address any science concept in the language classroom. (10 min.)
c. Introduce the session's central idea and learning outcomes. (15 min.)
d. Conduct a quiz to assess the participants' perceptions and beliefs on integrated instruction. This activity will be followed by a brief discussion of the different levels of integration. (20 min.)
e. Participants will watch 3 short movies to identify the level of integration depicted in each and state the characteristics of each level. (20 min.)
f. Identify the parallels in science and language teaching. (10 min.)
g. Become familiar with SIOP model (Sheltered Instructional Observation Protocol) and its components. (10 min.)
h. Present an integrated approach to teaching the digestive system. As learners, participants will engage in 3 different activities (performing an experiment and sequencing steps/ Writing the story of a pizza/ Labeling the different organs of the digestive system and identifying the function of each) (25 min.)
i. Take thoughtful actions and set goals for further inquiries

Webquest: Bring the World into your Classroom
Sahar Harakeh & Lamees Adada

Sequence of the Workshop (2 hours)

1. Welcoming(5min)
2. Power point presentation (slides 2-4) (5min)
3. Activity 1: Analyze a Webquest(slide 5)
    - Six different samples of Biology and Chemistry Webquests were distributed :
        - Acidity of Food (Grade 10 or 11)
        - Elements (Grade 8)
        - Human Immunity (Grade 8)
        - Addiction and Neurotransmission (Grade 10)
        - DNA for Dinner (Grade 11)
        - Should Smoking be Illegal (Grade 10)
    - Participants referred to Activity Sheet (1) to analyze in groups one of the above Webquests. (15min)

- A discussion was held about the answers of the participants with the help of the power point presentation. (slides6-24) (20 min)

4. Participants examined student's work for the studied Webquests (25min)

- **Film** prepared by Grade 10 students showing a debate about smoking and anti-smoking advertisements.
- **Song** prepared by Grade 11 student (Hydrogen Fuel Cell)
- **Posters and Brochures** prepared by students about the different Webquest studied.

5. Activity 2: Design your own Webquest (slides 25-26)(25min + 15min)

- Participants were divided into groups, and had the chance to choose one of the following topics:
  - Genetically engineered foods
  - Plant nutrients
  - Your immune system
  - Natural disasters
  - Fireworks
  - Acid rain
  - Nuclear energy
- Participants were provided with all the needed material to design their own webquest including :
  - an information sheet about the topic
  - a set of resources about the topic
  - a set of 10 different rubrics
- Participants were asked to fill in the sheet for Activity 2 and summarize it on provided transparencies.
- Each group presented the main elements of the designed Webquest.

6. A reflection session for 10min. (slides27-30)

7. Listed websites for participants to find different types of webquests.

(slide 31)

NOTE:

Attached: the abstract, synopsis, power point presentation, Activity Sheet 1 &2, two webquests studied in Activity 1, two samples for Activity 2 and photos of the posters & brochures prepared by students.

WebQuests are wonderful teaching strategies that prompt students to ask questions, focus on "using information rather than searching for it", and look at material critically. A WebQuest integrates the Internet into the learning process, thus "bringing the world into your classroom". Participants in this workshop will be given the opportunity to:

a. Infer the basic elements of a WebQuest from previously prepared WebQuests.
b. Design their own WebQuests.

A WebQuest is a journey through multiple websites to gather information and complete a specific task, such as creating a brochure, filming a short educational video or preparing a play. The goal thus is to create lessons that make good use of the web, use everyone's time well and engage learners in applying higher level thinking to authentic problems.

In order to develop great WebQuests, one needs to develop a thorough understanding of the different possibilities open for creating web-based lessons. One way to get there is to critically analyze a number of WebQuest examples and discuss them from multiple perspectives. That is part of the hands-on activities of this workshop: Participants will have the chance to identify the essential parts of a WebQuest and its benefits. They will learn also how they can use WebQuests in conjunction with other education techniques. Moreover, the workshop aims at teaching the participants how to create their own WebQuests through another hands-on activity.

The planned schedule for the workshop will be as follows:

1. Welcoming participants. (5min.)
2. Brainstorming about the WebQuest and its benefits. (5min.)
3. The first interactive activity will be done:
    a. Participants will be divided into groups of (5) to analyze different WebQuests used in Biology and Chemistry by referring to an activity sheet. (10min.)
    b. Discuss their findings to deduce the basic elements of the WebQuest and identify its importance. (15min.)
    c. The presenters will use a power point presentation to summarize the main components of a WebQuest. (10min.)
    d. Participants will examine students' work for the studied WebQuest revealing a range of effort and achievement in different grade levels: 8, 10, & 11. (25min.)
4. The second interactive activity will be done:
    a. Participants will be provided with necessary information and tools that they will use to create their own WebQuests. (25min.)
    b. Finally, each group will present the main elements of the constructed WebQuest.(15min.)
    c. A reflection session will follow to discuss the impact of using WebQuests in the classroom. (10min.)

Introduction

Acids and bases are not only found in the lab. Many substances are acids and bases, including those found in our homes. Soaps, detergents, vitamins, antacids, and many food items are just some of the acids and bases you will find at home, factories, catering institutions….

The acidity of foods-measured by their pH levels is a topic of interest for nutritionists, alternative health specialists, doctors, and consumers. Experts question how acidic and alkaline foods affect our physical and medical health. They believe that too much acid can cause physical and medical troubles, such as problems with cell energy and repair, detoxification, growth of tumor cells and illness. Hence, a pH balanced-diet, according to many health specialists, is a vital key to health maintenance.

The newest research shows that the diet should consist of 60% alkaline- forming food and 40% acid-forming food. “The countless names of illnesses do not really matter. What does matter is that they all come from the same root cause… too much tissue acid waste in the body!” Theodore, A. Baroody, N.D., D.C., Ph.D.

What should be done?! Alert alarms should ring.

Task

Your mission is to research all of the implications of a pH- imbalanced diet. As member of HHSII research team, you will be placed in groups of three. Each member in the group will be assigned a different role having a specific specialty: A chemist, a doctor and a nutritionist. Decide with your group members about the role you would like to play:

1. The chemist will define and compare acids and bases. He has to determine the pH scale and its role in identifying acids and bases. He must clarify the concept of acid- forming food and basic- forming food. He must keep the doctor and the nutritionist well informed.
2. The doctor will investigate the impact of food diet pH on the body and list the associated health hazards and diseases. He must coordinate with the nutritionist.
3. The nutritionist must suggest balanced healthy meals for one day to patients suffering from overacidity in their blood.

The final task of each team is to guide an awareness campaign about the raised topic by:

- Addressing lectures in the school theaters to the school community about the health risks of some foods.
- Designing posters that include all the work of the team members. Posters will be displayed all over the playgrounds and school floors.

Process

1. Arrange yourselves into groups of three.
2. Each member will choose to play the role of either the chemist, the doctor or the nutritionist.
3. Refer to the lists of websites mentioned in the reference section that would help you find information about your assigned role. Be selective in the information you read.
4. For the team member playing the role of the chemist, he must display the following in the poster:
    - Definitions of an acid and of a base.
    - The importance of pH scale for the determination of acidity and basicity of food.
    - Constructed pH scale showing the different pH ranges.
    - Identification of acid- forming food and basic- forming food.
    - A table showing some acid-forming foods and basic- forming foods.
5. For the team member playing the role of the doctor, he must:
    - Identify the normal blood pH (and/or urine pH) in the human body.
    - Correlate between low pH foods and certain diseases based on newest researches in that domain.
    - Include his findings in the poster.
6. For the team member playing the role of the nutritionist, he must:
    - Design a one-day, pH-balanced meals (breakfast, lunch and dinner) for a certain patient. He must depend on the doctor and chemist's findings in the suggested meals, besides respecting the food pyramid.
    - Display his work in the poster.
7. Posters must have an appealing and creative layout to draw back the readers' attention all over the school.
8. The group members must present lectures, in the process of the awareness campaign, to the school community in the school theater.
9. Presenters must respect the standards of oral presentation.

Resources

The following links will help you complete this webquest.

1. chemistry.about.com/od/**acidsbases**/a/**acidsbases**terms.htm

2. www.files.chem.vt.edu/.../Notes_on_**acids_and_bases**.html

3. staff.jccc.net/pdecell/chemistry/**phscale**.html

4. www.epa.gov/acidrain/education/site_students/**phscale**.html

5. www.pureliquidgold.com/**acid**-alkaline-**forming-foods**.htm
6. www.detox.net.au/**Acid**-Alkaline-**foods**.htm
7. www.balance-ph-diet.com/**acidosis**_symptom.html
8. www.womensforum.com/index.php?...**effects-of-acidic-foods**...**health**...
9. www.lifereserachuniversal.com/**acid**.html
10. www.hsph.harvard.edu › ... › What Should You Eat?

Conclusion

Dear team members,

The mission you accomplished has been invaluable in the quest to raise your school community awareness about the risks of highly acidic food diet.

Do you think that both the ministry of health and the ministry of mass communication should have more effective role in highlighting the health factors that will negatively affect of the future generations?

What preventive measures should be also taken to reduce the spread of many diseases, especially cancer??

Due Date: May 18th, 2010

Evaluation

Your grade will be determined according to the following scale

Product 1: Poster 70 points

Product 2: Oral presentation 30 points

A. Scoring Guide for a Poster

Criteria	Points	Self Assessment	Teacher's Assessment
1. Title can be read from 6 ft. away and is quite creative	10		
2. The poster includes all required	20		

elements as well as additional information.			
3. It includes drawing, or pictures that clarify the main ideas.	15		
4. The poster is exceptionally attractive in terms of design, layout, and neatness.	10		
5. It has no spelling errors.	10		
6. It is submitted on time.	5		

A. <u>Scoring Guide for Oral Presentation</u>

Criteria	Points	Self Assessment	Teacher's Assessment
1. Every group member has the chance to present.	5		
2. Every member speaks in clearly and loudly.	5		
3. Every member has to prepare his/her notes cards and try to avoid reading.	5		
4. Every group presents the important facts/ concepts in an organized way.	5		
5. Every presentation is limited to 20 min.	5		
6. Every group displays the lecture in a creative and inspired way.	5		

Activity (1)

Analyze a Web Quest!!!

Answer the following questions about the given Web Quest

1. What is a Web Quest?

_____

_____

2. What are the learning outcomes of this Web Quest?

_____
_____
_____
_____

3. What are the benefits of implementing the Web Quest strategy on students' learning?

_____
_____
_____
_____

4. Do you think that the task is interesting? Will it engage students in the grade level at which it is aimed?

_____
_____
_____
_____

5. Find out the basic elements of the given Web Quest and indicate the importance of each.

_____
_____
_____

6. What problems might arise when students work on such a Web Quest?

_____
_____
_____

Activity (2)

It is your chance to make a WebQuest yourself

- Please use the following table/outline to help you.
- In order to speed up the process, I have given you four topics to choose from. If you have already have one in mind please use that one.
- Summarize this outline on the given transparencies.

Grade Level	
Title	

Goals	
Introduction What kind of background knowledge should your students have before starting the webquest? Are there any vocabulary words and functions relevant to the theme they need to know or accomplish.	
Task What would you like your students to answer and to be able to do during and after completing the WebQuest	
Process How will your Webquest progress? Are they working individually/in pairs/in groups? Any specific directions you need to mention to the students before starting the webquest?	
Evaluation What will you assess your students on? Scoring guides. (You have different rubrics that you can choose from them)	
Conclusion What would you like your students to talk about after the webquest? How would you like to to end your webquest?	

Hariri High School II
Web Quest Project
Grade 11

DNA FOR DINNER?

Should genetically engineered food crops be labeled for consumers and why?

Introduction

Scientists have recently developed the techniques to insert genes into plant crops to give the plants new traits. For example, genes for insect resistance, originally from bacteria, can be placed into corn or soybean or potato plants. Other inserted genes can make plants resistant to viruses, fungi or even to herbicides. This technique can directly increase the yield or health value of the crops and thus provide more food. In a world where people are starving, this is important. Moreover, the use of these genetically engineered crops may reduce the use of environmentally harmful insecticides and herbicides. But there are serious questions about the ramifications of this type of genetic engineering, too. Are these foods safe for the environment and for us to eat and farm animals to eat?

Today, more than ninety percent of American soybeans, nearly ninety percent of cotton, and more than three quarters of the corn that is grown is already genetically modified. In 2008, more than 309 million acres of genetically engineered crops were grown worldwide by 13.3 million farmers in 25 different countries. Still, most people do not know very much about genetic engineering and biotechnology.

Currently, there are no requirements in Lebanon for genetically engineered food to be labeled in a special way. Why is this? What regulations are there of genetically modified crops? Do consumers want labels on food crops that state that they are genetically modified? Would such labels help or harm us in the long run? Why might we want labels and why might we not want them?

Task

Your task is to gather current information about genetic engineering of food crops and find out how genes in plants can be changed, why they are changed, and what the possible side effects might be, if any. Then, apply your knowledge by:

- Preparing a draft of proposed legislation dealing with labeling of genetically engineered foods in Lebanon.
- Presenting your proposed legislation to your classmates.
- Explaining your proposed legislation in writing and presenting it to the ministry of Agriculture in Lebanon to convince them of your point of view and help them take action in order to increase people's awareness about the impact of genetic engineering on their lives.

Process

1) You will be working in a team of 5 members. Your group must work together to successfully complete the Web Quest and become DNA Experts.

   *Remember, your contribution is essential to the success of your team.

   There are four keys to successful group work:

Coordination	coordinate meeting times and places and complete individual tasks before the project due date.
Cooperation	put aside individual concerns and work together for the good of the group; be unselfish.
Organization	use time and resources wisely and efficiently; help teammates do likewise.
Communication	really listen when other group members speak and choose your words thoughtfully when you contribute to discussions.

2) Divide your work up so that each member in a group investigates one of the following resource areas:

   A. DNA and How It Works in General
   B. How Biotechnology Works & Some Agricultural Examples
   C. Some Positive Aspects of Agricultural Biotechnology
   D. Some Questions About Agricultural Biotechnology
   E. Labeling of Genetically Modified Organisms

3) Decide on the content of your proposed law or legislation. If you are working in a group, discuss this within your group; otherwise, come up with your own ideas of what you think should be in a law.

4) Draft the law and print a copy of the law to hand in.

5) Present your law in a 250-word factual statement that explains why the law should be enacted. Present factual support. If you have been working in a group, you need to determine as a group what to write, including comments of each student in the final statement.

It is important as you proceed that you gather lots of information before you come to a decision on this matter. Try not to make a quick or an emotion-based decision and then back that up with inaccurate information that you pick and choose from here or there. Instead, try to put your decision about this question off until you have lots of factual information first.

Hand in the results to steps 1-5 before proceeding with step 6. Wait for your teacher's approval to continue with step 6.

6) Interview the minister of agriculture and discuss your points of views on what type of law you think should be passed regarding labeling genetically engineered foods. Be sure to indicate that you are a student and that you are working on a project.

Resources

The following links will help you complete this WebQuest.

1) DNA and How It Works in General [http://dnafordinner.blogspot.com/2007/11/links-about-how-dna-works.html]

2) How Biotechnology Works & Some Agricultural Examples It[http://dnafordinner.blogspot.com/2007/11/links-about-how-biotechnology-works-and.html]

3) Some Positive Aspects of Agricultural Biotechnology [http://dnafordinner.blogspot.com/2007/11/positive-aspects-of-genetic-engineering.html]

4) Some Questions About Agricultural Biotechnology [http://dnafordinner.blogspot.com/2007/11/questions-about-genetic-engineering-in.html]

5) Labeling of Genetically Modified Organisms [http://dnafordinner.blogspot.com/2007/11/labeling-of-genetically-engineered.html]

Due Date: January 18th, 2011

Evaluation

The grade on the Web Quest will be based on the details of your work on the proposed legislation and your presentation of the legislation in writing. The following rubric is used for determining your grade. Score / 20

	Unsatisfactory	Satisfactory	Good	Excellent

	1	2	3	4
Understanding of how and why genetic engineering is done	Fewer than 5 correct facts or weak facts, with little understanding	5-10 correct facts, with good understanding	10-15 correct facts, with good understanding	More than 15 correct applicable facts, with good understanding
Substantiation for the law that you constructed	1 or fewer reasons or weakly-related reasons	2-3 acceptable reasons	4-5 substantive reasons	More than 5 substantive reasons
Appropriateness of the law to issues of genetic engineering	Law may not address the question	Law addresses some issues but may not be fully acceptable	Wording of law is mostly acceptable and appropriate	Fully acceptable, appropriate law
Clear explanation of ramifications of law with pros and cons indicated	1 pro / 1 con	2-3 pros / cons	4-5 pros / cons	More than 5 pros / cons
Knowledge of others viewpoints	1 or fewer statements indicating understanding of others' viewpoints	2-3 statements indicating understanding of others' viewpoints	4-5 statements indicating understanding of others' viewpoints	More than 5 statements indicating understanding of others' viewpoints

Fireworks!

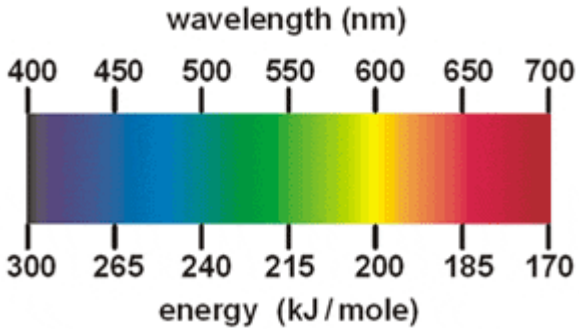
Have you ever been to an aerial fireworks show at an amusement park, baseball game, Fourth of July celebration, or on New Year's Eve and wondered about how all the impressive colors and sounds are produced? People everywhere enjoy the fantastic explosions and the brilliant light displays of fireworks. However, these spectacles are much more than just a form of entertainment. Each firework launched into the sky is a precisely formed assembly of chemicals and fuel, carefully calibrated to produce a particular effect – a red chrysanthemum spray accompanied by a powerful explosion, or a blue strobe,

for example. Understanding how the contents of a firework produce the impressive variety of colors, forms, and sound intensities requires only a simple understanding of chemical reactions.

Fireworks generate three very noticeable forms of energy: a tremendous release of sound, bright light, and heat.

The amount of energy emitted is characteristic of the element, and the amount of energy determines the color of the light emitted. For example, when sodium nitrate is heated, the electrons of the sodium atoms absorb heat energy and become excited. This high-energy excited state does not last for long, and the excited electrons of the sodium atom quickly release their energy, about 200 kJ/mol, which is the energy of yellow light.

The amount of energy released, which varies from element to element, is characterized by a particular wavelength of light. Higher energies correspond to shorter wavelength light, whose characteristic colors are located in the violet/blue region of the visible spectrum. Lower energies correspond to longer wavelength light, at the orange/red end of the spectrum.



When watching fireworks, we see them much sooner than we hear them. That happens because light travels about a million times as fast as sound. The speed of light is 300,000,000 meters per second, but the speed of sound is only about 340 meters per second. If you are watching fireworks that are about a kilometer (1000 meters) away, the light takes only 3 millionths of a second to reach you. The sound takes about 3 seconds. You can tell how many kilometers away fireworks are exploding by starting to count seconds as soon as you see an explosion. Stop counting when you hear the explosion and divide the count by 3. This gives the distance away in kilometers.

The colors you see exploding in the sky are produced by the elements with the characteristic emissions listed in
the table.

	Color	Compound	Wavelength (nm)
	red	strontium salts, lithium salts lithium carbonate, Li_2CO_3 = red strontium carbonate, $SrCO_3$ = bright red	652

	orange	calcium salts calcium chloride, $CaCl_2$	668
	yellow	sodium salts sodium chloride, NaCl	610-621
	green	barium compounds + chlorine producer barium chloride, $BaCl_2$	589
	blue	copper compounds + chlorine producer copper(I) chloride, CuCl	505-535
	purple	mixture of strontium (red) and copper (blue) compounds	420-460
	silver	burning aluminum, titanium, or magnesium	

In making fireworks, the metal salts are put into stars, small clay or dough-like lumps or cubes 3 to 4 cm in diameter. Stars consist of a blend of oxidizing agent, reducing agent, coloring agent (metal salt), and binders. When ignited, the stars produce both sound and light effects. The appearance of a firework is determined by its stars, which are made by hand and carefully packed into cardboard compartments within the firework shell, where they await ignition by a time-delay fuse.

Fireworks are classified as both a low and a high explosive. The initial lift charge that sends the firework into the sky is a low explosive. The burning charge undergoes rapid decomposition, but not detonation. The firework can be thought of as flying through the air powered by a fast burning wick. Where the wick ends, it meets the high explosive components of the firework. In this second stage there is an instantaneous detonation producing both a loud explosion and a bright flash of color.

When an aerial firework explodes, its component stars fly off in all directions. However, when viewed from a distance, these aerial fireworks seem flat, as though they were displayed on a screen. We do not easily perceive that some parts are coming toward us, while others are moving away. We have a hard time seeing this, because we don't perceive the normal clues that tell us the direction in which something is moving. Normally, when an object moves toward us, it appears to grow larger, and when it moves away, it appears to grow smaller. However, the stars in fireworks are so bright against a dark background, that we can't get an accurate impression of what size they are; their intensity saturates our retinas. We can't tell if they are getting larger or smaller, so we judge them not to be moving either away from us or toward us. Therefore, they look flat. If, however, we could see them from directly below, we

would observe that the stars move in all directions away from the central explosion.

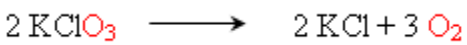
Chemistry of Fireworks

The sights and sounds of each explosion are the result of several chemical reactions – oxidations and reductions – taking place within the firework as it ascends into the sky. Oxidizers produce the oxygen gas required to burn the mixture of reducing agents and to excite the atoms of the light-emitting compounds. Various oxidizers are used in both the black powder and the stars. The most commonly used oxidizers are nitrates, chlorates, and perchlorates. The reducing agents, sulfur and carbon, combine with the oxygen from the oxidizers to produce the energy of the explosion.

The most commonly used oxidizers are potassium nitrates, the major component of black powder.

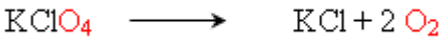
$$2\,KNO_3 \longrightarrow K_2O + N_2 + 2.5\,O_2$$

In the 1830s Italian fireworks makers found a group of more explosive oxidizers, which produced temperatures of 1700 to 2000°C and made possible the creation of much more intense colors. These oxidizers are the chlorates, which contain the chlorate ion (ClO3-), and they give up all their oxygen upon reaction.



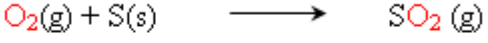
$$2\,KClO_3 \longrightarrow 2\,KCl + 3\,O_2$$

Perchlorates contain the perchlorate ion (ClO4-), in which each chlorine atom is bonded to four oxygen atoms. The chlorine is bonded to its maximum number of oxygen atoms, and so perchlorates are more stable than chlorates. Yet, perchlorate is able to release all four of its oxygen atoms.

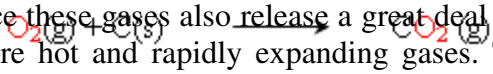


$$KClO_4 \longrightarrow KCl + 2\,O_2$$

The oxygen released by nitrates, chlorates, and perchlorates in the star compartments immediately combines with the reducing agents to produce hot, rapidly expanding gasses. The most common reducing agents are sulfur and carbon (charcoal) –standard components of black powder – which react with oxygen to produce sulfur dioxide and carbon dioxide respectively:



$$O_2(g) + S(s) \longrightarrow SO_2\,(g)$$



$$O_2(g) + C(s) \longrightarrow CO_2\,(g)$$

The reactions that produce these gases also release a great deal of heat energy, so not only are the gases produced rapidly, they are hot and rapidly expanding gases. This adds to the explosive force of the reaction.

Natural Disastes

Natural disasters come in many shapes and sizes. There are different types of disasters. Most are related to the weather but some are geological. A natural disaster is the effect of a natural hazard leads to financial, environmental or human losses.

Natural disasters can arise from:

Weather patterns eg storms, hurricanes, floods, tornadoes

Other climatic conditions eg droughts, bush fires, severe heat.

Changes in the earth's crust eg volcanoes, earthquakes, tsunami or tidal waves

Natural disasters are extreme, sudden events. People who are prepared for such an event have a better chance of survival. Preparation ensures that if disaster occurs people are ready to get through it safely and make an efficient response. Preparedness means figuring out what you'll do when a disaster occurs, planning for problems that may occur during the disaster, and practicing the plan.

Natural Disasters

Resources of fireworks

Look at the web sites given here to find the information that will enable you to answer questions about the chemistry of fireworks.

- **A History of Fireworks.** At this site, you can learn about the history of fireworks.

  Where did fireworks begin?

- **Professional Colors.** Visit this site to learn how professionals create the colors that appear during the vibrant displays of fireworks.

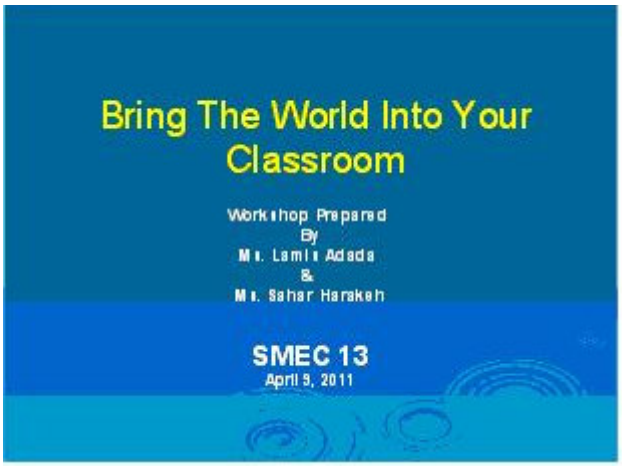
- **Lights and Colors.** Go to this site to see what chemicals create the colors of firesworks. Before the 19th century, only the colors white, yellow, and orange were possible in fireworks. When did the colors red, green, blue, and purple become possible in fireworks?

- **How Fireworks are Made.** At this site you can find out what chemical compounds create the colors of modern fireworks.

- **NOVA Online: Kaboom!** Go to this site for a diagram of the parts of a modern firework. Each part of the diagram has an active label. Click on each label to learn more about that part of the firework.

- **The Chemistry of Fireworks.** Visit this site to learn more about the chemical reactions in fireworks. Find out what two types of binders are used in fireworks today.

Slide 1



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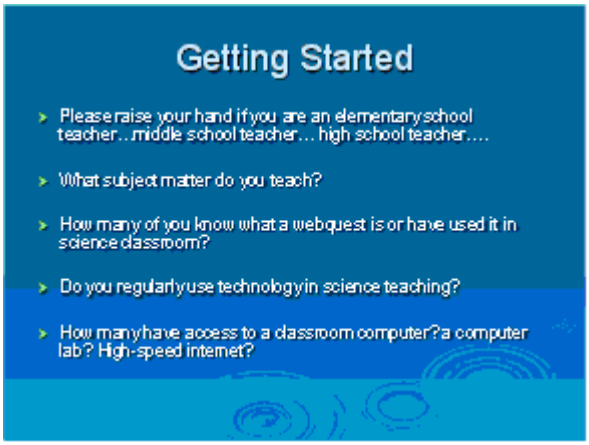

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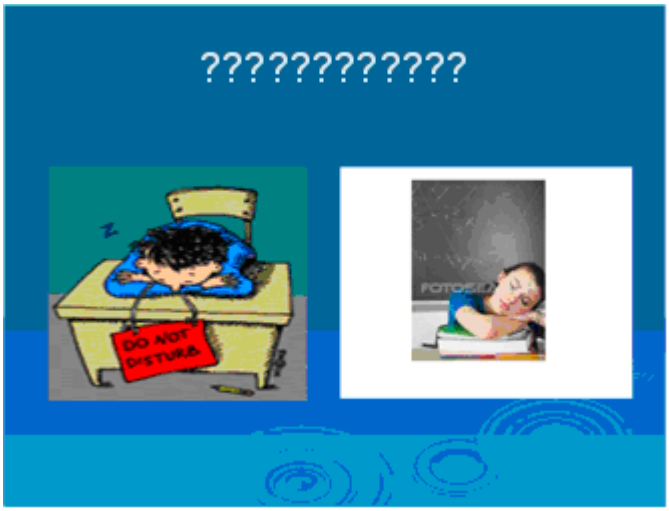

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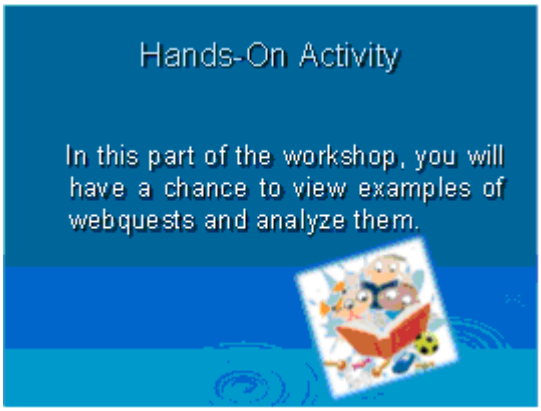

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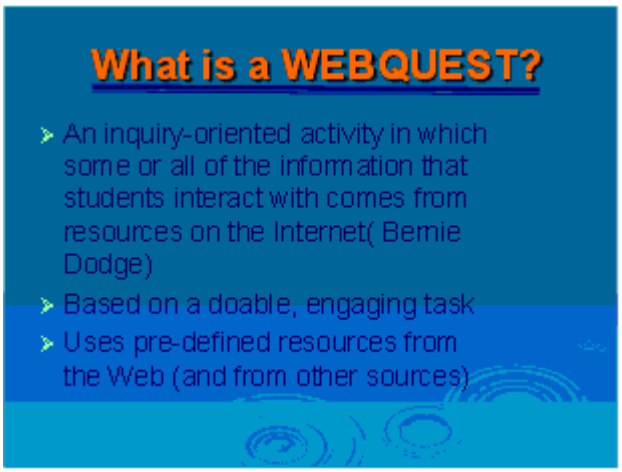

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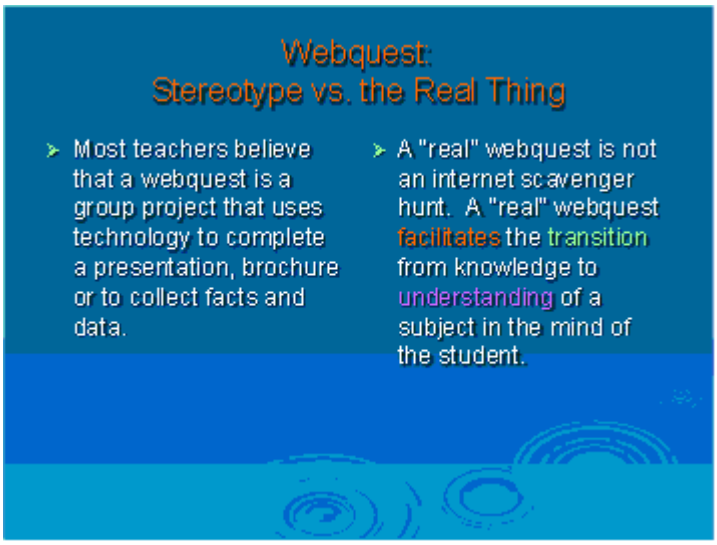

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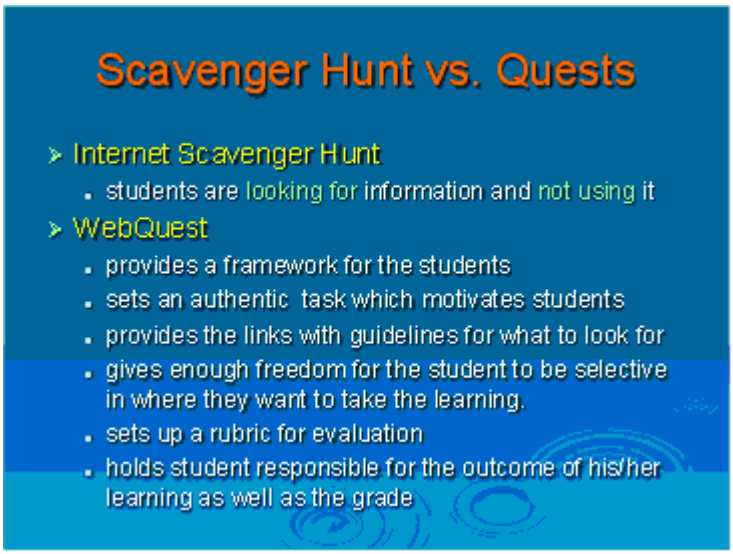

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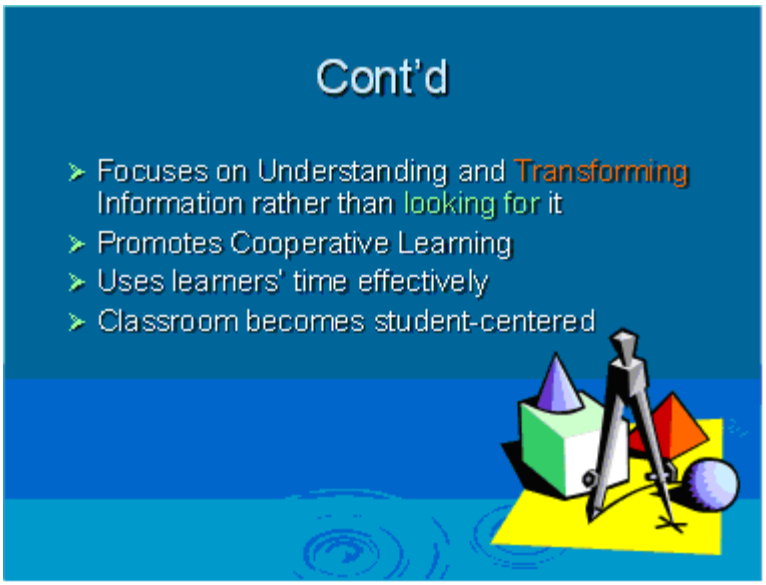

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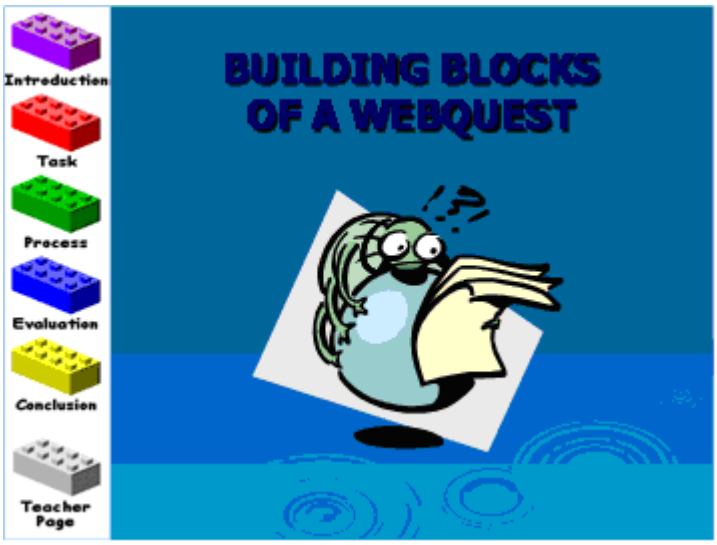

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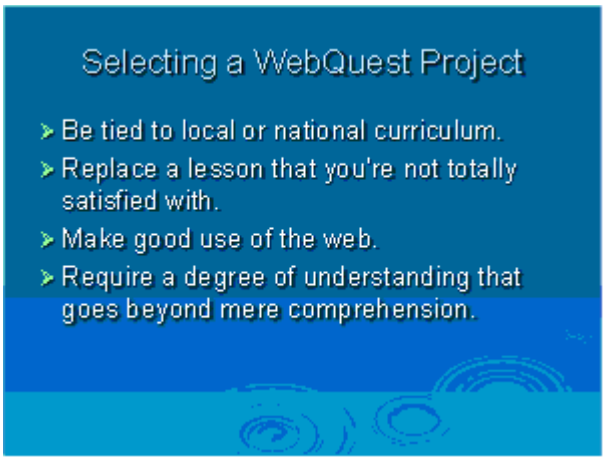

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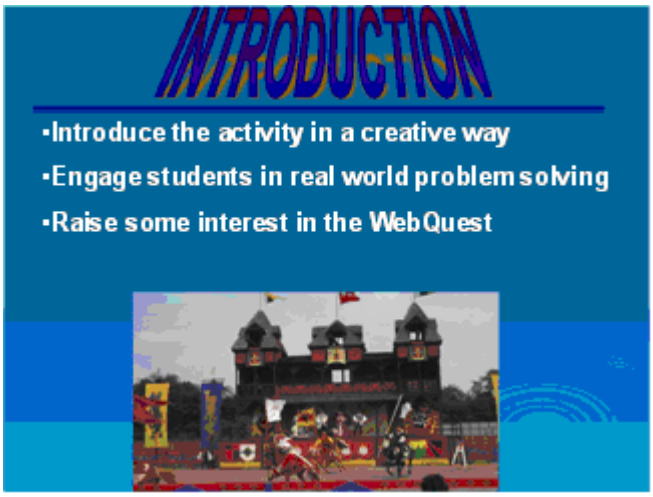

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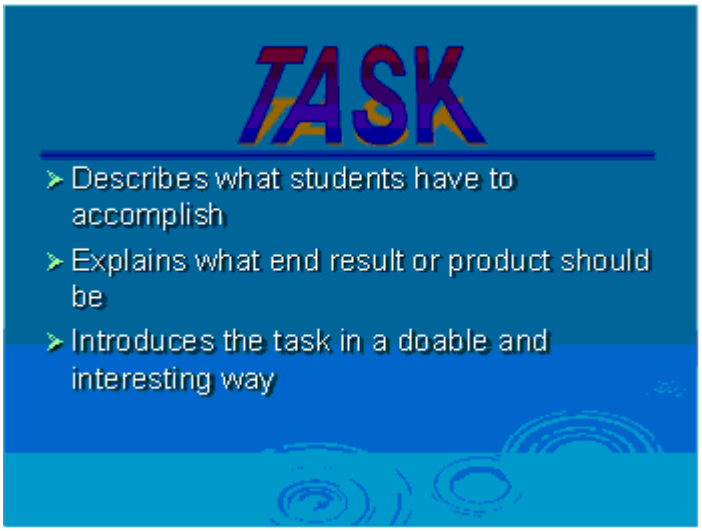

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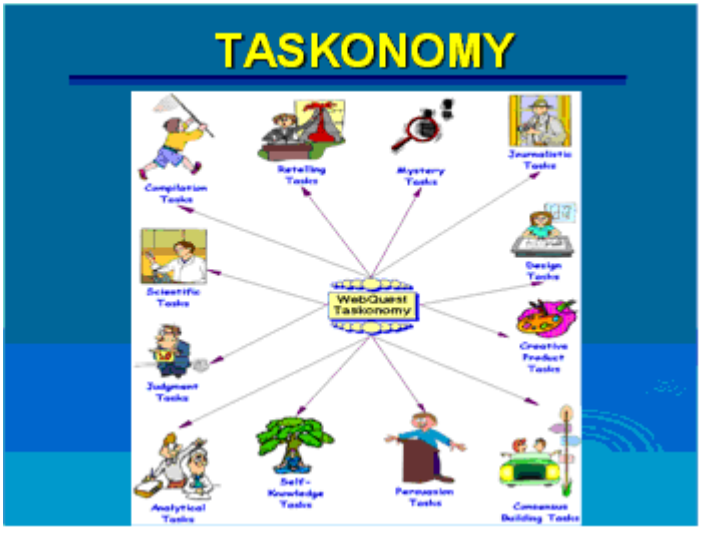

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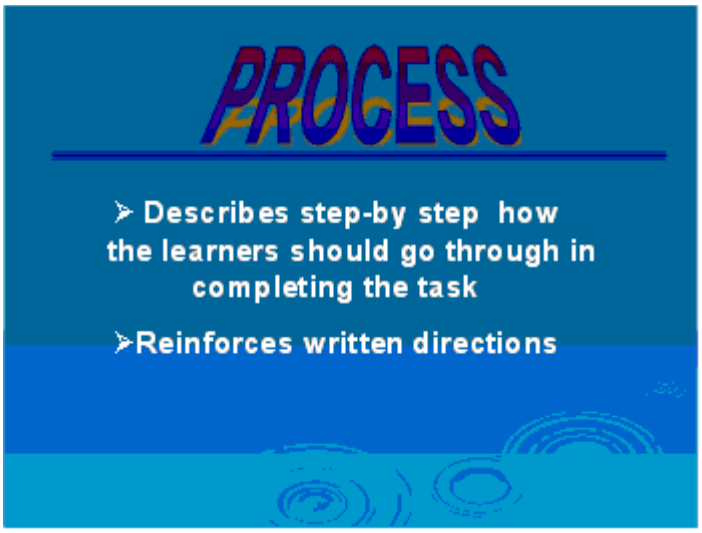

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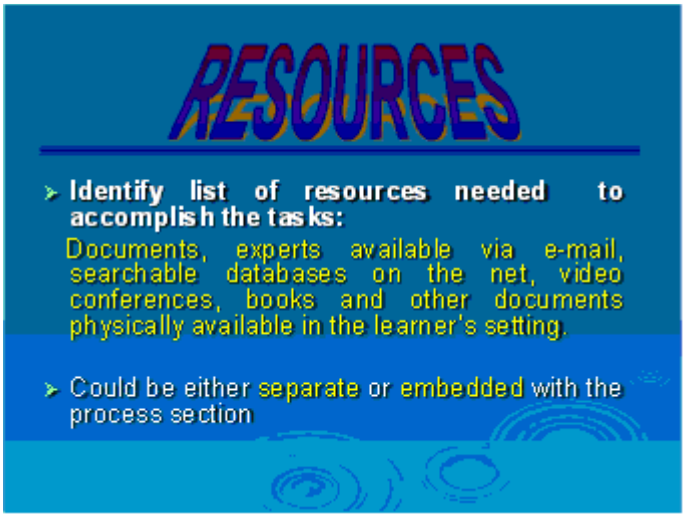

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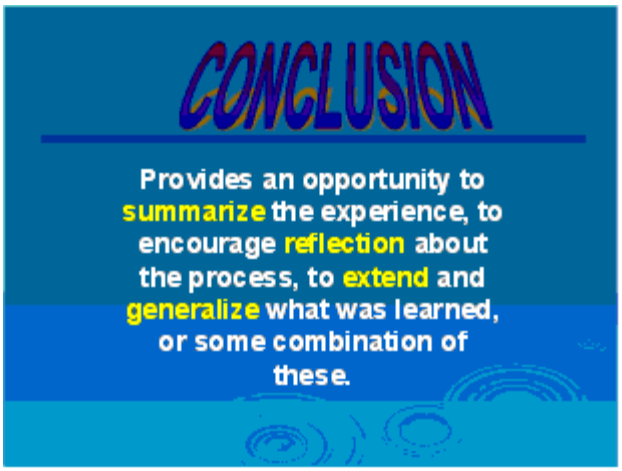

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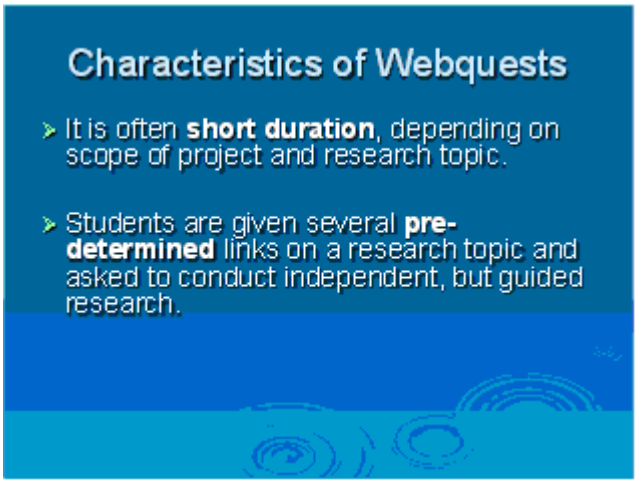

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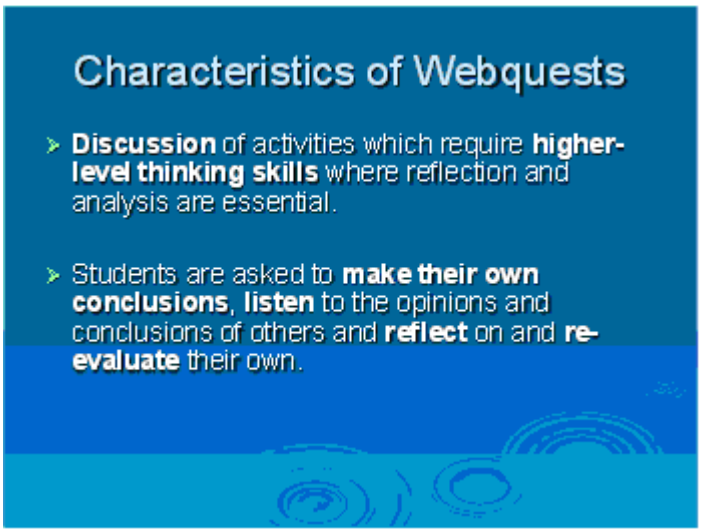

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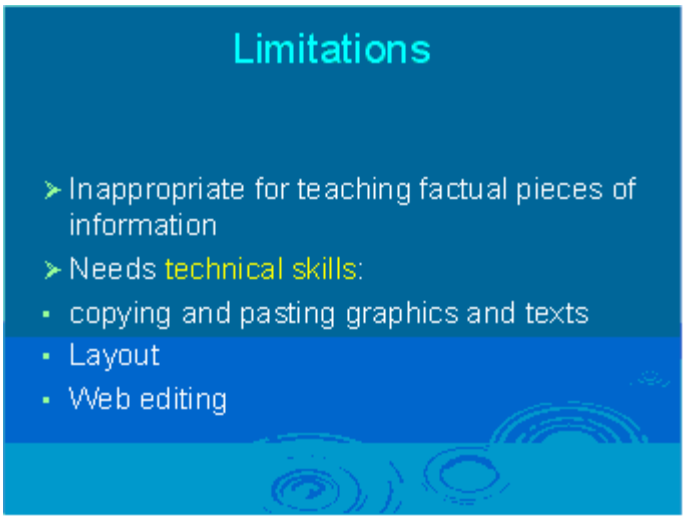

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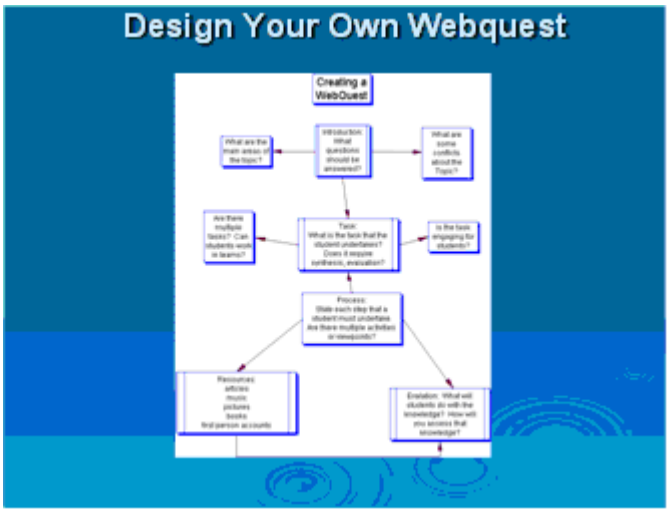

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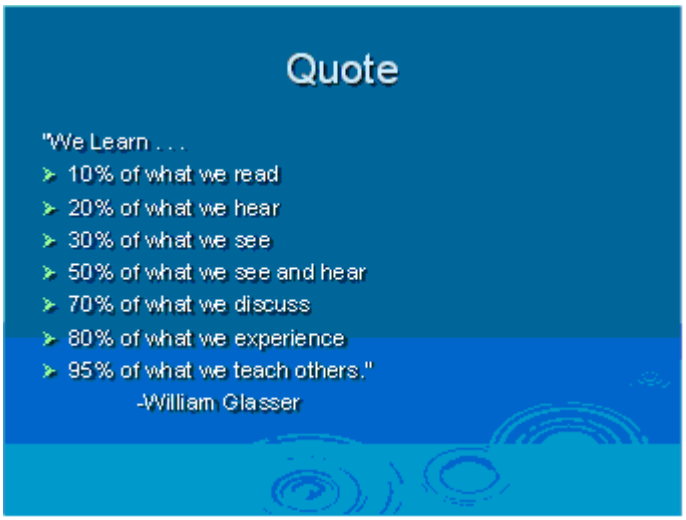

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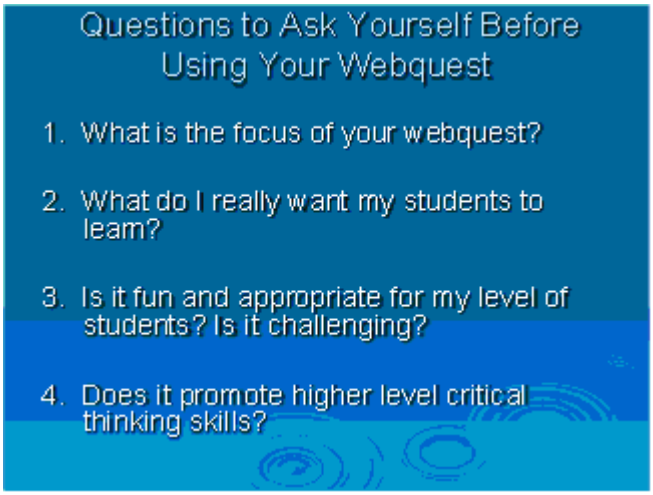

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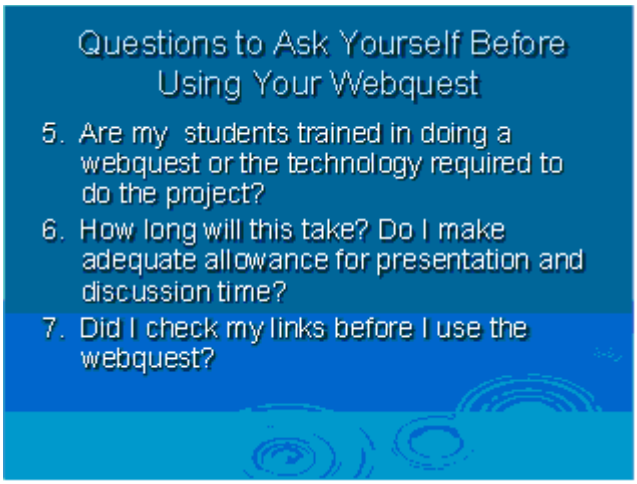

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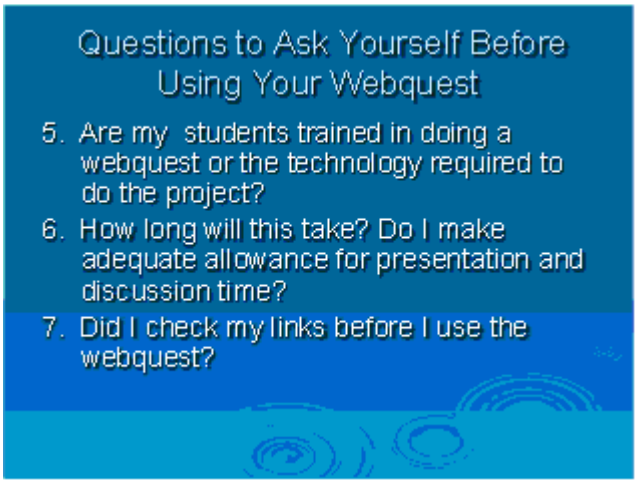

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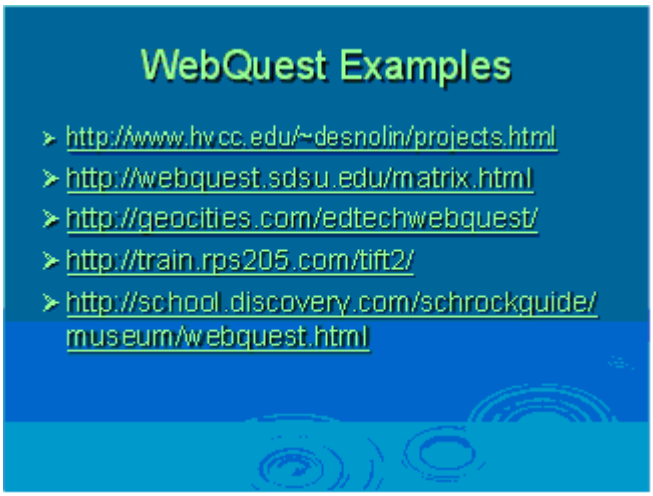

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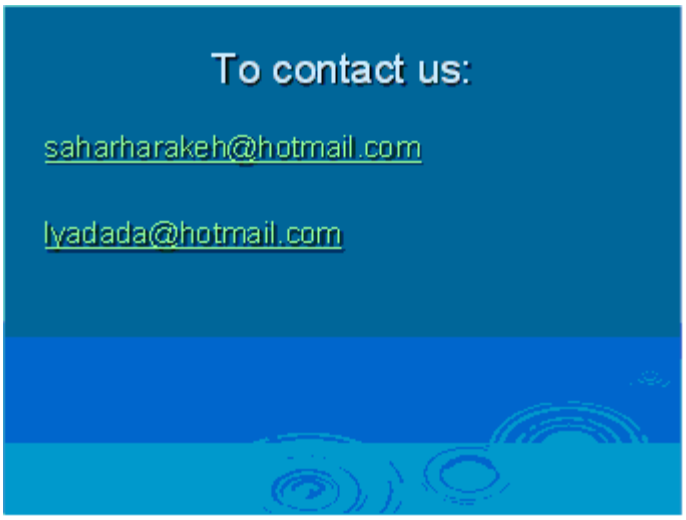


Lab Rules & Tools

Mahassen Chanouha-Ramadan

Objective: To disseminate International College – Middle School Science Lab's experience in the organization of a Physics, Chemistry and Biology Lab.

Abstract: Organizing a science lab for middle school students is a simple task yet it requires organizational skills, documentations and regular inventory updates for the proper distribution and arrangements of tools and instruments that can be of help for both students and teachers. Part of the process of records keeping, is the Laboratory Manual that recapitulates on all responsibilities and stored items in the physics, chemistry and biology laboratories. What to include in a laboratory inventory and manual are steps that will be shared during this workshop. Moreover, working in a lab as a student, teacher or technician necessitates a level of responsibility towards own, colleagues and environment safety. Safety measures and rules to be followed by both students and teachers will also be highlighted in this workshop.

Synopsis:

Session Outline	**Session Time Planner**
Introduction: Brief history on Middle School Science Labs including organizational chart.	10 minutes
Laboratory Organization: Tools and equipment distribution. Laboratory Inventory (share sample) Laboratory Manual: what to include? (share sample)	50 minutes
Safety Measures: Safety Terms/Signs and Safety Procedures Strategies (success and weak points) adopted to dispose of the	30 minutes

following material: - Dissected elements - Chemicals - Glassware Sharing of useful websites that include comic stories on safety	
Materials Safety Data Sheet (MSDS): What is a MSDS? Why it is important to have it in the Lab? How to prepare it? (share sample) Sharing of useful websites	30 minutes

How to Successfully Participate in a Science Fair
Simon Barakat & Maya Mouhaidly

WORKSHOP PURPOSE: The purpose of this workshop is to help participants conduct a successful Science Fair, with an emphasis on the value of project-based learning, and the constructive role of students, parents, teachers and mentors throughout the process.

WORKSHOP DESCRIPTION: Conducting a Science Fair project is a unique inquiry-based learning experience in which students shape their own learning, use the different steps of the Scientific method, and Integrate various disciplines. However to successfully participate in a Science Fair, this complex process should be simplified into a step by step constructive endeavor. Using a Science Fair Guide developed by ACS, this workshop will provide a solid tool for reaching the appropriate outcome (experiment, research paper, and threefold display board). Participants were engaged in a discussion throughout the workshop involving the evaluation of a good Science Fair question, the role of teachers as facilitators, the role of mentors as moderators, and the role of parents as supporters. Samples of actual students' work (videos of experiments, display boards and research papers) were shared. As an application of the workshop, participants were engaged in producing their own display boards.

Students learn science as part of their curriculum at school. They learn, in most cases, basic concepts and sit for graded assessments to check for understanding and mastery. Do grades truly reflect learning and level of mastery?

Science is everything around us. It goes much beyond textbooks and pen-and-paper. The essential question that needs to be asked: How much are our students able to apply learned material and come out with their own application in a creative and competitive manner and what is our role as teachers?

Our students have a lot of potential that needs to be guided and directed to go beyond the curriculum basic requirements where they get the chance to move a step forward.

The major objective of this workshop is to help teachers identify the importance of project based learning, the significance of giving their students the opportunity to participate in science fairs, and their role in mentoring their progress throughout the process.

The workshop will run in the following order:

1. Introduction: what is project-based learning and why?

2. Project topic selection in relation to curriculum and student interest

3. Steps of the scientific method and their proper application in a science project

4. Providing guidelines for teachers on how to mentor their students work throughout the process successfully

5. Explain and discuss the application of scientific method from three perspectives:

    a. Experimental projects that include designing and running an experiment. Collect, analyze, and present data using various means including technology to show the significance of their findings.

    b. Model projects that reflect a better understanding of a certain concept.

    c. Working projects that apply learned concepts in a very creative and challenging way where students go far beyond the curriculum requirements and can come out with innovative inventions. This part is the most challenging and science fair competitive.

    Participants will be shown samples of projects for each of the three items above and samples and videos of competitive and winning students' projects that actually work in the three fields of science (biology, chemistry, and physics) from middle and high school levels.

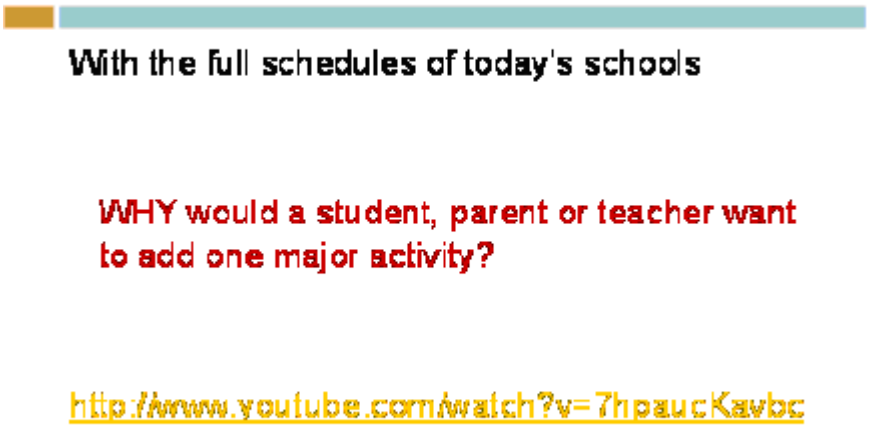
6. Participants will be provided with various handouts and will be working in groups where they will take the role of the student going through all the required steps to come out with an innovative design and proposal for a science fair project.

7. Brief presentations of group projects. A discussion will follow for each project and will include ways to improve it.

8. End of session

SLIDE 1

SLIDE 2



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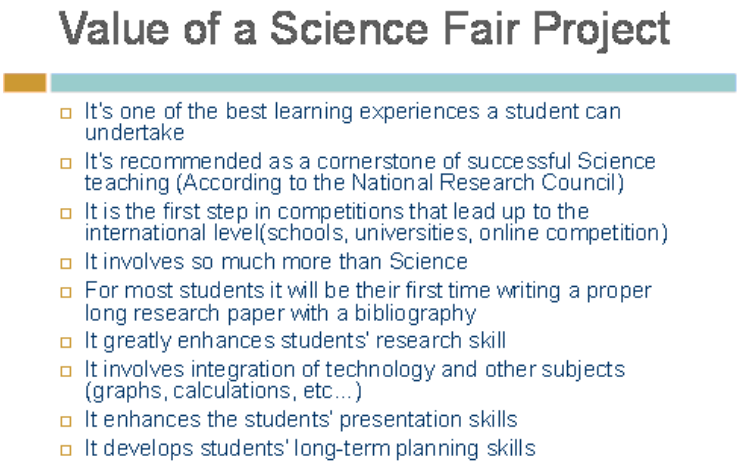

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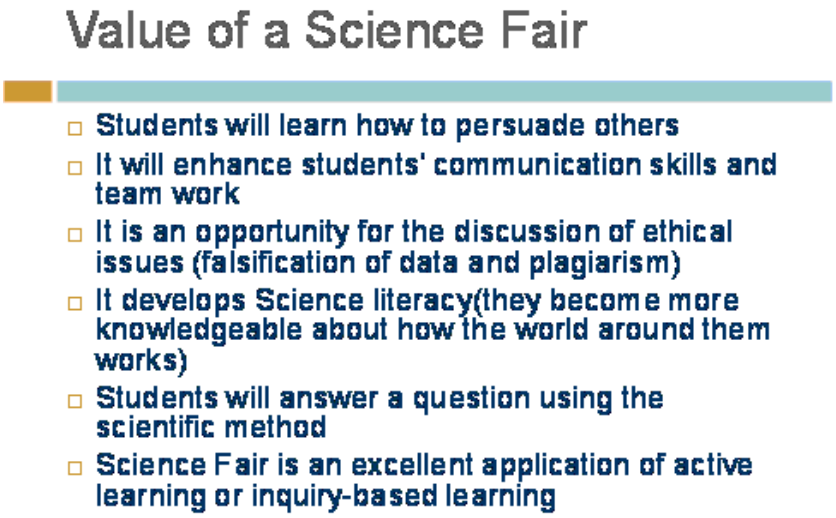


SLIDE 5

Science Fair Process

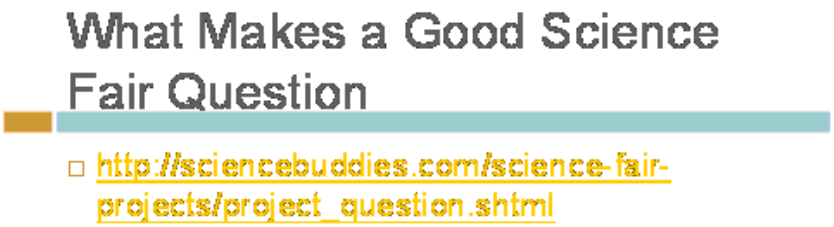
- Choose a scientific question to answer
- Research
- Formulate a Hypothesis
- Design an experiment
- Write a research report
- Perform the experiment
- Find results
- Draw conclusions
- Present results using a display board

SLIDE 6

Selecting a Good Science Fair Question

- How does water purity affect surface tension?
- When is the best time to plant soy beans?
- Which material is the best insulator?
- How does arch curvature affect load carrying strength?
- How do different foundations stand up to earthquakes?
- What sugars do yeast use?

SLIDE 7



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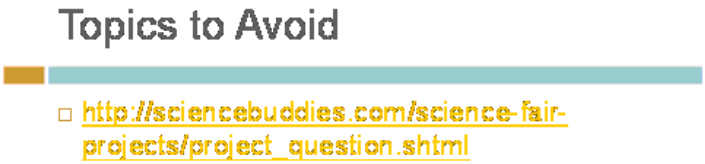
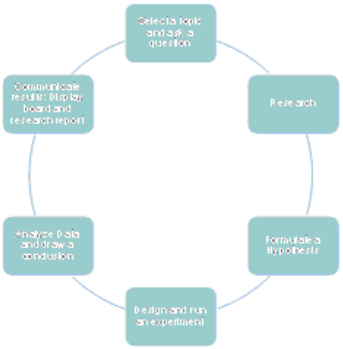


SLIDE 9

Student's Role: Applying the Scientific Method



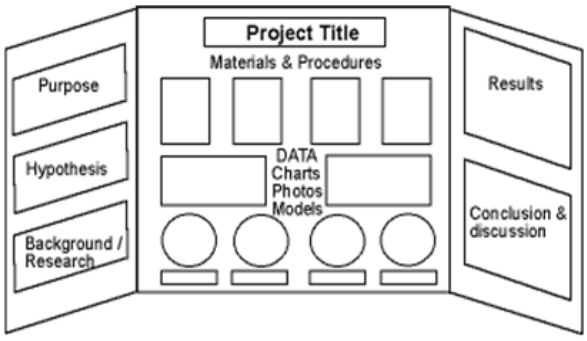
SLIDE 10

Parts of a Research Paper

- Title Page and Table of Contents ACS Guide
- Introduction
- Materials And Methods
- Results
- Discussion
- Conclusions
- Acknowledgement
- References

SLIDE 11

Display board



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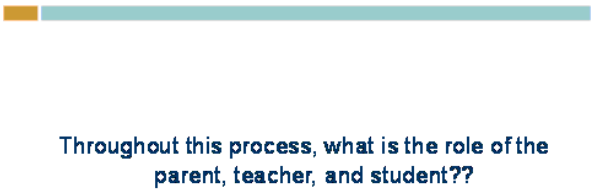

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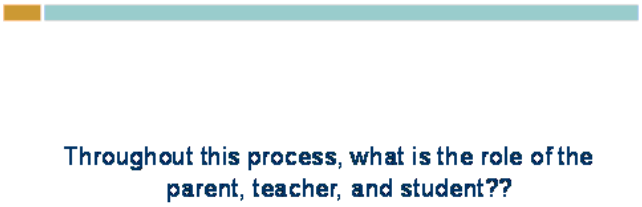

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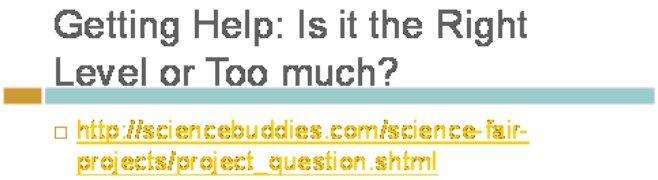


SLIDE 15

Teacher's Role: Facilitator

- Set Science Fair Expectations
- Give students a Science Fair Guide including a schedule and direct students and divide the work into small manageable tasks
- Provide students with topic selection websites and wizards
- Review and approve Science Fair Proposal Forms (consider safety and practicality)
- Direct Students to credible sources (tips for assessing source quality)
- Set a source requirement (offline and online sources)

SLIDE 16

Teacher's Role

- Remind students about plagiarism
- Discuss in length hypothesis and variables in class
- Do a review of material needed with students and their availability
- Discuss Data recording tools, tables, charts, ect..
- Set a requirement that each student do at least three runs of the experiment
- Remind students to use a data recording and reflection notebook while running the experiment
- Let Students know that a failed experiment is not a failure (it is part of the Scientific Method)

SLIDE 17

Role of Mentors

- Mentors are moderators
- Mentors are willing to take time to explain difficult concepts and answer questions
- Readily available to review experiment results
- Mentors should be knowledgeable about availability of materials in their labs
- http://www.youtube.com/watch?v=JuFsDN8dsJU

SLIDE 18

Student's Perspective

- VINNIE: Don't be afraid to ask your mentor questions. It is much better to ask your mentor a question about something that can be resolved easily, rather than spending a full day working on something that shouldn't really take that long. Also, by asking your mentor questions about theory, etc. you gain more knowledge, which you may be able to apply later in your project. For the project I worked on with a mentor, I was doing a lot of work with electronics. This included creating control circuits, and analyzing them with oscilloscopes and other hardware. Since I had never used this type of equipment in the past, I was really grateful that my mentor was patient and willing to explain the related concepts to me. By asking questions and having your mentor explain concepts, it will make you much more efficient in your research.

SLIDE 19

Integration Across Disciplines

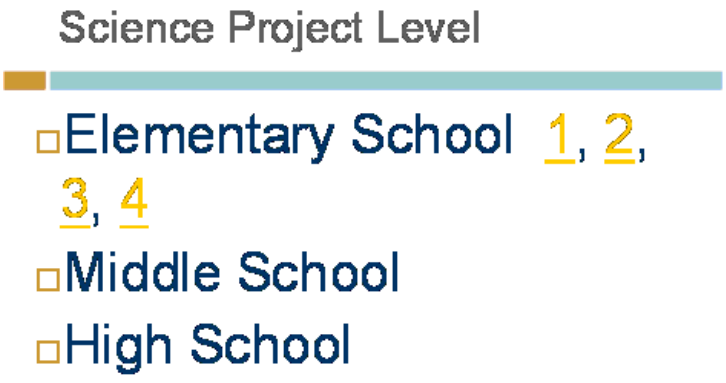
- Language arts
- Math
- Technology
- Arts

SLIDE 20

Integration of Technology

- Use of Various Software Magnets video
- Crowd sourcing
- Upload of results on the internet/youtube
- Online science fair competitions

SLIDE 21



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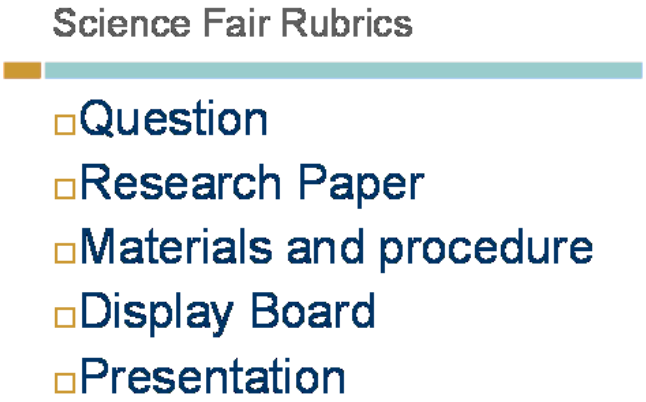


Mathematics & Science

Communication in Schools
Nibal Hamdan

This session emphasizes the importance of proper communication and collaborative work among school personnel and between schools and parents. It presents the channel as well as the barriers of the communication process and discusses its different forms (verbal and nonverbal). Participants will realize that body language (head, face, eyes, mouth, arms, hand, fingers, legs and posture) can tell a lot in school conferences (teacher-teacher, teacher-parent, and teacher-administration conferences). The session will also shed light on the proper verbal communication skills. Spoken words just constitute **7%** of the effective communication skills and the average person communicates through speech about 23 percent of the time and listens to communication about 53 percent of the time. Commandments for good listening will also be presented. Participants will also take communication and personality quizzes that help them to self-reflect and to know more about their communication style. The features of the four

communication styles (controller/director, promoter / socializer, supporter/relator, analyzer/thinker) will be discussed. Participants will also share their knowledge and experiences to respond to different problems that they may encounter in their conferences with school personnel and with parents.

The session is planned as follows: (a) The participants express what they expect to learn from the workshop. (b) A brief icebreaker that serves as a brief introduction of the purpose of the workshop and the importance of working as a team.(c) The participants will then be asked to reflect on different situations where they encountered difficulties with other students, teachers, administration or parents. Participants shall realize that the lack of proper communication is the major reason behind these difficulties. They will be introduced to the two forms of communication: verbal and nonverbal.(d) The participants will do several activities that will help them better understand how we can communicate through body language (head gestures-looks on faces-eye secrets-mouth signs-as well as the gestures done by hands, arms, finger, legs, feet and body posture. (e) Verbal communication also plays a major part in the work of teachers and administrators. Participants will then be asked to play a game that will help them better understand the proper methods of verbal communication.(f)Barriers to effective communication will be presented and participants will be do an activity that shows how the meaning of original messages might be lost and ,even worse, reversed when they go through many channels. (g) Participants will then do another activity that shows the importance of proper listening in communication channels. Commandments for good listening will then be presented. h) Participants will then be asked to do a communication style inventory that will help them learn more about their personalities. (j)A clip about teachers and administrators encountered in different problems with parents and with each other will then be played and participants will be asked to comment on the ways the actors reacted. They will in turn be asked to react to different problems that they may encounter by role playing.

Mnemonics: Strong Memory Tools
Marie-Therese Tutunji

The purpose of this development workshop is to give participants a brief introduction on the journey of memory in the brain, and introduce them to different mnemonic techniques such as substitution, pegging, chunking, mapping, chaining, rhyming, association and senses. The workshop consists of a power point presentation including videos and direct applications of different mnemonic techniques, and is planned as follows:

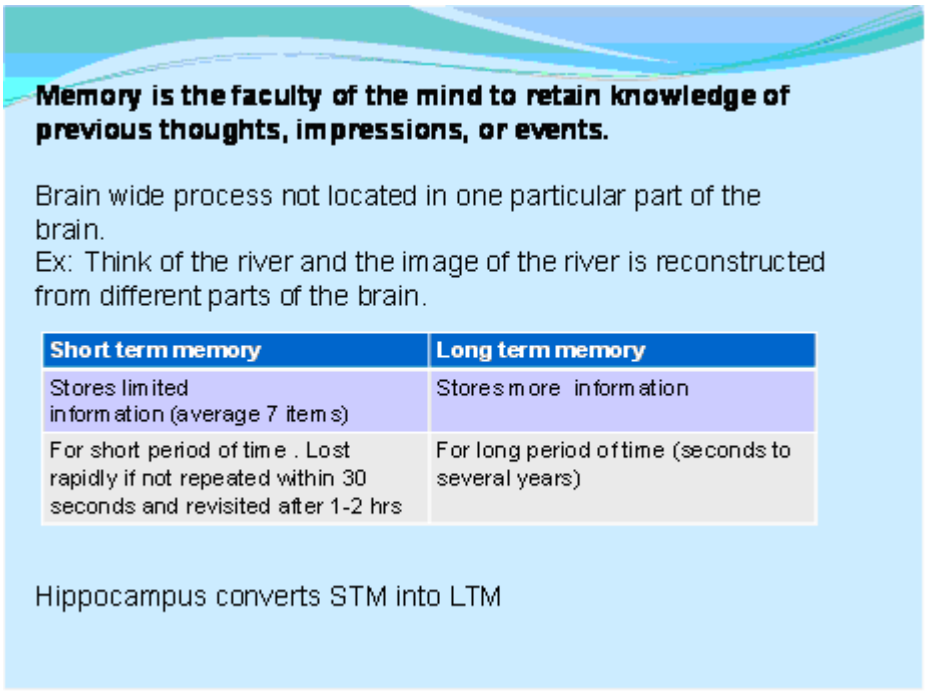
a. Brief introduction on the difference between short term and long term memory, the processes of encoding, storage and retrieval, and the parts of the brain involved (10 minutes)
b. Explanation of the different mnemonic techniques including examples (15 minutes), videos and hands on activities:
    1. Video about the number-rhyme pegging technique (7 minutes) followed by direct application where participants will use the number-shape pegging technique (15 minutes)

2. Video about the association technique (6 minutes) followed by direct application where participants will memorize the first 15 digits of the number π using association, chaining and senses (15 minutes)
3. Video about mind mapping technique (6 minutes) followed by direct application where participants will develop their own mind maps (30 minutes)

c. Sharing the mind maps by making a quilt of the different mind maps developed (10 minutes)

SLIDE 1

SLIDE 2



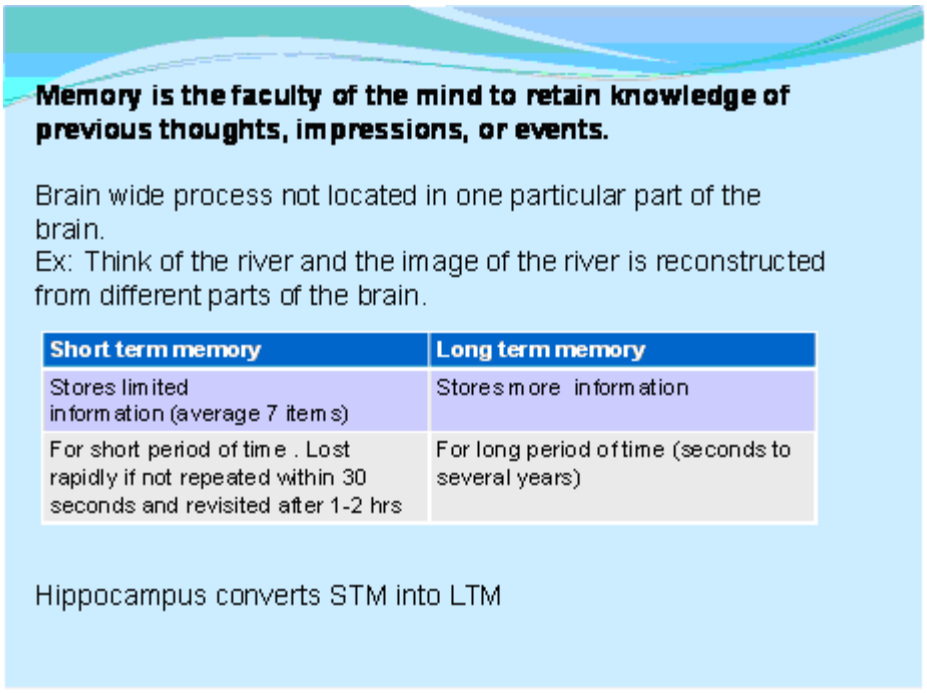
Memory is the faculty of the mind to retain knowledge of previous thoughts, impressions, or events.

Brain wide process not located in one particular part of the brain.
Ex: Think of the river and the image of the river is reconstructed from different parts of the brain.

Short term memory	Long term memory
Stores limited information (average 7 items)	Stores more information
For short period of time . Lost rapidly if not repeated within 30 seconds and revisited after 1-2 hrs	For long period of time (seconds to several years)

Hippocampus converts STM into LTM

SLIDE 3



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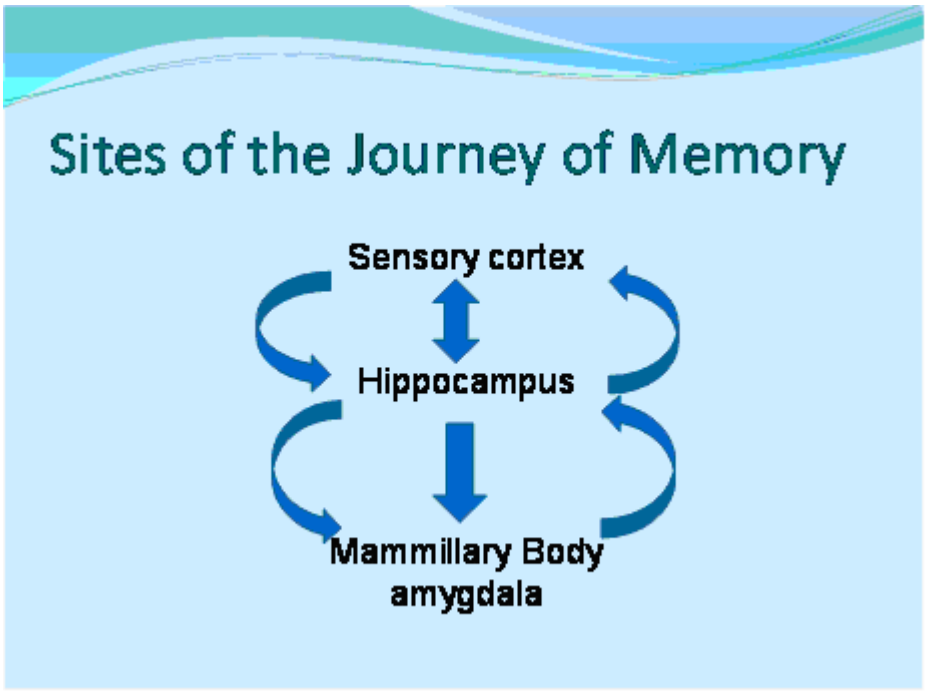
SLIDE 4



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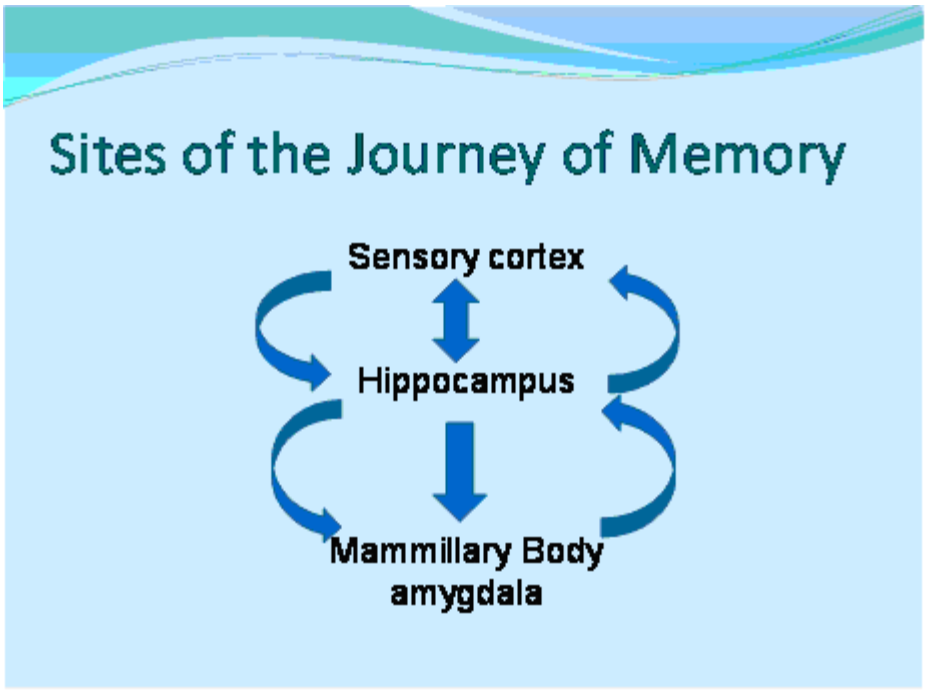


SLIDE 6

Storage

Holding information in your memory

Hippocampus facilitates associations among Different parts of the cortex and helps convert STM into LTM. Acts as a surge protector.

"Too much too fast, it won't last

- ✓ Nomadic Phase: Alert phase where the information goes back and forth between cortex and hippocampus. Could go on for years

- ✓ Stability phase: memory is stored and becomes independent of the hippocampus

SLIDE 7

Retrieval

Remembering information when needed

Retrieval pathway related to :

- Encoding pathway

The more ways information has been encoded, the more ways there are for retrieving it

- Storage pathway

knowing ***how*** it was stored and what was it connected to can help in retrieving

SLIDE 8

Techniques to improve Memory

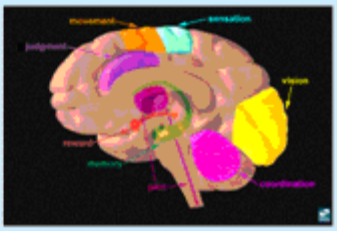
- **Exercise:** 20 minutes 2-3 times a week. Produces BDNF (brain derived neurotrophic factor) that boosts brain power by neurogenesis. Also produces norepinephrine, a memory fixative
- **Relaxation:** Stress increases the level of catecholamines that kill the cells of the hippocampus
- **Nutrition:** healthy nutrition including antioxidants
- **Rehearsing information:** Repeat to remember, and remember to repeat. Repeat after 30 seconds, and revisit after 1 to 2 hours
- **Playing memory games:** Reinforce neuronic circuits in the brain
- **Sleeping/ cat naps:** Organize information in the brain
- **Bed time recital:** Rehearse and organize information
- **Mnemonics:** memory tools

SLIDE 9

Mnemonics

'Mnemonic' is another word for memory tool. Mnemonics are techniques for remembering information

Our brains evolved to code and interpret complex stimuli such as images, colors, structures, sounds, smells, tastes, touch, positions, emotions and language



Using Our Whole Mind to Remember

Designing Mnemonics:

- **Imagination:** coding information by creating a vivid mental image
- **Association:** associating things together and to location

SLIDE 10

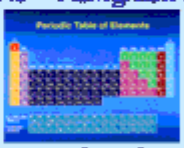
Substitution

- **Memorizing names and unfamiliar words by substituting them with familiar words that can be visualized in their place**

✓ Acronyms: Use the first letter of the major part of a compound term to create words.

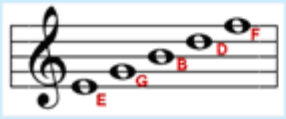
ROY G BIV

LiBeBCNOFNe NaMgAlSiPSClAr



✓ Acrostics: Use the first letter of the word to be remembered to create a sentence not just a word.

Every Good Boy Deserves a Fudge



Please Excuse My Dear Aunt Sally

SLIDE 11

Pegging

Method of thinking in pictures or "visual thinking".
It consists of developing a list of "peg words" and associating them with a list of items to be remembered
Ex: Number/ Rhyme method: 'pegging' the things to be remembered to images rhyming with the numbers 1-10
http://www.youtube.com/watch?v=zz4voNYevvI

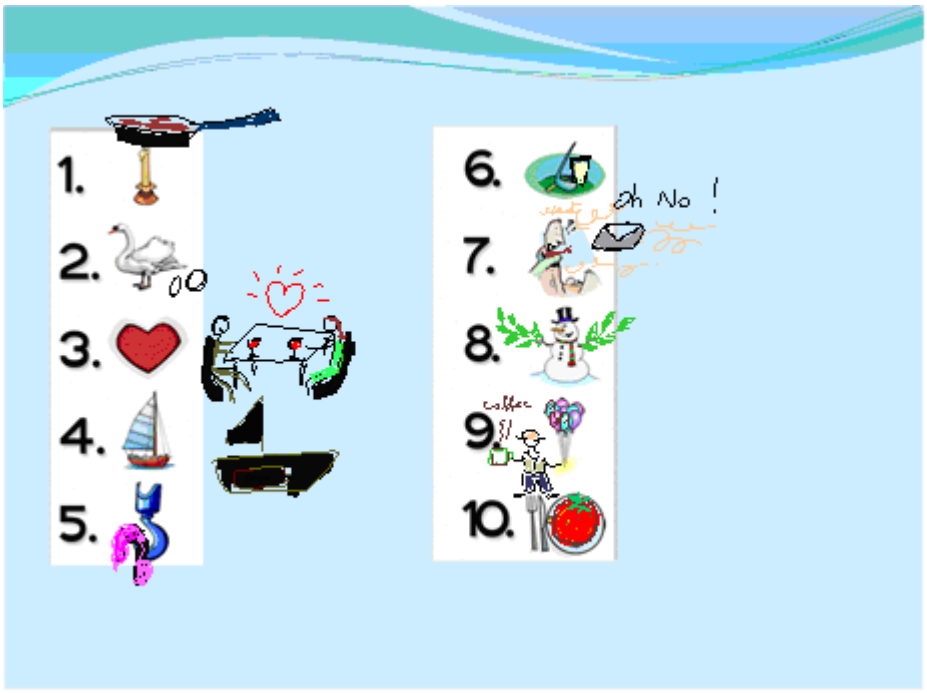
Number/shape method: numbers are represented by images shaped like the number and pegged to the things to be remembered

Try it yourself

Grocery list

bacon
egg
wine
batteries
chewing gum
milk
envelopes
spinach
coffee
tomato

SLIDE 12



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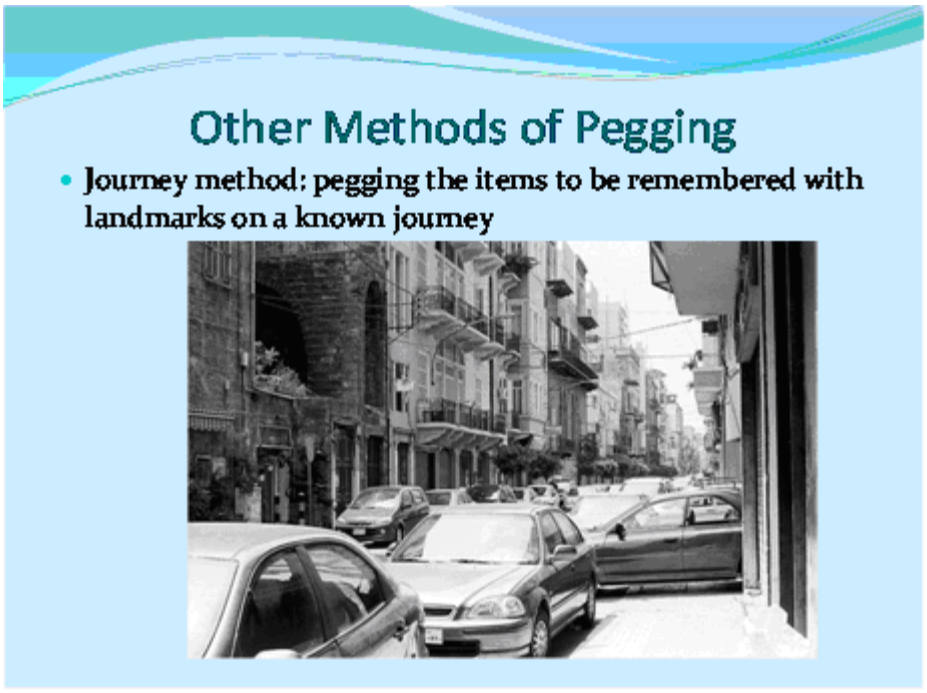

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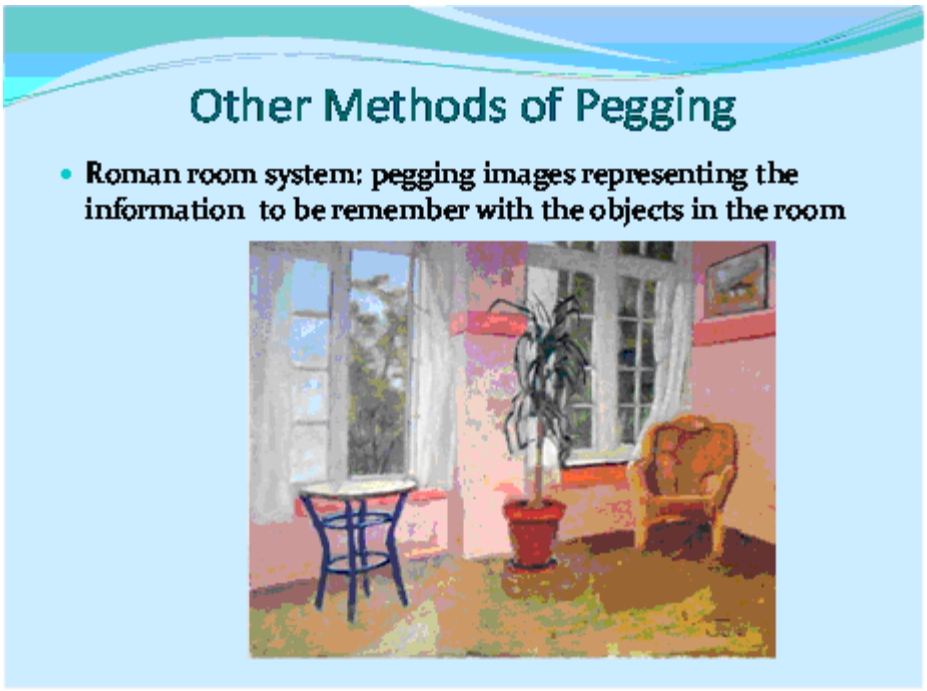

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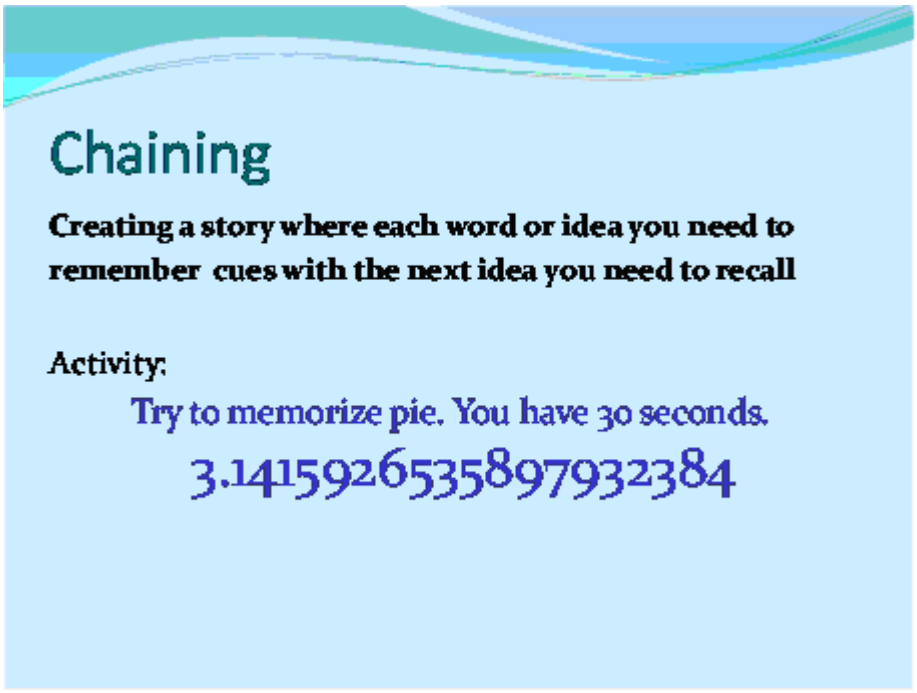

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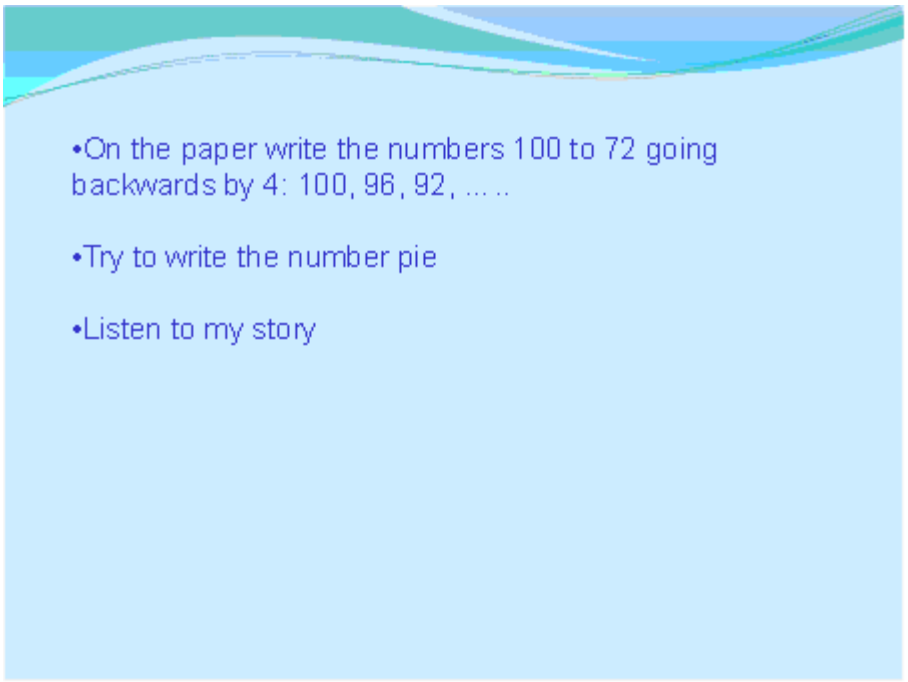

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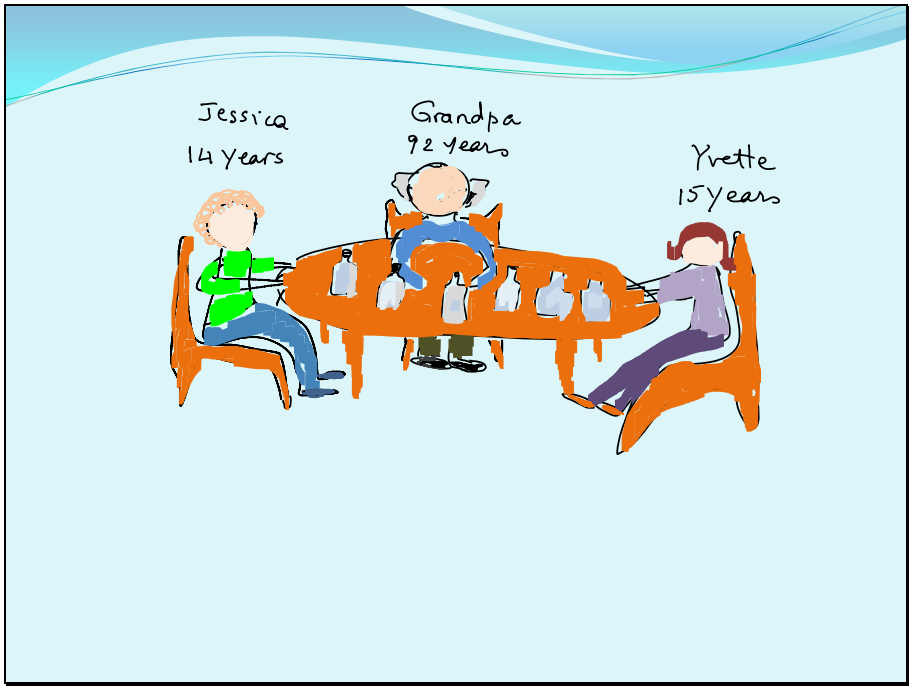

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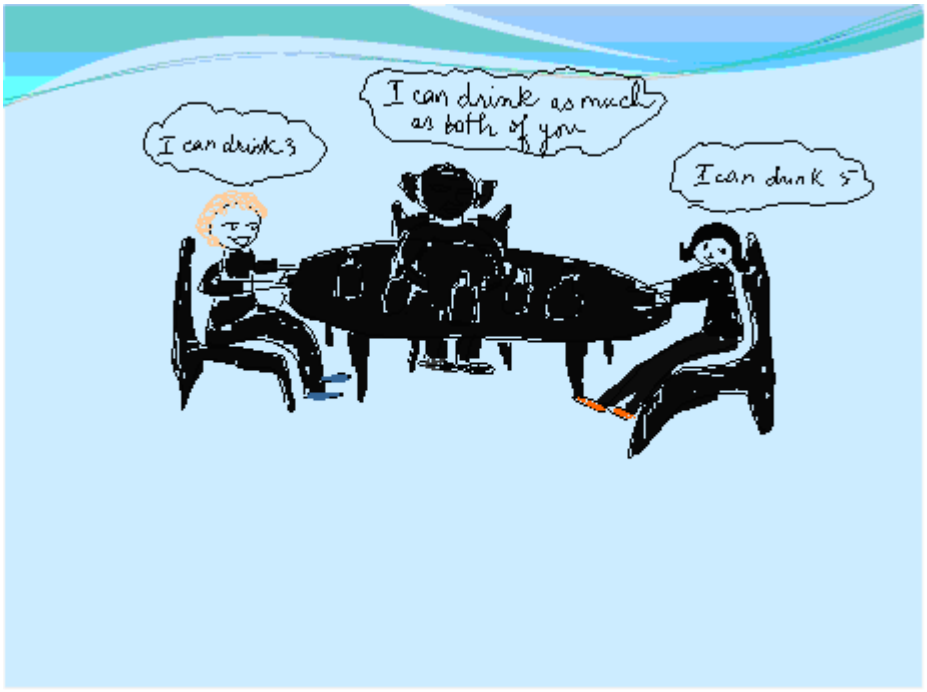

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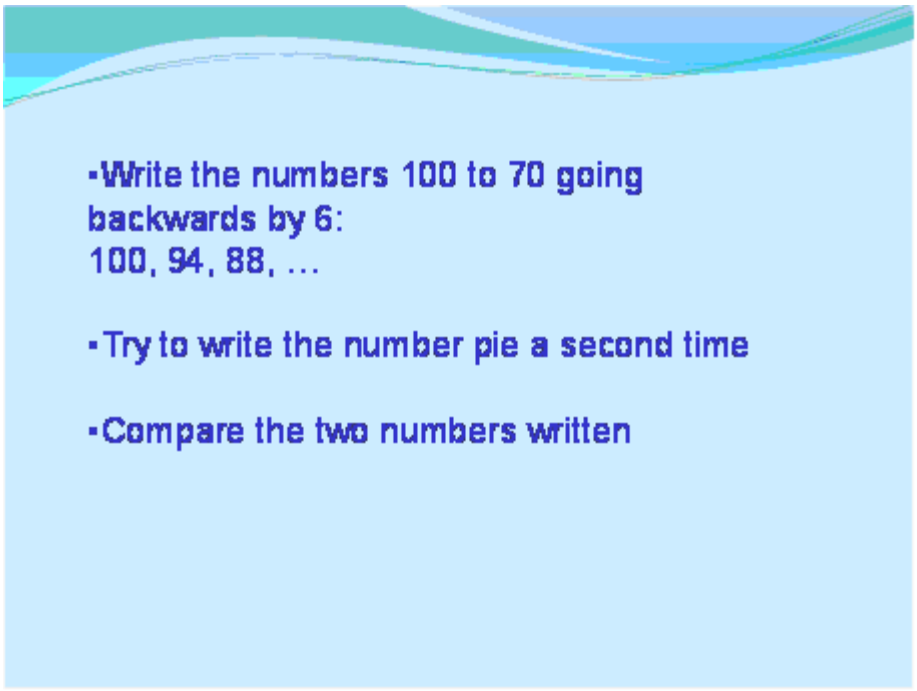
SLIDE 23



SLIDE 24

Mapping

Mind maps, concept maps, flow charts are all types of mapping.
A mind map is a diagram used to represent words, ideas, tasks, or other other items linked to and arranged around a central key word or Idea. http://www.youtube.com/watch?v=xJ6haf0vxpQ

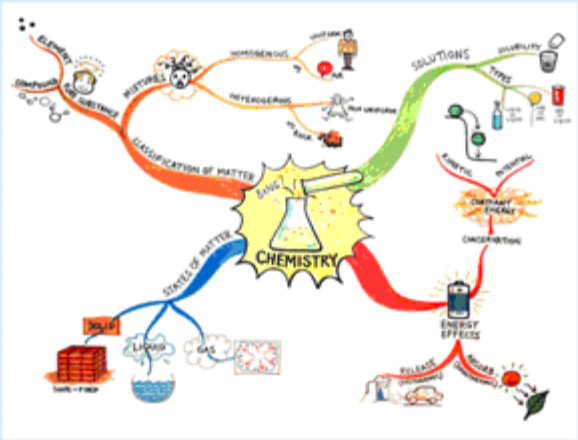
Steps:

- **Write the main subject in the center and circle it**
- **Draw lines from the circle and label them with headings**
- **Draw further lines representing further subheadings**
- **Link individual facts with proper subheading**
- **Link new information to the mind map**

Free sites: https://bubbl.us/, www.edrawsoft.com/freemind.php

SLIDE 25

Chemistry Mind Map



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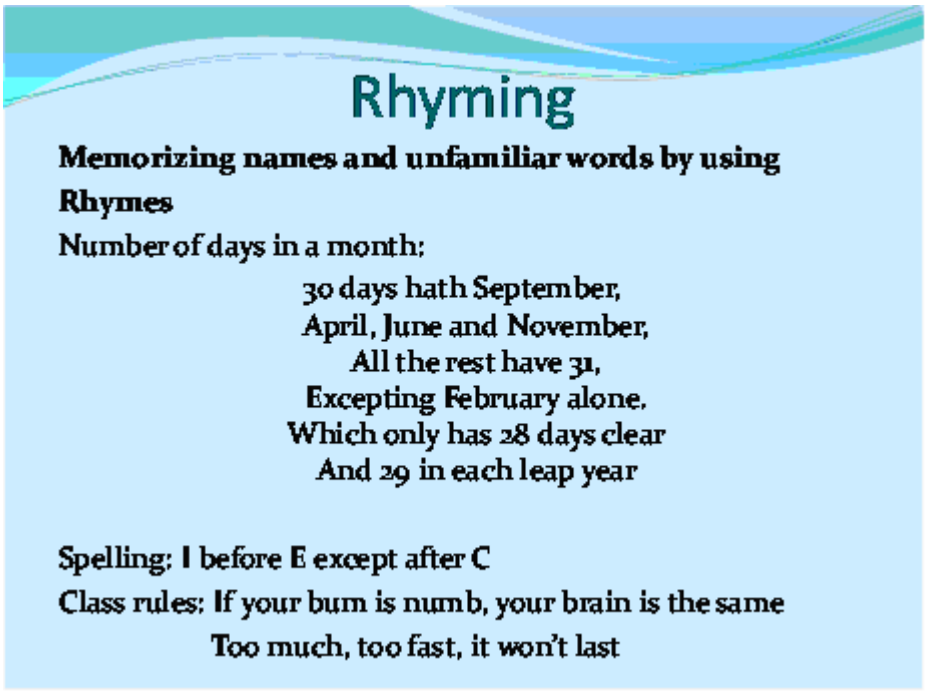

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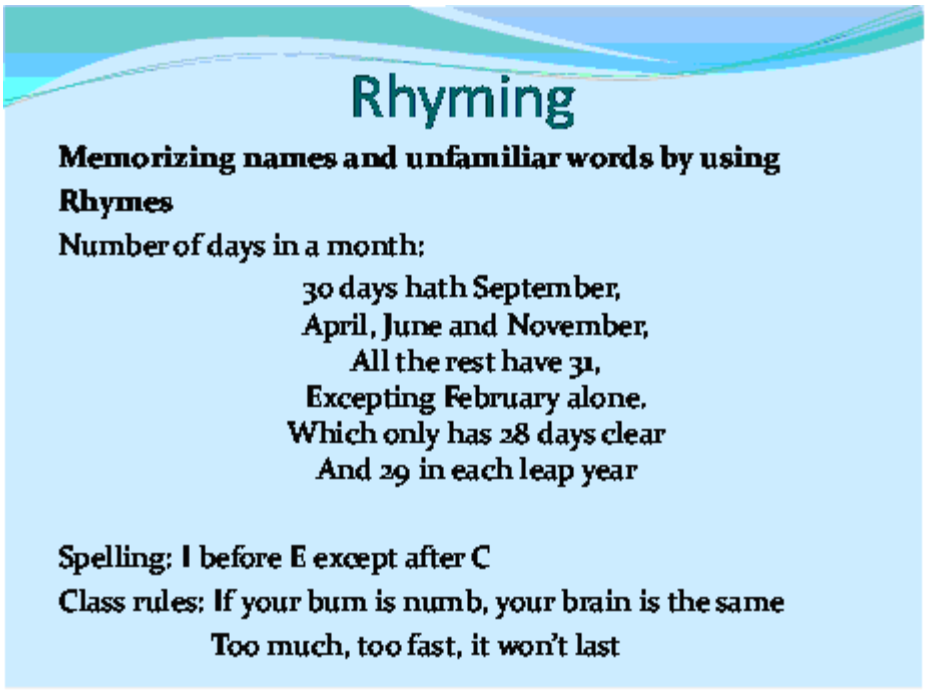

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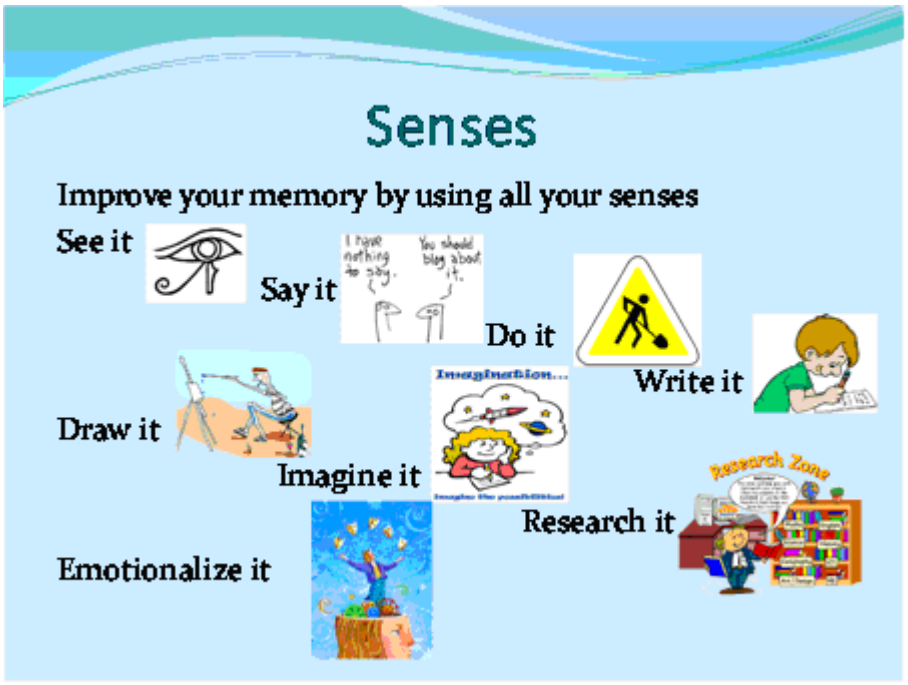

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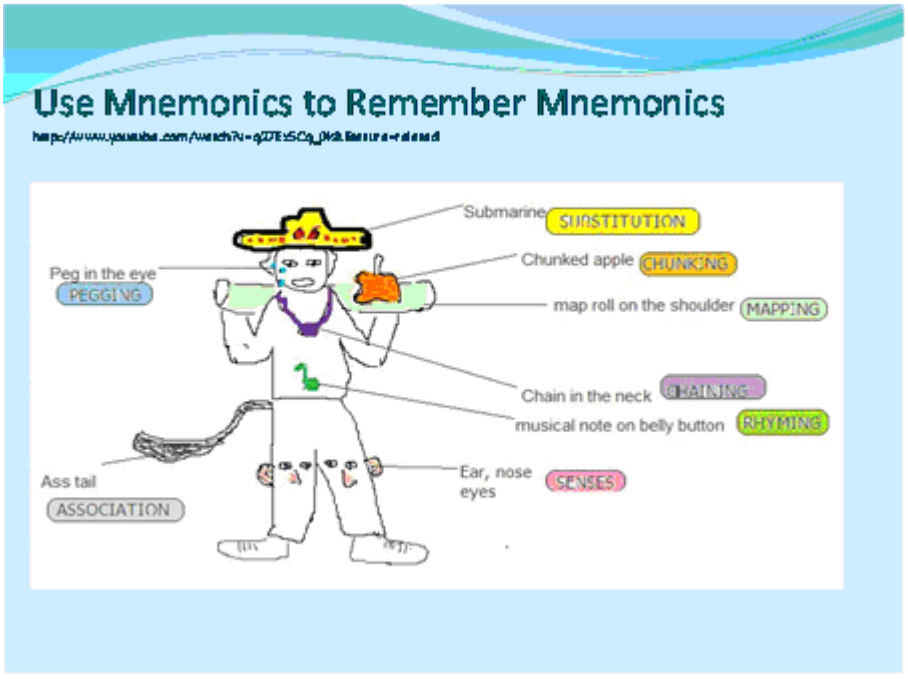

SLIDE 30

Today's Students, Tomorrow's Workforce
Enja Osman & Rana Shmaitilly

Synopsis

Have you ever thought of the changes that should occur in the science and math classrooms in this century? Have you thought of a new curriculum that inspire, motivate and encourage students to be future innovators? Innovations and inventions require multi-disciplinary approach where the theory and practices are grounded in topics that require the mingling of different disciplines. STEM Education is the solution!!! It is an interdisciplinary approach to learning where students apply science, technology, engineering and mathematics in real-world problems that make connection between school, community and work which might steer more students into scientific and technological careers. In this workshop, science and math teachers are invited to a friendly hands-on learning environment to discover how the STEM works. Participants will compete in constructing the fastest car. Provided with tools and materials, the teachers will apply science and math concepts in designing their own cars using an instructional manual and a visual program to run the car. Participants will then reflect on the effectiveness and limitations of implementing such programs and teaching strategies in their classrooms.

Procedure:

The session is planned as follows:

- Welcoming participants and introducing the purpose of this workshop. (5 min).
- Brain storming session where teachers identify major obstacles in teaching and suggest new strategies and approaches to enhance learning and increase students' motivation. (10 min).

- Viewing a film showing the Skills and Competencies of the 21st Century. (5 min)
- Introducing STEM Education, using a power point presentation, and identifying its different components. The rationales for implementing STEM Education will be discussed in light of the philosophical, psychological, pedagogical and pragmatic aspects on students' learning. (10 min)
- Introducing robotics, as an example of hands-on activity used in the STEM curriculum. (5 min)
- Dividing participants into groups and providing each group with a relevant kit and instructional manual to design a simple car. In this hands –on activity, teachers will design their cars by applying the concepts of speed, distance and time; the concept of perimeter of the circle upon following an instructional manual and a simple visual programming language to program their cars using laptops (45 min) .
- Groups will be challenged to increase the speed of their cars by changing the size of the wheels.(5 min)
- Groups will enter into a car race using the Science, the Engineering, the Mathematics and the Technology concepts and skills that were highlighted during the workshop. (5 min)
- Groups will discuss the concepts and skills used in designing their cars.(10 min)
- Groups will share their products and reflect on the usefulness of this teaching tool on students' learning. (10 min)
- Participants will view teaching in 21st century as a challenge which necessitates having motivated and enlightened educators who value this approach; teachers whom we call Renaissance teachers. (5 min)

Education for Sustainable Development (ESD)-Teacher Education Guidelines/Learning Modules in the Arab Region

Sulieman Sulieman & Ahmad Qabalan

As part of the ***UN Decade of Education for Sustainable Development (DESD, 2005-2014) ,*** UNESCO Regional Bureau-Beirut and the Hashemite University/College of Educational Sciences presented a development workshop on ESD-Teacher Education Guidelines/Learning Modules in five universities from Jordan, Lebanon, Oman, Palestine, and Syria. The project is funded by the Japanese Fund-In-Trust (ESD-JFIT). The ESD-Teacher Education guidelines/learning modules were used as a model of cooperation between educational institutions (universities and schools) in achieving the UN DESD goals: improving the quality of education and enhancing teachers' competencies in the knowledge and practices of ESD.

The program focused on teaching and learning strategies in relation to social, economic, and environmental dimensions of ESD. 24 science and math teachers/supervisors from Lebanon and other Arab countries participated in the workshop. The participants were divided into groups of 4 persons, to facilitate interactive ESD learning strategies and demonstration of the ESD Modules. The presented ESD-Teacher Education Modules in the workshop were:

1. Survival Needs (social dimension);
2. Water Problems in Jordan (environmental dimension); and
3. Energy Debate in Lebanon (economic dimension).

For each Module a set of teaching and learning strategies were discussed first among the group, then shared with other participants. Conclusions and recommendations on expanding the use of ESD Resource Kits in school curricula were elaborated by several participants in the workshop.

The Role of the Teacher in Inclusive Classrooms
Ghia Saifan & Nancy Abou Hamra

Abstract:

The placement of learners with Special Needs in a regular school environment does not simply mean that this school is an inclusive school. Inclusion must incorporate fundamental changes in the way a school community supports and addresses the individual needs of each child. As such, effective models of inclusive education are not only beneficial for learners with Special Needs, but they also create an environment in which every learner has the opportunity to grow in heterogeneous classes, where all children can learn better because they are together.

The role of the classroom teacher in an inclusive school is crucial. In fact, the presence of learners who need to learn in a different way will challenge him/her to diversify the educational experience of the children and will incite him/her to provide adaptations and accommodations of tools, techniques, and strategies to meet their unique needs.

Synopsis/introduction:

The session was interactive and the attendees had the chance to implement different techniques to cater for the needs of learners with special needs in their classes. In fact, through various activities, they were able to know more about inclusive education and the target population to whom the inclusion program is addressed to. Besides, they had a clear idea about the different learning profiles that should be taken into consideration by the teacher while planning a lesson.

In addition, they got the opportunity to learn more about adaptations and accommodations and to implement some examples in their classrooms.

At the end, the presentation showed the importance of the role of the teachers and proved that they can be effective with learners with Special Needs in inclusive classrooms.

Strategy:

The main strategy applied during this session was based on the active participation of the attendees in searching for the answers and on the experimentation techniques that were offered to the participants to guide them without giving them direct and absolute answers.

Description of session:

The activities performed in the session are the following:

- Activity-1:

Brain storming activity: questions were asked to the participants to deduce the target population in the inclusive schools.

The participants were involved but showed a lack of knowledge in the field of inclusion.

- Activity-2:

It is a story telling activity after which the participants had to recall it using their own way and then explain which strategy they used to remember the main ideas and events of the story. Through this activity, the members could identify their different learning styles.

They were very cooperative and involved.

- Activity-3:

This activity was a group work. Each group had to fill the activities that can be done for each learning style. The participants came out with very creative ideas.

- Activity-4:

Group work: tests adaptations and modification. After discussing the different types of adaptations, the groups had to modify different tests in various subjects and then explain the types of adaptations they implemented.

The attendees were motivated and they all agreed that this work was very new for them.

Conclusion:

The content of the session provided answers to most of the attendees who are generally, facing a lot of difficulties in dealing with learners with difficulties in their classrooms. Apparently, there was a real need on the ground to know more about this subject.

However, most of them have to attend basic sessions about inclusion and inclusive schools as they need to get supplementary information about the mode of work in inclusive classrooms before being able to work on adaptations and accommodations of tests and educational tools.

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Mathematics

Math New Literacies

Rola Hallak, Tharwat Baassiri, & Narmine Majzoub

Synopsis

Mathematics has changed over the last number of decades. Recently, as we crossed over into the new millennium, calls for new literacies in mathematics have once again emerged. Living in the twenty first century makes the change in our understanding of Math teaching and learning inevitable if we, as educators, aim at modeling a generation able to cope with the challenges of the age. Thus, the purpose of the workshop is to provide a number of new technological literacies, which help foster conceptual and meaningful understanding of Math. In addition, the workshop will be addressing different learning styles and intelligences through a bunch of interesting and challenging activities. As for the attendees, they will be taking the role of the educator at specific identified instances and the role of the young learner at others.

To break the ice, attendees will be moving in the room searching for people that match with the descriptions in the grid. In fact, descriptions will include Math concepts, so teachers may take advantage of the engagement to warm their students up with an interesting movement. Second, attendees will be watching a slide show on prezi about Digital Bloom's Taxonomy that has recently been modified to meet the needs of twenty-first century demands. After viewing the slide show, a brief oral discussion will be held answering the question: "How could Math teaching and learning change to teach in the life and for the life of the twenty-first century (conceptual, relevant, and engaging teaching and learning)?" Third, attendees will be introduced to the first literacy: Brain Hook. During that time, attendees will be asked to think about the skills that the new literacy teaches. After that, attendees' reflection will focus on the importance of teaching international mindedness, decision-making, reasoning, integrated Language and Math, etc… Fourth, attendees will do some mental math calculations under the title of being a human calculator. Then, attendees will read creative Math projects for elementary students. At last, each group of participant will present their findings. As a closure, the workshop will close with an exit pass on which each attendee will post a statement that reveals a change that they are thinking to apply in the near future in their Math class.

Activity 1: Warm up: Getting to Know You People Search!

Can you find someone in our classroom who fits each of the characteristics? Once you find someone, have h im or her sign the box they fit in. Try to get as many different signatures as possible!

I have been to a different country _____	Math is my favorite subject _____	I can estimate the area of the room we are in _____	I am an only child _____	I like to dance _____
I was born in December _____	I play basketball _____	I have a cylindrical-shaped item _____	I know what a smart board is _____	This is my first attendance at AUB Smec Fair _____
Pizza is my favorite food _____	I am wearing jeans _____	I wear glasses or contacts _____	My family has a dog or cat at home _____	I took a vacation this summer _____
I am good at integrating technology in my Math class _____	I was named after someone famous _____	My watch includes Roman numbers _____	I know the square root of 400 _____	I am professional chef when measuring ingredients _____
I know a great knock-knock joke _____	I have a class blog _____	I play a musical instrument _____	I have an internet access in my mobile _____	I have more than 10 letters in my first name _____

Timing: 15 min

Brain Nook is a virtual world in which students can practice their mathematics and English skills. Brain Nook provides students with a series of scenarios that they have to resolve by answering mathematics and language arts questions. The first scenario presented to me when I tried out Brain Nook required me to earn coins to buy materials for a vehicle that I would then use to explore one of the virtual worlds. I could earn coins by answering questions correctly. Brain Nook presents students with questions based on their skill levels, which is determined by a quick pre-assessment and adjusted as they progress through Brain Nook's virtual worlds.

Learn Your Tables is a neat little site for students to use to learn and develop multiplication skills. The site offers two basic games on two different levels. The most basic game is a simple drag and drop activity in which students match equations to their correct answers. The more "advanced" game has students enter the correct answer to a multiplication question. The easier of the two levels only contains problems from one multiplication table while the more difficult level contains problems from multiple multiplication tables.

Ten Marks, an online mathematics tutoring service, offers a free program for teachers. Ten Marks for educators is designed to be a supplement to classroom instruction, not a replacement for it.
Ten Marks provides educators with an online forum in which they can assign mathematics practice problems to students and track their students' progress. If a student gets stuck on a problem he or she can

open a tutorial to help him or her through the problem. Ten Marks provides teachers with the option to CC parents on the assignments sent to students. The online curriculum provided by Ten Marks can be aligned to the state standards a teacher chooses.

Yummy Math is a website designed for the purpose of sharing mathematics problems and scenarios based on things happening in the world today. For example, the activity for December 4th was based on Lebron James's return to Cleveland. Yummy Math lists activities chronologically as well as by mathematics subject area. Two mathematics teachers, Brian Marks and Leslie Lewis, developed Yummy Math and welcome suggestions from other mathematics teachers.

Web2.0calc is a free online scientific calculator. While it will not replace the TI-84 Plus, it can do what your average high school student needs it to do. The best part is, you don't have to use it on the Web2.0calc site because they offer three widgets that you can use to embed the calculator into your own blog or website.
Math Open Reference is a free online reference for geometry teachers and students. Math Open Reference features animated and interactive drawings to demonstrate geometry terms and concepts. The table of contents on Math Open Reference is divided into four basic categories; plane geometry, coordinate geometry, solid geometry, and function explorer tools. Click on any subject in the first three categories to find definitions, examples, and interactive drawings. In the function explorer category users can select linear functions, quadratic functions, or cubic functions to explore how changes in variables affect the graphed output.

When it comes to creative uses of Google tools, Tom Barrett is certainly a leader that we can all learn from. A great example of this can be found in Tom's Math Maps. Math Maps are Google Maps on which Tom and others have created placemarks which when clicked reveal mathematics questions for students to answer based on the maps. There are questions available for every elementary school grade level. The placemarks are color-coded to indicate the level of the questions. Blue = Kindergarten, Red = 1st grade, Green = 2nd grade, Light Blue = 3rd grade, Yellow = 4th grade, Purple = 5th grade. Visit Tom Barrett's Math Maps page to view the existing Math Maps and read about how to contribute to the existing Math Maps.

Math Live is a neat mathematics website developed by Learn Alberta. Math Live presents students with animated stories that teach mathematics lessons. In all there are twenty-three lessons for elementary school and middle school students. The lessons are divided into four categories; Number, Patterns and Relations, Shape and Space, Statistics and Probability. Each animated lesson is accompanied by a mathematics worksheet that students complete either while watching the lesson or after viewing the lesson. Each lesson is divided into sections and students can advance or rewind as needed.

Conceptual Math is a provider of interactive visual mathematics lessons. Conceptual Math's primary focus is on the development of tools to aid teachers in the instruction of lessons on fractions. Conceptual Math's offerings are a mix of free and premium (paid) tools. There are fifteen free interactive tools for

teachers and students. Each of the free tools has an introductory video and a sample lesson plan.

If you have seen Dan Meyer's TED Talk, Math Class Needs a Makeover, you already know that he's an awesome educator. If you have not seen his talk, go watch it now then come back to this post. This past summer Dan Meyer published his entire 38 week Algebra curriculum complete with slides, handouts, and just about everything you need in order to deliver the lessons. You can download each week individually or download the entire collection as one file. Dan Meyer also has his entire 38-week Geometry curriculum available for free. Again, you can download each week individually or download the entire collection as one file.

Plus Magazine is a free online publication dedicated to introducing readers to practical applications of mathematics. Plus Magazine strives to reach that goal through the publication of mathematics-related news articles, podcasts, and mathematics puzzles designed around "real-life" scenarios

Great math projects for elementary school students

Project 1

by ***Felicia Arnold***

Math is the best game in town! As adults we need to show our students that math is great fun, valuable, and essential to our leading successful lives. Without knowing how to compute and problem solve, we would all be broke and possibly out of a job!

The child in the elementary grades needs to see how math is a vital part of our lives. A perfect example for this would be to figure out if you have enough money to afford a pizza birthday party for ten guests. If each pizza provides 8 slices how many pies do you need for this party of ten if each person eats two slices? If each pie costs $8.75 how much will three pies cost? Add the cost of soda, 75 cents per guest, and two platters of garlic bread sticks at $2.75 each. If you pay for this meal with a fifty dollar bill will you receive change? Which bills and coins did you receive? If you did not have enough money, how much more money do you need to add to the $50?

Another wonderful game to play to learn about money is done with a closed box and coins. Ask your students to identify six coins from the box which would add up to the value of 97cents. After a while the children become so quick at figuring this out, they ask for sums involving dollar bills!

Understanding fractions can be confusing; therefore, if each child can work on their own egg carton and use various manipulatives they can improve their knowledge of fractions. Provide small items which can fit in each section of the carton. Ask them to put Cheerios in six sections, cashews in three, raisins in two, and a chocolate candy in one. They can record these amounts on paper showing the correct numerators and denominators. After figuring out how many treats are in half a carton, in one fourth of a carton, the tasty manipulatives can be gobbled up by the hungry workers!

To develop fine skills in coordinate geometry, provide a sheet of grid paper for each team of two players. One player is the "X" and the other is the "O". The students number each line on the horizontal and vertical axis from 1 to 12. The object is to get four Xs or four Os in a row. Each player lists their

coordinates on their score sheet. It is amazing to see the different strategies these children employ to win...especially when they play against the teacher!

Enjoy these games in the classroom, at home, or when your family is visiting relatives. The children love to challenge others and themselves as well. And, everyone is having a fun time playing with math projects!

Project 2

by Nik Fisher

Here is a question, if the word math can invoke fear and anxiety in a child's heart, then how are you ever supposed to inspire students to learn? Easy, you just cleverly hide mathematics in subjects that students enjoy more, such as art and games. There are lots of fun activities children can participate in that are introductory to high level mathematics. With a good foundation in the operations of addition, subtraction, multiplication, division, and an understanding of fractions, children can accomplish much more in math than they would think is possible even at an undergraduate level. If you don't believe me, you can try these activities out for yourself.

Fun With Fractals

The study of fractals is a very new and wide open field in mathematics. The term "fractal" was coined by Benoit Mandelbrot in the mid seventies and since then even a firm definition has been near impossible. Roughly speaking, a fractal is a geometric shape that is self similar; it contains infinite copies of itself. Fractals have proven themselves immensely useful in fields such as data compression, video game technology, and even medicine.

Children can play with fractals without realizing they are doing math. Have the student take a piece of paper and draw a straight line. Then have them break the line into even thirds. The first and final thirds will remain straight. The middle third will be broken into a half. Erase the middle line and replace it with two lines whose length is equal to the original middle line so that they form a triangle. After this is completed you will see a section that looks like this, __/__. Have the student continue doing this for every segment of the new shape, for the second iteration there will be four of them. Doing this should help the student feel more at ease with fractions. There are analytical projects you could do with this but it may be a little too challenging for young students. In case you wanted to try though, you could have the students measure the total length and the number of segments of every iteration. They could try to find patterns in these numbers.

Another fun fractal project is the forest fire fractal. Supply each student with a piece of graph paper and a random number generator. For the random number generator a four sided die, a spin wheel, or a calculator with such capabilities will be just fine. Randomly generate a number between 1-4, this number will indicate the number of squares with which the student will start. Have the student color in the number of squares wherever he or she wants. Then place a probability for each direction, for example, you may want to say north is , south is east is and west is . Don't worry; the numbers do not have to add to anything in particular, just so long as they are easily divisible by four. (Note: If you have a six sided die you can have n/6 as your probability for each direction, where n is any number less that 6 that you choose.) The student will then randomly generate a number for each square surrounding a

colored square. We said that north is , so if the student rolls a 1 or a 2, color the square, if not leave it blank. Continue until no more squares can be filled in.

This problem is called the forest fire fractal because it can be used to model the spread of a forest fire (or epidemic disease, as well as a number of other infectious events). The probability can represent factors such as wind speed and direction, air density if a fire were spreading up a mountain, and moisture in certain areas. The student does not have to know they are doing math, but really they are touching on areas of math that are still unexplored.

Games For Kids

Games are a great way for children to learn valuable information without feeling the need to learn. Game theory is another new and growing field in mathematics. If you have seen the move A Beautiful Mind, John Nash was one of the largest contributors of game theory. Game theory is used in virtually every social science on the planet, from economics to philosophy. The principles are essentially practical in all walks of life. One of the key concepts is the idea of a natural winner for any game, where if both players perform the best possible moves one will always win.

Tic-tac-toe is one of the easiest games in which to see this. As a matter of fact, I remember when I was very young my sister taught me that X (assuming X is always first) will always win. If X plays a perfect game it will never lose. There are many games in which a natural winner emerges.

Try this easy pencil and paper game. Draw a triangle of X's on a piece of paper with the bottom row of X's being equal to some number (four or five is usually enough). The students play one-on-one, taking turns crossing out any number of X's in a single row they please. The game continues until someone crosses out the last X. The loser is the student who does so. There are three points in a game that I have found with winning strategies. If one student can eliminate X's in such a way that there is a 2x2 square left, that student will win if he or she plays optimally. The same is true if a row of two and a row of three are left, as with three rows of one. After playing a few games let the students know these rules and see if they can form winning strategies from the start. Start with a triangle of 1-2-3 X's and add another row each time a winning strategy is discovered.

Graph Theory Disguised and Demystified

Graph theory can be one of the easiest fields of mathematics to teach children because it relies on visual learning so much. Take a piece of paper and using a pencil divide the paper up into as many parts as you would like. See if the students can color every section of the paper with some number of colors, without the same color sharing an edge. You can show them why they can or cannot with a graph. Each colored section will be represented with a vertex and each shared boarder will be represented with an edge. The minimum colors you need to color each section without consecutive colors is called the chromatic number. There are plenty of detailed lists about the properties of chromatic numbers all over the internet.

Overall, the idea is ensure that children will not be discouraged by mathematics. By the time many students reach high school or college they are so turned off from math by the tediousness of long division, lack of proper education, or the failure to realize math's elegance. Math is a very beautiful subject and some of the most beautiful art can be found in mathematical branches. Try searching the web for the Mandelbrot Set and admire its infinite complexity, as well as its striking similarity with the flora and fauna of the world. Entice your students to embrace math and hopefully they will not be so afraid of it later in life.

Project 3

by Laura Hageman

Learning math can be very hard for elementary school students and will need to be guided to learn in a fun way. I know I never enjoyed learning math and we were typically not given fun projects to learn by either. The students that learn the best are those that had teachers that offered fun ways of learning. The students never forget that and will always try to learn more keeping in mind the fun they had during these years.

Depending on the age of the students will depend on this math project. Kids love to play store. They can learn to add and subtract if they pretend they are purchasing groceries and a student pretends to be the cashier. A game that can be played is having a display of empty boxes or cans of various groceries and have a group of students select items that would add up to a certain amount such as $10 or $20. Then they would take their items to the cashier to see if they went over or under that amount. The student that is closest to the amount should be rewarded and if everyone gets it right then everyone should get a reward by receiving cupcakes the next day or something like it.

The next thing the students should be asked to do is go grocery shopping with their parents within the next week and write down all of the groceries their parents bought and the amount it came to. This will help them understand how much groceries can be and it will also enhance their adding skills.

The show the Price is Right is something that can be played in the classroom as well. For students to get a better grasp on adding and subtracting you can offer them ten items to choose from. They must choose five items that will add up to a specific amount. The student closest to the amount should receive a small prize or a star depending on what the teacher has set up for giving incentive to the students. Playing various Price is Right games in the classroom can help students learn math easier.

A game that can be played that can really be helpful to the students learning math is one that will be a group effort. First have them separate into four groups. Each group has one student from their group come up to the board to figure out a math problem that is given by the teacher. Then if the student gets it wrong another person from the group has to come up and help them until they get it right together. They only have so much time to figure it out and if they don't they lose against the others. The winners will get a prize to encourage them to keep learning.

Giving the students different fun ways of learning math will only encourage them to keep trying. It is vital that they learn math so that they can make it through everyday life. This cannot be explained to an elementary school student since they won't grasp what you are talking about. In todays world elementary schools students are more apt to what their parents can and cannot afford but times haven't changed much when it comes to learning math. Many students don't like the idea of math therefore, fun games or projects will only help them understand it better.

Project 4

by Olivia Kay

Math is a part of our everyday lives, whether we realize it or not. Counting change, balancing a checkbook, calculating the amount of materials we need for a household project, or how many miles it is

from one place to another, and countless other daily activities all involve the utilization of mathematical skills. Most of the time, math becomes so automatic that we don't even realize we are using it. However, we learned it somewhere, right?

Young children are taught math in school, but is that really the only place they can learn it? In one word, no. Children are eager learners from the beginning. It's up to their parents and others around them to facilitate that hunger for knowledge, something that really isn't as difficult of a task as it may appear to be.

In order to teach math to your child, all you really need to do is spend time with them and involve them in your everyday activities and be involved in theirs and find pay attention to opportunities that arise to teach math skills. It really is as simple as that. Here are some examples of situations that lend themselves to teaching math to children...

1. Whenever you are counting something in your daily activities, even if it isn't very many of one thing, involve your child and let them count for you. They will gain practice counting and will also feel helpful and feel like they have a purpose and are important in helping you complete tasks.

2. When you are in the kitchen cooking or baking, explain to your child how to measure ingredients and let them use the measuring cups. Your child will be introduced to and have the opportunity to practice using their measuring skills and will feel proud of themselves when they realize they were a part of the finished product.

3. When you are measuring anything to complete an indoor or outdoor household project with a ruler or tape measure, show your child how to use these items and let them do some of the measuring. This would also be a great time to teach children how to figure perimeter and area.

4. If your child plays a sport, or enjoys watching a sport, teaching them how to figure out things such as batting average, shooting percentage, made field goal percentage, etc. This will help children to relate an activity they really enjoy to math.

5. When you are looking at a map, show children how to use a map scale. Show them how to use this skill to figure out the distance between two places, then go on to show them how to use addition and subtraction to figure out which of several places are farther from where they live. Besides teaching math, you are also teaching geography, another useful skill.

6. Show children where to find the price of gas on gas station signs and explain to them how to figure out how much the gas cost by telling them how many gallons you put into the vehicle. This could also lead into you teaching your child how to figure out gas mileage.

7. Take time for your children to play computer games with them that involve math. Not only are you teaching your child how to use technology, you are also helping them to learn and/or reinforcing their math skills.

8. Have a garage sale or set up a lemonade stand or other temporary business and let your child help. Teach them about expenses and profit and let them figure out how much money they actually made. Kids will usually find this to be a very fun experience.

These eight ideas are only a start, there are many other simple ideas that provide your children with great opportunities to develop their math skills, without much extra effort at all.

Math is everywhere, and all it takes to teach it to children is the time and patience of the adults around them. Parents cannot expect schools and teachers to solely teach their children all of the math skills they need. A love or dislike for math develops at a very young age. Children have to enjoy math and find purpose for it to enjoy learning it and the people they are around have great influence in that. If children see their parents using math and are given opportunities to feel like they are helping their parents with everyday tasks by using their math skills, math is more likely to appeal to them and they'll be eager to learn more. It is almost certain that they will have a better understanding of and get more out of classroom math lessons and work hard to develop their knowledge in the years to come.

Project 5

by Rachelle de Bretagne

From the moment a child is born, they have one learning tool which is built in, i.e. curiosity. To harness this curiosity during elementary school ages, and to incorporate an understanding in math is vital since those children who fail to understand the basics of math invariably struggle later in their school years. Parents can devise great projects which involve children in an understanding of math, as well as schools themselves.

This article is written with ideas for parents and teachers to come up with original ideas which incorporate math as a natural learning skill, rather than an imposed one.

- *The younger child.
- *The growing child.
- *Home projects.
- *Internet fun projects.
- *Teaching projects for the classroom.
- The younger child.

A younger child is curious and enjoys learning things which give positive response. This can be harnessed in the home as an opportunity for the child to learn basic math skills which help them later in their education. The introduction of numbers is every bit as important as the introduction of colors and words.

Children at a young age can perform a lot more than we think by copying. They love to imitate and parents have great opportunity to share day to day activities with the child which involve math. Playing shop with the child is a great start, each taking turns being shopkeeper and customer, and using money to count out change. A child learns very fast and even if they only think of that money in terms of one coin or two coins, what you can do is label the items to be sold together and ask them what they consider to be the value of all the items on display.

This helps the young child to learn how different values mean different things and also gets them learning how different amounts of pennies mean different opportunity. Here, they can be given a set amount of money to spend in your make-believe shop and be challenged into how to get the most they can for the money they have.

The growing child.

Projects which are fun with children and which involve math are easy within the home environment, ranging from measuring the height of a child, to weighing them to see how much weight they have put in. Keeping records of these measurements, a child can be taught to work out the difference between the last time they were measured, and taught the basic skills of subtraction.

Fractions are an easy concept to grasp once you understand the basics. Making a cake together and then dividing it into different parts, fractions can be demonstrated very easily, and the child will understand better when they see one cake divided into four to make quarters than they will if they are presented with figures which fall outside of their scope of expertise.

Here, cut the cake into halves first, and write down how this is written. One first, and then the line and then the two. Explain that the one represents one portion of two, and teach them how this is written. Working through cutting the cake, the child can write down the fractions as they cut, counting the portions of cake and then marking these down on paper.

Home projects.
Give a child work to do and they may resist. Give them a family project which you do together and they may surprise you. Making a great organization board together to hang all your reminders helps them learn the skills of measurement.

Here take the measurement of cork tiles to establish what size board they should be stuck to. Let them decide and work with them to show how it all works. The edging of the board can be made by explaining not only measurement but angles as well, and once a child sees how angles work in practical experience, this makes them less of a mystery in the classroom.

Internet Fun Projects.
Mathforum.org a variety of tests for elementary school aged children which are a fun way for kids to learn math skills. Here they can approach different problems and work out ways of learning about Geometry, addition, fractals etc., in the comfort of their own homes. The exercises come in clear layout and a child can choose their difficulty level, trying past challenges as well as a day to day challenge, which takes very little time and can be shared with the parent, to gain a better understanding.

Funbrain.com has some amazing games. More fun for children on their own, the site has interactive games which help children decide mathematical values and is a great learning project for those kids with spare time on their hands and who are not particularly looking for a project which is book based. The nice thing about this is that it turns learning into fun, and offers many opportunities for a child to challenge their ability and to try for better scores at the same time as learning.

Teaching projects for the classroom.
In the younger stages of elementary school, nothing could be more dull than traditional lessons which depend upon math. Start projects which involve math and introduce it as a concept which leads to some kind of fulfillment and that is quite a different matter. The kind of projects which can be introduced are book covering, involving measurement, accuracy of cutting out skills, and use of drawing implements such as rulers. Group projects which involve taking down different statistics and making these into a colorful graphs work very well indeed.

For the less academic child, this can be something as simple as counting the number of birds or butterflies found on a nature walk, or the different species of flowers. The colorful nature of graphs may be the element the child enjoys, though what they are learning is a very important skill. This planning down of numbers to demonstrate some kind of pattern over a period of helps them to see what numbers mean and to put this into perspective.

Instantly in graph form, they can examine which presented itself the most, i.e. butterflies or birds, or even the number of flowers, and work out how many more flowers they saw, or how small the number of any one part of the items chosen is.

Even class comparisons can be charted and made into great fun, showing on a graph the number of children with different colored eyes or hair, and different features to see which numbers are the highest. Kids enjoy interaction very much indeed, especially if this relates to them. How many kids wear blue, green, brown, white, etc., can help kids determine the favorite colors within the classroom.

The introduction of math based projects during these years is fundamentally important to a child's understanding. These should include addition, subtraction, division and fractions, so that a child understands not only what these look like written down, but learn from using them to demonstrate how these matter to their world.

Once you enable a child to understand the significance of numbers, you open up possibilities for the child, and often the response that you obtain by carefully planning projects which involve group work and also individual goals, is astounding, if all the elements are well explained and expectations not beyond the scope of the child's understanding.

From bricks with numbers on them, to graphs and designs, a child needs to learn how numbers play a role in everything that we do. Once they learn for themselves, they come up with even more ideas which mean that, as a teacher, you have succeeded in gaining their interest. Let the children suggest projects they would like to do, and take heed, as the mind of a child is filled to brimming with unique opportunities that a teacher can use to foster even more understanding.

Project 6

by Sarah E. Pollard

Math seems to be in almost everything we do. As the mother of 3 children, my oldest being a junior in high school now, there have been more times than I can count that everyday life has lent itself to a math project. When my children were as young as preschool or kindergarten, they became obsessed with the telephone poles on the side of the road as we drove from our home to grandma's house. Naturally, I asked them to count them as they passed. We also counted decorated houses during the Christmas season and trees in a row in certain areas. These simple counting skills were easily adapted to watching for reflectors on the side of the highway, and then, to mile markers.

How many miles? In Michigan, the exits match up with the mile markers fairly closely, so, if you are getting on the highway at exit 41 (near where we live) and you plan to get off the highway at exit 23 to go to the beach, how many miles would you have to travel? As first graders, they were all able to do this simple two digit subtraction problem. As they grew, the trip planning, navigating, and timing all was turned over to the children. Of course, I always knew the answers before I gave them their assignments,

but they felt more like they were a part of the trip this way. In addition, they will be excellent navigators and travelers when they are older. My sixth grader is now practicing his math skills by figuring out how much gas will cost for each of our vehicles for a year, based on the number of gallons the tank will hold and how often we refill it.

How much flour do I need? Another mathematical project that my children have enjoyed is adjusting recipes. Quite often, a recipe is great for a family of 4 but it needs to be stretched a bit to feed the extra person. Sometimes, planning for leftovers, we'll simply double the recipe. I already know how to do this, so I'll hand the recipe card over to one of them and they will have the task of making the adjustments. As a result, I have a son who loves to bake, and another son who would rather ask, "What can I make for dinner?" than, "What's for dinner?". Last year, at Christmas time, we planned to give platters of home baked cookies to the teachers. We make several kinds of cookies and a sampling of those cookies is made into a decorative gift platter. The kids help decide how many kinds to make and whether the batches should be single or double (or even more) so that each teacher will have some, and we will have some left for us.

What would you park look like from the air? One project I ran across to help children understand scales and ratios is to create a park. Begin with a large piece of art paper or poster board. Decide on a size for your park and what you might want to include in it. Then, using ratios and proportions, create a bird's eye view of your park. Begin by determining a scale. For example, your park is going to be 300 meters by 200 meters. Metric measures convert more easily than standard. Convert this to a scale you can use on your poster board, most likely centimeters. 10m=1cm. Then, have your child(ren) use the Internet to find the average size of playground equipment they would want in the park, plan for an open field to play ball or run with your dog, and some trees for shade. Believe it or not, you can even find out how wide a tree will be when it is full grown by researching it on the Internet. Next, make some construction paper cutouts of each item to be added to your park, using the same scale. Treat them like puzzle pieces and move them around on your poster board until you have them the way you like. Then, glue them down. Color your background, write your legend, and voila! Instant imaginary park for all your wonderful imaginary play sessions. Who knows? You may be molding the next greatest a What's the tip? Whoever said going out to dinner was a vacation was not altogether accurate. When we go out to eat, we always guess the total of the bill. This is not always easy when you haven't paid much attention to what others are eating, but my children have become rather skilled at it. Once the closest guesser has been decided, it's time to figure the tip. This requires an understanding of percentages, first of all. But how many people do you know who can figure 15% of a $35 bill in one step? First, you take 10% of the total which would be $3.50. Then, you halve it to $1.75. Next, you add the 10% to the 5% to get $5.25. This would be a decent tip. Sometimes service isn't so go or it's more than outstanding. Tips should be figured accordingly. Not only are they learning to calculate percent, but they are also learning a life skill that will serve them the rest of their lives. Who can beat it?

Fraction pizza, anyone? Make a frozen pizza or two and have children help you cut it into equal pieces for the correct number of people eating it. If you have three people eating pizza that day, cut it into fractions that may be shared equally among three. If four, then multiples of four. Then, before eating the pizza, talk about how many slices you could "glue back together" to equal the next fraction up. For example, how many eighths you would need to make fourths.

How big do you think it is? Work together to guess how tall a tree is, using the properties of geometry and similar triangles. Plan a Lego house and decide how many "bricks" it'll take to build it. Changing the bedroom carpeting? Determine the area of the rug you will need to replace it. Plan a garden in the yard

and have your child determine the perimeter around which you'll need a fence. Then, have him/her help you install the new fence. Did it come out right?

The possibilities are endless. Never do for yourself what you could share with your children. How will they learn to love math if they never see it being used? How can they possibly internalize all that math information if they can't connect it to anything real? Whether in the classroom, at home, or as a home-schooler, children need to see how math works in real life. The best projects for math are those which bring the basic concepts to life. Calculate, convert, create, and cultivate learning. But always always always, use critical thinking skills to put the concepts into practice. This makes it permanent.

Project7

by Just Me Here

As a parent of a fifth grader, a kindergartner, and a soon to be preschooler, I can share several ways to incorporate mathematics into their lives. Man simple things you do can be a way for them to learn different mathematic skills that which can help them for the rest of their lives. I enjoy making it fun for my children to learn. It encourages them and it is just as much fun for them to learn as it is for me to teach.

One of my favorite things we do together is setting the table. This can get children of all ages together to help count out the cutlery, dishes, cups and napkins. My kindergartner loves doing this and we count out as she places the items on the table. Even my three year old gets involved and counts with us.

My fifth grader has excelled in mathematics and is way above average for his age. His teacher always raves about how great he is in math. He and I have always played a variety of math games as he grows up and he can add, subtract, and multiply so fast it amazes me. He has always loved math as well as I have.

Another great activity we play that incorporated math into our daily activities is when we go shopping at the grocery store. I will tell one my children we need to get six apples for instance. Then I allow them to count out the apples as they place them into the bag. We do this with varies items to help encourage them to count. The love helping me out and don't even realize they are learning at the same time. It’s a win win situation. My son also loves when we go to the grocery store and I give him an amount he has to work with. I tell him OK you get $20 to choose your snacks for the week. He knows he has to stay within his price range to choose his snacks and adds up the prices himself without the use of any calculators. He does this like nothing now, and we have started doing this with our five year old and she is doing pretty well.

So many people rely on electronics and computers to do everything for them and it is very sad to think about that. I want to teach my children how to do things for themselves rather than relying on computers and other electronics. A few other easy ways to start off your child counting and incorporating mathematics into their daily activities are the following.

- When cooking or baking have them measure out the amounts you need.
- Give them items in your home to count.
- Play counting games, even when driving tells them to count how many lights you pass or other games. There are so many different ways you can have then count.

- When gardening ask them to count how many flowers are blooming or count out the seeds you need to plant in your garden.
- Set out to see lady bugs or butterflies and have them count how many they see.
- Award them for counting to encourage them.

Mathematics can be very fun, and as you see your child excited about learning it is great. What greater pleasure can you experience then teaching your child? Children are so capable of learning so much from an early age. They are like sponges and can soak so much in!

Embeddable Technology Activities For All Classrooms Spring 10 Ncties Presentation Bivens - Presentation Transcript

1. **Where can I embed?**

Websites	Nings	Social networking sites
Blogs	Blackboard	Etc…
Wikis	Moodle	

2. **How do I embed?**

Find the embed code (usually HTML)
Highlight and select all of the code (Ctrl+A)
Copy (Ctrl+C)
Paste into the appropriate window (Ctrl+V)

3. **What (Free) web 2.0 tools are available?**

Animoto	Google Maps	Shared Copy	Voicethread
Blabberize	Picassa	Slideshare	Voiki
Glogs	Project Playlist	Sumopaint	Wordle
Go Animate	Scribd	Teacher Tube	Widgets!
Google Calendar	Screentoaster	Toondoo	
Google Docs	Scribblar	uMapper	

4. **What are they? How can I use them in MY class?**

Animoto – you/your students can create beautifully orchestrated, unique video pieces from photos, video clips, and music (sample)
Blabberize - create audiovisual masterpieces with talking photos using your /your students' voice/s (sample)
Glogs - you /your students can create a virtual poster full of text, images, music, and video (sample)
GoAnimate – you/your students can create computer animated cartoons (sample)
Google Calendar – keep yourself /your students organized by detailing homework, events, extra credit, etc. that's color coded (sample)

5. **What are they? How can I use them?**

Google Docs – create online assignments, quizzes, tests , spreadsheets, and presentations that house in one location! (sample)
Google Maps – create a variety of maps, virtual tours/field trips with notes and photos (sample)
Picasa – embed photoslideshows (sample)
Project Playlist - find and create a music playlist relevant to your subject/content (sample)
Scribd - upload PDF, Word, PowerPoint, and Excel files (sample)
Screentoaster – capture your onscreen action and add voice or music to create screencasts, tutorials, demos, tranining, lectures, and more (sample)

6. **What are they? How can I use them?**

Scribblar - create your own virtual classroom with multi-user whiteboard, live audio, image collaborations, text-chat, and more (sample)
Shared Copy – create website annotations with enabled collaboration (sample)
Slideshare – upload and share PowerPoint , Word, and PDF files with live audio (sample)
Sumopaint - draw, paint, scribble, write, and create masterpieces that can be saved as image files (sample)
Teacher Tube - upload videos and share with this unblocked youtube replacement (sample)
Toondoo – create a comic strip/book online (sample

1-Mental Math - Critical to Conceptual Understanding

By Shannon Dipple

http://ezinearticles.com/?Mental-Math---Critical-to-Conceptual-Understanding&id=3864702

Mental math is a critical component to a balanced math program. Sadly, many teachers are leaving this crucial piece out or are not using it to maximize student learning potential.

Most educators associate mental math with basic fact memorization and practice. This is not what it is. Mental mathematics is an outcome of being able to manipulate numbers by

finding patterns and using strategies to make a process easier and quicker. Therefore, teachers must teach strategies to aid mental math.

Importance of Mental Math

Knowing how to correctly manipulate numbers in our head reinforces number sense. Without a strong foundation in number sense, students will be at a disadvantage in all areas of mathematics. Number sense incorporates the themes of place value, measurement, estimation, and the ability to understand how numbers work. When this foundation is in place, all math processes become much more simple and then the "speed factor" of mental math begins to make sense.

Also, when we teach our students how to do math in their heads, we are reinforcing concepts of patterns, which is how our brains learn best. This is turn will lead to connections between numbers, which will then lead to easier memorization of math facts.

We want our students to be "nimble with numbers."

So how should you teach it?

How To Teach Mental Math

Teaching mental math is more than simply stringing together a random group of numbers and asking students to come up with the correct answer. It is also more than simple fact memorization.

To correctly teach these processes, teachers need to focus on teaching conceptual understanding of mathematical processes. Just because we use the word "mental" does not mean this is going to be quick. The speed comes later as a by-product of being able to do "math in your head."

There should be about five minutes of practice every day, but mental math can also be done anywhere, anytime.

Look for ways to incorporate mental Base Ten strategies into your daily math routine: skip counting backwards and forwards by 2s, 5s, and 10s, subtracting the same number multiple times, making a 10 for addition facts (13 + 9 can be thought of as (9 + 1) + 12 = 22. You can also teach the use of doubles plus one or more, such as 7 + 6 = 6 + 6 + 1.

These lessons can be brought forward into higher math skills. For example, 238 + 644. Make both numbers a multiple of 10. Round the numbers to multiples of 10, which makes them easy to work with, such as 240 + 650. (Note: You are not teaching rounding here - you are teaching a mental math strategy!) Add them together for a sum of 890. Then compute what you added: 2 + 6, subtract that from 890, and you are left with the answer: 882.

While this may seem long to you, many students grasp this way of doing maths very quickly in their heads. However, this is not possible without that strong conceptual foundation of what number sense is.

Remember as well that it is the frequency of practice that strengthens retention, not the length of the practice session. Brief daily practicing of skills lead to success. Teaching students to use a variety of strategies is pointless if teachers do not provide enough opportunity for students to practice with integrity, repetition and experience success.

What About Timed Tests?

There is nothing inherently wrong with timed tests if your students feel confident in working with numbers. If this is the case, timed tests serve their purpose which is to increase the speed with which we perform mental calculations.

If your students cannot quickly solve their facts, then they are missing a conceptual piece and no amount of timed tests is going to change that. Teachers must intervene and teach different strategies, get out the manipulatives, and talk to their students about their mathematical thinking and reasoning. There is no point to doing timed tests at this stage, other than to reinforce to some children that they hate math and cannot ever be good enough to pass a timed test. That is exactly what we do not want to happen.

Try to incorporate daily mental math. When done correctly, the growth in number sense and understanding of how numbers work is phenomenal.

http://www.primary-education-oasis.com

Article Source: http://EzineArticles.com/?expert=Shannon_Dipple

2-K-4 Mathematics Teacher Information: Mental Math Strategies

http://www.plpsd.mb.ca/division/Rubrics/Mental%20Math%20Strategies.pdf

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Mental Math Strategies

Thinking Strategies for Addition

Counting On: Students start with a number and count on 1, 2, 3. For example, if the question
is 5 + 2, students count 5, 6, 7. Note: This strategy is only useful for adding 1, 2, or 3.

Using Doubles: The first fact combinations students often learn are doubles. Examples:
2 + 2 =
3 + 3 =

8 + 8 =
Making Ten: Students make combinations that equal 10. Then they extend to make combinations that are multiples of 10. Examples: 6 + 4 = 10 extends to 76 + 4 = 80. This can then be extended to 10 + 4 = 14 or 50 + 8 = 58.

Thinking Strategies for Subtraction

Counting Back: Students start with a number and count backwards. If the question is 5 – 2,
students count 5, 4, 3. Note: This strategy is only useful for subtracting 1, 2, or 3.

Counting Up: Students start with a number being subtracted and count up to the number from which it is being subtracted. For example, for the question 9 – 7, students can count 8, 9.

Using Part, Part, Whole:
Given: Part + Part = Whole
Therefore: Whole – Part = Part
Examples:
a. Thinking Addition:
15 – 8 = ?
Whole – Part = Part (?)
Students think 8 + 7 = 15 (Part + Part = Whole)
Therefore: 15 – 8 = 7
b. Partitioning:
9 – 7 = ?
Numbers include 9, 7, 2.
Students make all possible combinations for Part + Part = Whole
7 + 2 = 9
2 + 7 = 9
so 9 - 2 = 7 or 9 - 7 = 2

K-4 Mathematics Teacher Information: Mental Math Strategies
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c. Missing Part:
8 + ? = 11
Students use part, part, whole to answer such questions.
When students have an easier time adding than subtracting the following strategies can be helpful.

Make Ten and Then Some:
Given a subtraction question such as 14 – 8 = ?, students start with the part (8), add-on to make 10 (i.e., 8 + 2), then add-on from 10 to make 14 (10 + 4).
Then the students add the numbers they added-on to make 14 (4 + 2 = 6).

Using Doubles: For the question 13 – 6 = ?, students think addition using doubles. For example, 6 + 6 = 12, then add-on 1 to make 13, so 6 + 1 = 7.

Thinking in Patterns

Skip Counting: Starting at any number, students skip count by 10s, 2s, 3s, 5s. For example,
ask students to skip count by 10s starting at 46.

100 Chart: Make sure a 100 chart is visible in your classroom and that students have access to desk-size charts. Refer to the chart and practise counting skills or the

chart regularly.
Arrow Moves: Indicate moves on the 100 chart by using arrows. For example, 23 + 11 = ?,
would be indicated with one space across from 23 to 24 and then from 24 ten spaces down to 34. Note the pattern for all additions of +11 on the chart.
Extend to the addition or subtraction of other numbers.
Chaining Operations:
Example: 8 + 2 + 4 + 6 – 3 = ? (Note: choose combinations that end in multiples of 10 to encourage students' visualization of the 10 frame.)

Strategies for Adding and Subtracting Large Numbers:

Multiples of Ten: For addition: 30 + 50 = , 56 + 10 = , 56 + 30 =
For subtraction: 50 – 30 = , 56 – 10 = , 56 – 30 =
Expanding the Second Addend or Subtrahend:
For addition: 28 + 17 = , 28 + 10 + 7 =
For subtraction: 28 – 17 = , 28 – 10 – 7 =
Front-end Adding: Example: 65 + 26 = ? Ask students to think 60 + 20 = 80 and 5 + 6 = 11, so
80 + 11 = 91.

K-4 Mathematics Teacher Information: Mental Math Strategies

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Compensation for 8 and 9:
Examples: 67 – 19 = 67 – 20 + 1 43 + 29 = 43 + 30 – 1
67 – 18 = 67 – 20 + 2 43 + 28 = 43 + 30 – 2
Compatible Numbers:
Students bring together numbers that add up to 10 or multiples of 10.
Example:
8 + 5 + 12 + 7 + 5 + 3 + 4 = ?
Think 8 + 12 = 20, 5 + 5 = 10, 7 + 3 = 10
Therefore, 20 + 10 + 10 + 4 = 44
Multiples of 25: Students count by 25s and relate to money.
Common Zeros: For addition and subtraction operations, students remove the 0s, complete the
operation, and then tack the 0 back on.
Example:
120 – 70 = ?
Think 12 – 7 = 5
Add the *common* zero, so the answer is 50.

Strategies for Multiplying

Trailing Zeros: For multiplication, students remove the trailing 0s, multiply, and tack on *all*
the removed zeros.
Examples:
a. 5 x 60 = ?
Think 5 x 6 = 30
Tack on the removed 0, so the answer is 300
b. 20 x 30 = ?
Think 2 x 3 = 6

Then tack on all the removed 0s, so the answer is 600

3-Mental Math

http://s22318.tsbvi.edu/mathproject/ch5-sec5.asp

The ability to calculate mentally with efficiency is a very important skill for all students, but especially for visually impaired and blind students. Using the braillewriter, and the abacus can be very labor intensive and time consuming, and calculators have their own limitations (see the discussion on calculators). The more efficiently students can estimate, calculate, and check the reasonableness of answers using mental math techniques, the more facile they will be at using numbers, in both schoolwork and independent living skills. These strategies should be taught to students as soon as they begin to count and work with simple numbers.

In order to manipulate numbers and calculate mentally, students must understand the concept of "complements" or "partners" of numbers. For example, in addition and subtraction, the student needs to know that the number 5 is made up of addends of 2 and 3, or 1 and 4 (complements, partners). Likewise, the number 12 is made up of 3 and 9, or 6 and 6, or 10 and 2. In multiplication and division, the student must know that the number 24 is made up of factors of 2 and 12, or 6 and 4, or 8 and 3.

Teaching approaches

While there are many individual techniques for estimating and calculating mentally, most strategies involve one of the following four basic approaches:

a. decomposing numbers — breaking apart numbers into meaningful and useful units or groups that can be easily recomposed
b. making easier numbers to work with — putting numbers together that are easier to use, often by changing the order of numbers
c. substituting numbers — replacing values with equal values that are easier to manipulate
d. compensating — rearranging numbers so they are easier to work with, either by changing a number and then adjusting the answer, or by adjusting both numbers so there is no need to change the answers

Strategies for developing mental math skills

Following are several examples of strategies which may help students develop skills in counting and using the basic operations.

Addition

- Using the idea of complements, the student can adjust numbers to make adding a lot easier.
- Students can handle larger, more complicated numbers by starting their addition by adding the largest place values first, then next largest, etc.
- Students could also simplify their addition by adding the tens or hundreds together first, and then adding the units. (The student could write down subtotals of 120,15,135 as needed as he or she calculated mentally.)
- Students who have difficulty remembering many of the facts, can use the additive principle, doubles (2+2, 3+3) or facts or "partners" for numbers up to 10 (7+3, 6+4), and derive other facts from these (4+3=1 less than 4+4).
- For the addition of nines, the student can keep in mind that the one's digit in the sum is always one less than the number added to the nine.

Subtraction

- The ability to understand the concept of partners or complements comes in handy in mental subtraction, as with other operations.
    1. Start by practicing subtracting partners from numbers up to 10.
    2. Continue the process by subtracting partners from numbers 20, 30, 40, etc.
    3. Continue practicing subtracting two digit numbers from 100, and then numbers larger than 100.
- Another approach involves subtracting numbers from smaller units which are closer to the actual subtrahend, and then adding the remaining portion. Always start by subtracting digits from the same number of digits immediately above it, then deal with the remaining amounts.
- When subtracting a number from a number that is a power of 10, use the complements that make up the numbers 9 and 10.
- Students can also "balance" numbers by adding the "same difference" to both to make them easier to work with.
- "Balancing" can also be done with decimals.

Multiplication

- Students can learn to think in patterns or arrays by using a "thinking model" with naturally occurring arrangements like those occurring in egg cartons, pop bottle cases, buttons on cards, cookies or candies packaged in rows, etc; then children can develop their own arrays. This approach can also be used with auditory cues; for example, how many times do you hear 2 taps, 3 rings, etc.?

- Emphasize the associative properties of the factors in multiplication. For example, remind the student that 3 fours is the same as 4 threes, 2 sixes is the same as 6 twos (rotate an egg carton 90 degrees to illustrate).
- Multiplication is repeated addition—if the child knows that 2 fours is 8, then 3 fours is 8 plus another 4, or 12.
- Use the concept of doubles—if the child knows that 2 sixes are twelve, then 4 sixes is twice as much, or 24.
- When multiplying by multiples of 10, students can just remember to add zeros

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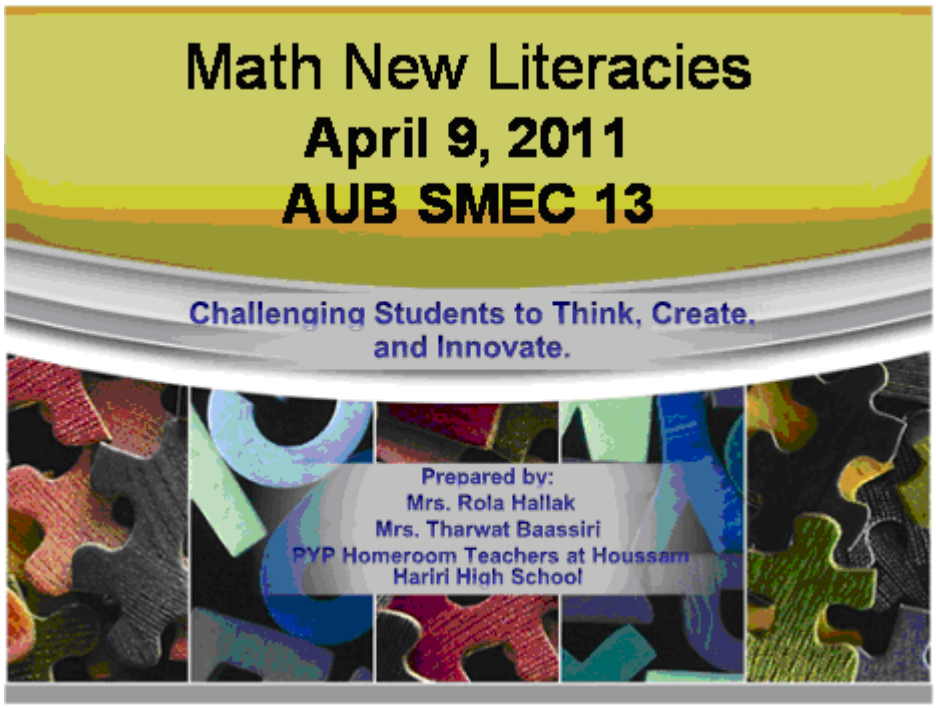

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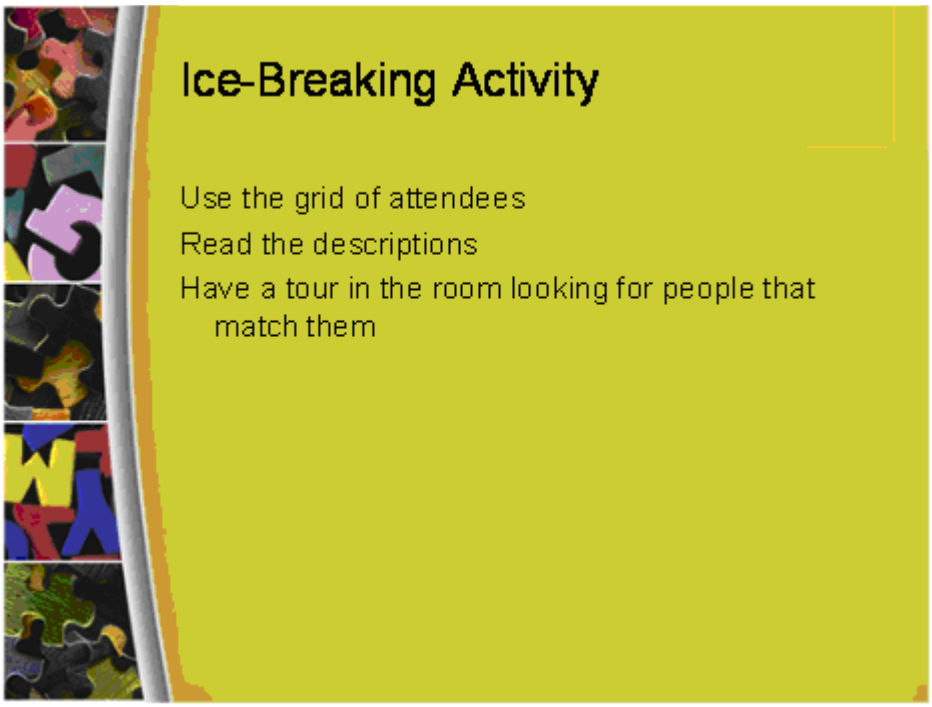

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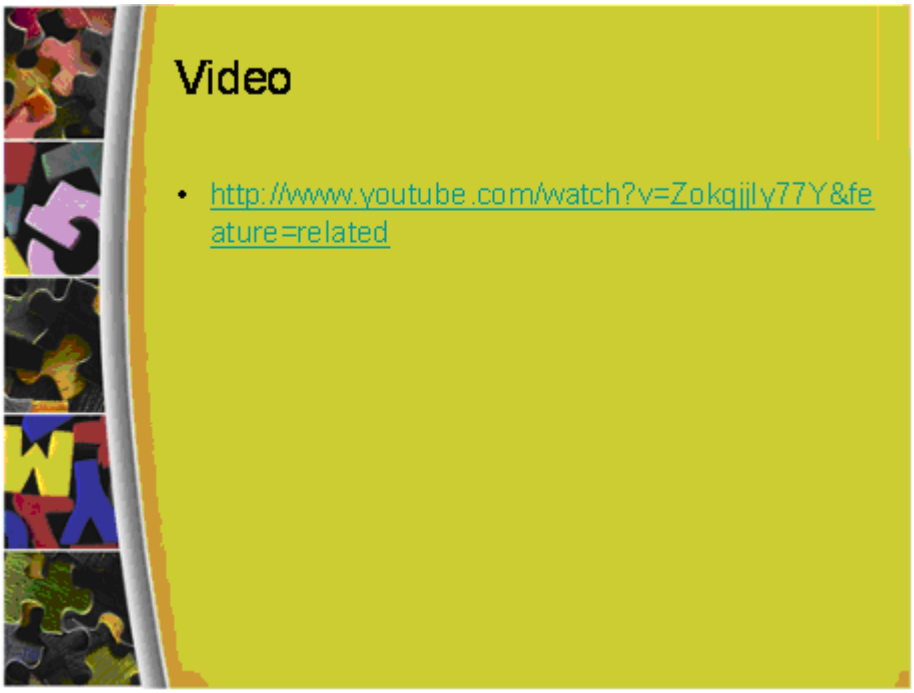

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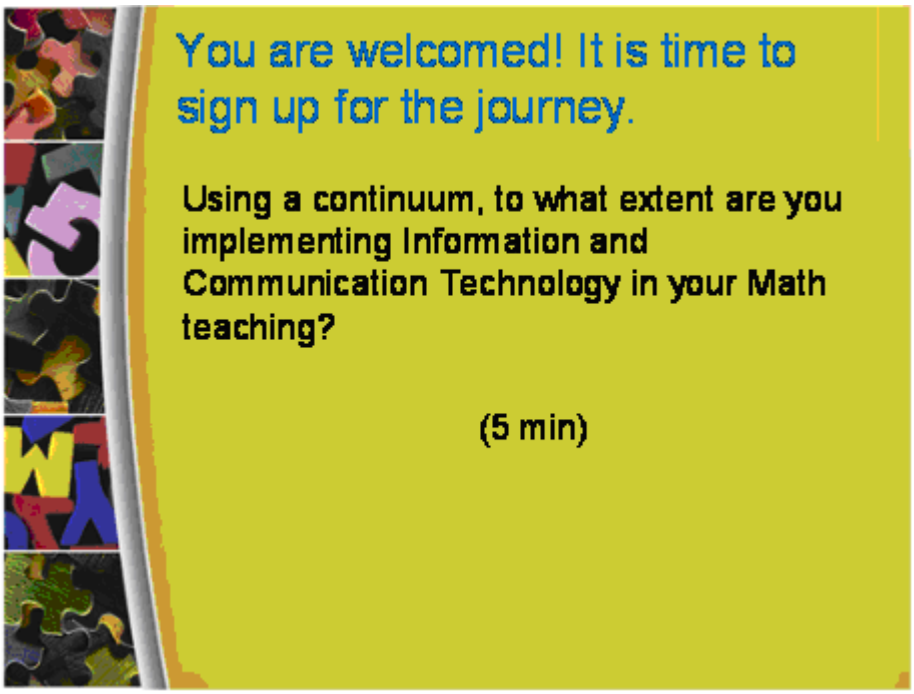

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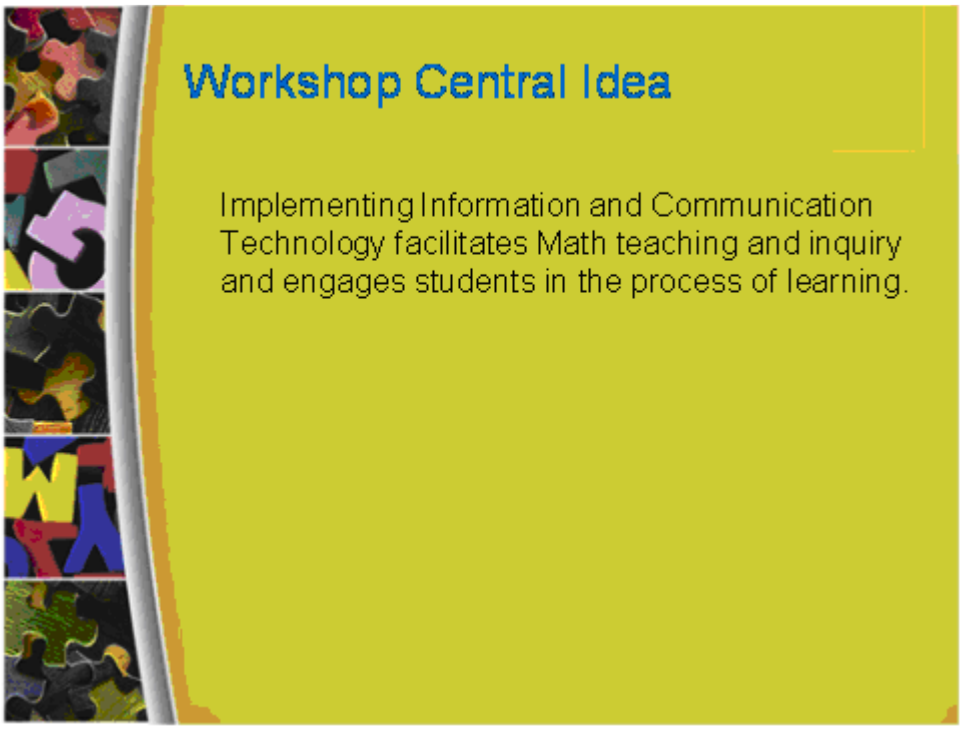


SLIDE 6

Workshop Central Idea

Implementing Information and Communication Technology facilitates Math teaching and inquiry and engages students in the process of learning.

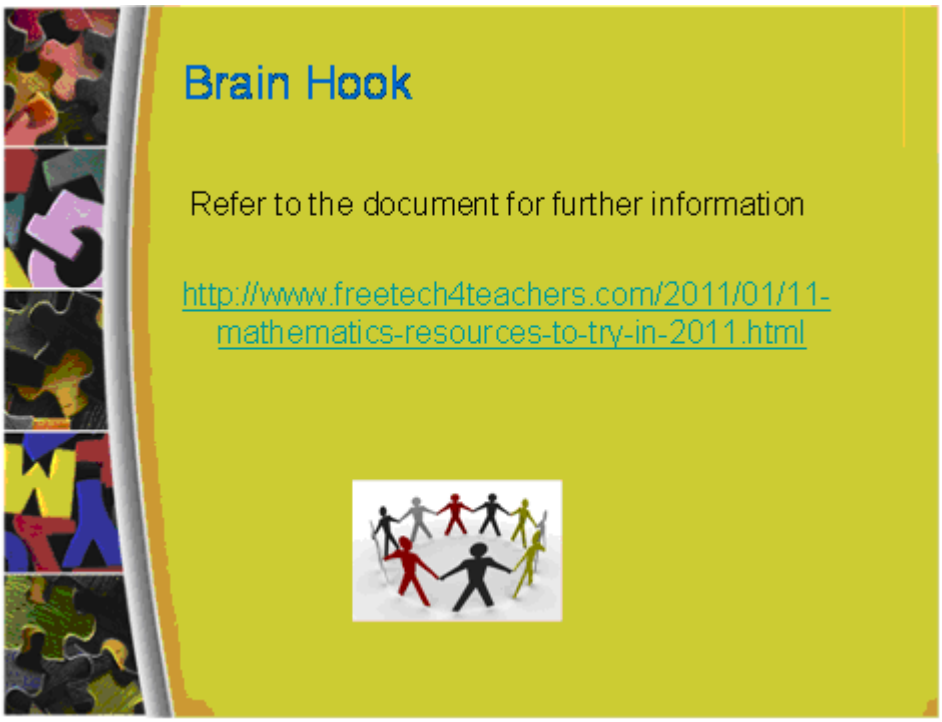
SLIDE 7

Collaborative Thinking about Math Practices

How could Math teaching and learning change to teach **in the life** and **for the life** of the twenty-first century (conceptual, relevant, and engaging teaching and learning)?"

Brainstorming Web

SLIDE 8



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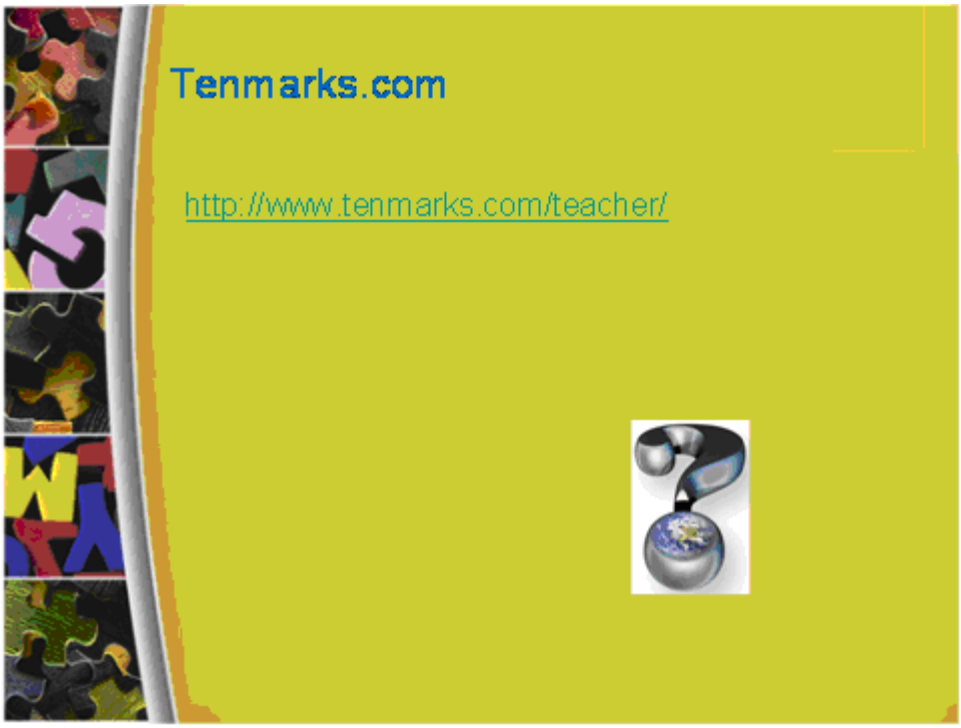


SLIDE 10

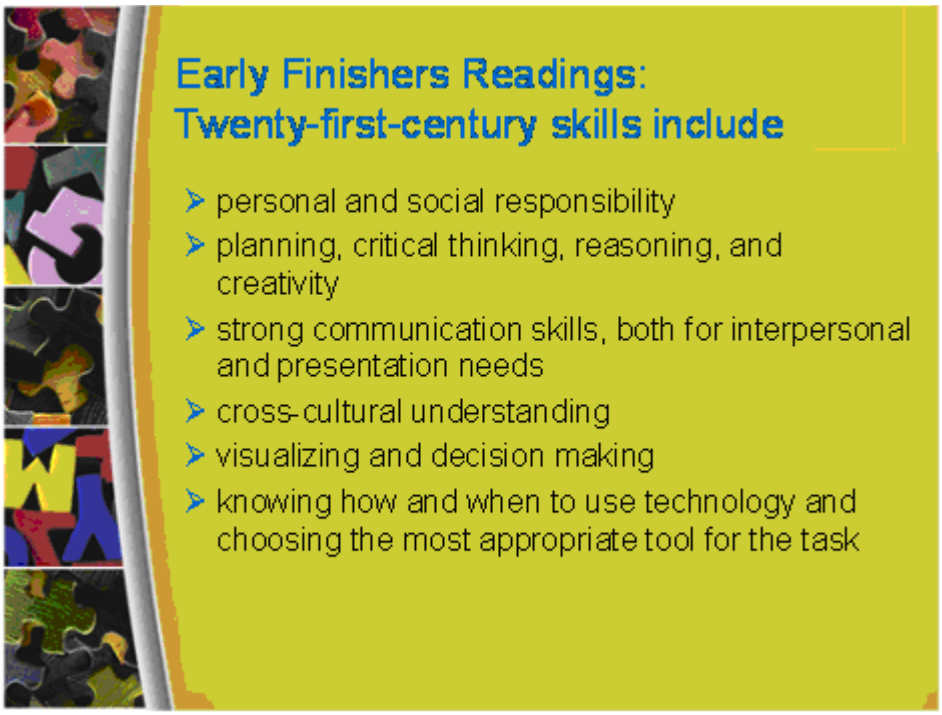
Journal Reflection

- What are the Skills that the new literacy teach?
- How engaging and relevant to students' life is the application?
- Does it address the discipline standards?

SLIDE 11

Jigsaw Reading

SLIDE 12



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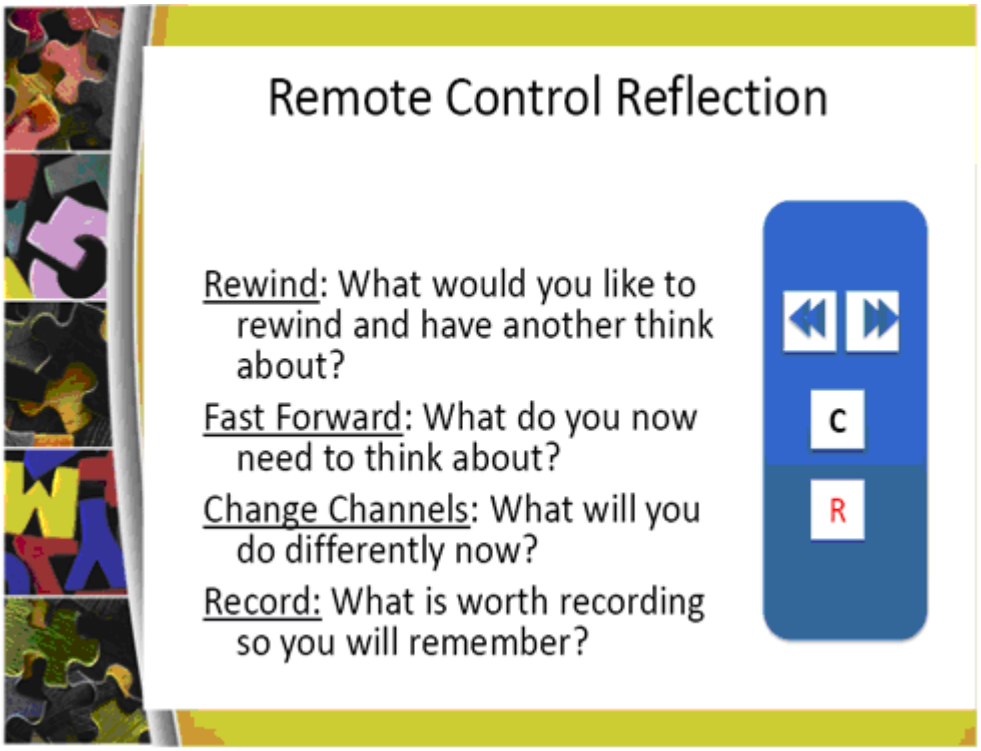

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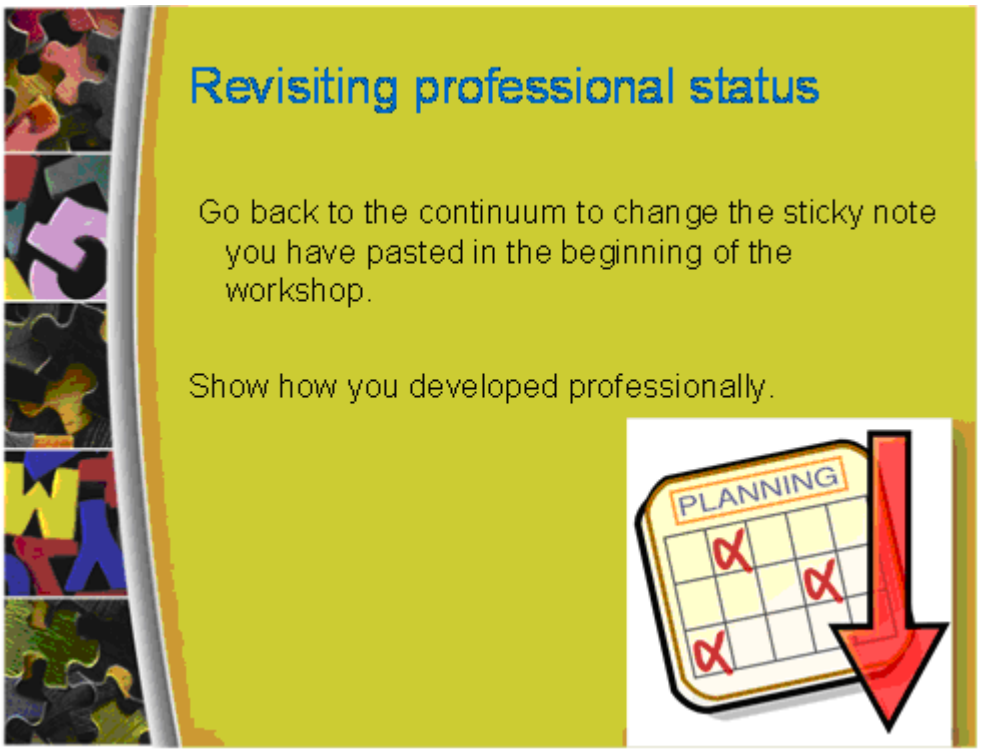


SLIDE 15

MathMania: A Revolutionary Way To Incorporate Math Everyday OUR WAY
Dolla Kanaan

The goal of the presentation is to illustrate to teachers a fun and innovative method in experiencing the relationship between mathematics and the surrounding world as well as its application in everyday life. This would promote amicable interactions between students and teachers and even amongst students themselves.
Students steered the presentation which cast a light on mathematical principles through the eyes of a learner instead of the accustomed-to perspective of an educator. This way, students' mathematical concepts were reinforced, their communication skills improved, and the horizon of their creative thinking broadened.

Students helped others become aware of the inseparable relationship of mathematics and the world by presenting glimpses and images of mathematics in the many facets of our lives.

Mathematics is a science, a language, an art, a way of thinking. Its influence appears in all facets of the universe.

Description of session: Here are some of the projects that were explained and discussed.

Pattern:
Participants will figure out how to make patterns with Rubik's Cube. Rubik's cube is a 3-D puzzle that challenges spatial imagination and memory. In this project the participant tried to figure out ways of making geometrical patterns with Rubik's cube.

Tiling with Spidrons:
Spidrons are geometric forms made from alternating sequences of equilateral and isosceles (30, 30, 120) triangles.
This project is a great way to learn about the mathematics and art of tiling patterns.

Triangles are everywhere:
a. A structure built with rocks is used to direct the flow of water in a stream and increase the rate of the water's flow. Its shape is a right angle.
b. Kitchen Design: for ease of movement among appliances, the perimeter of an ideal kitchen triangle should be less than 22 ft and more than 15 ft.

Brain Teasers:
Solving brain teasers will keep our brain in shape and well throughout our life. This project will enhance critical thinking of the participants.

Comic Strip:
through comic strips students can explain a certain mathematical concept.

Pascal's Triangle:
Mathematics is often described as the study of patterns. Learning to look for patterns in all aspects of mathematics will help this work to be more entertaining and understandable. The purpose of this project is to discover some of the striking visual patterns in Pascal's Triangle, such as: Sierpinski’s triangle (color all odd numbers to see

it) / Hockey stick pattern / Fibonacci's sequence / magic 11 / inverted triangles / power of 2 etc.

Tessellation:
use regular tessellations to create geometric designs. This project showed a tessellation, or tiling, of a plane which is a collection of tiles that fill the plane with no gaps or overlaps. You can tessellate a plane with squares, triangles, or hexagons. You can use these tessellations to create other geometric designs that tessellate.

Origami:
The student showed an elegant method for construction using the minimal number of folds. The folding method is called ' the binary folding algorithm'

Memory game:
The student discussed how can they grasp the concept of similar shapes in trying to match the geometrical figures.

Dominoes:
The student, again, showed a fun way of grasping the concept of rounding through playing dominoes.

Sing-along:
This project is appropriate for those who enjoy using their singing talents to express a mathematical principle or concept. Our student rapped a song involving proving two triangles are congruent.

3-D projects:
Students built 3-D bedrooms, sky scrapers, animals, etc. while using geometrical shapes and constructed according to a certain ratio.

Conclusion:

It is always very challenging to come up with project ideas that can capture the interest of the student. However, when there is a will there will always be a way. Students are very creative. They only need that extra push to get them motivated and hooked on a certain idea or concept.

Go Math! Go active Learning! Active Learning Activities in Math
Sharon Reed

Abstract:

This session provided information about the new U.S. Common Core Standards for Math, and to engage with other participants in activities that will promote critical thinking, reasoning, talking, writing and problem solving in the math classroom with attention to meeting a range of learning needs. Technology activities were shared.

Introduction:

The session opened with some background about math instruction, best practices, and current/ongoing changes in math instruction in the United States through the newly adopted Common Core (National) Curriculum standards.

Strategy:

The activities through the session helped participants to interact with best practices, to see how math and language can be extended, and how routine practice for math activities can be turned into more engaging and motivating learning activities.

Description of Session:

The session opened with participants completing an Alphabet chart for math terms- an activity that has direct use in the classroom for all ages as students move through math instruction. The session then moved into various thinking and hands-on activities to support active learning. Vocabulary supports included The Frayer/Four Square vocabulary model was discussed, Word Pyramid, and Password. We also took **The Important Book** (M.Brown) as a literature model and developed our own Important Thing About Triangles. Using literature as a foundation for math instruction can be powerful and cement understanding. We considered alternative ways to work with place value including Secret Code cards, and Build the Greatest Number activity to promote listening, place value understanding and completion.

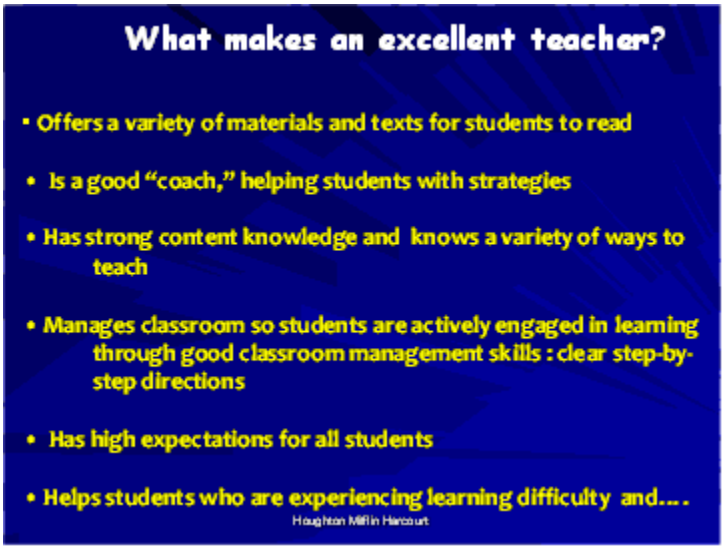
Conclusion:

Math can be engaging, fun, inquisitive, and inquiry- especially when every seat in the presentation room is filled with over 65 active, engaged participants! Teaching is less about what the teacher does than about what the teacher gets the students to do!

SLIDE 1


Go Math
Go Active Learning
HOUGHTON MIFFLIN HARCOURT
Sharon Reed
Director of Consulting Services

SLIDE 2


What makes an excellent teacher?
• Offers a variety of materials and texts for students to read
• Is a good "coach," helping students with strategies
• Has strong content knowledge and knows a variety of ways to teach
• Manages classroom so students are actively engaged in learning through good classroom management skills : clear step-by-step directions
• Has high expectations for all students
• Helps students who are experiencing learning difficulty and....
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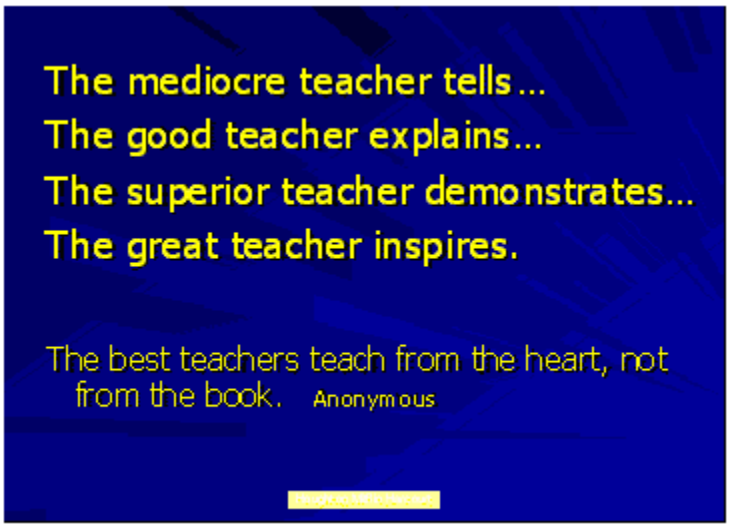
SLIDE 3



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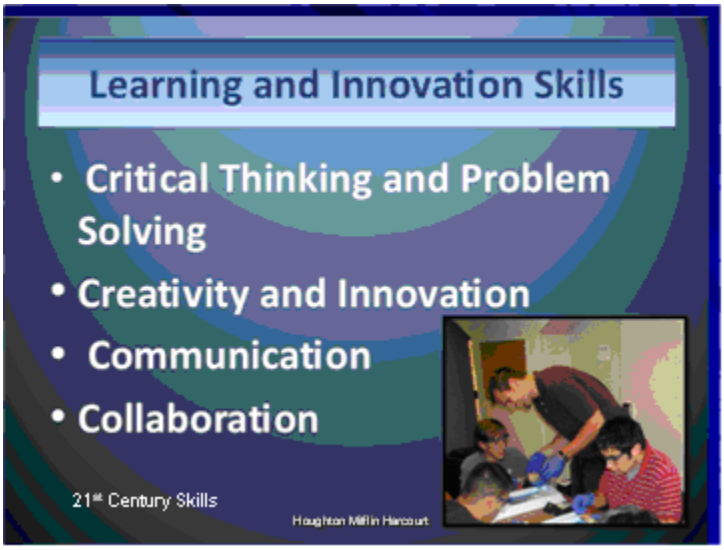

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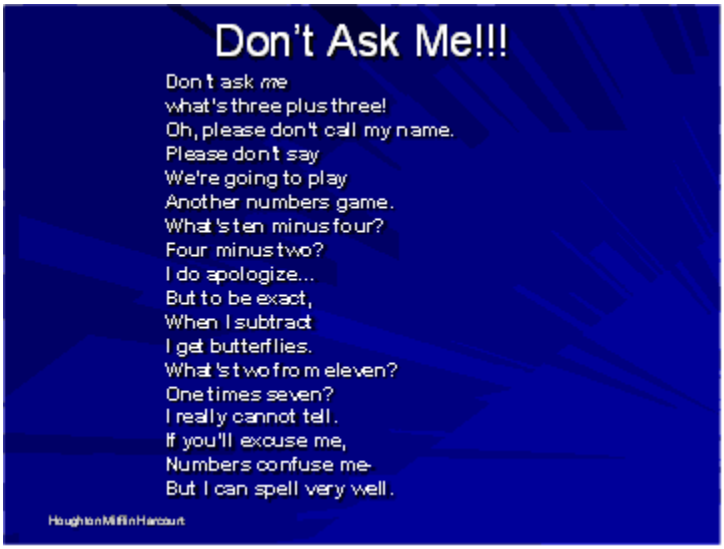

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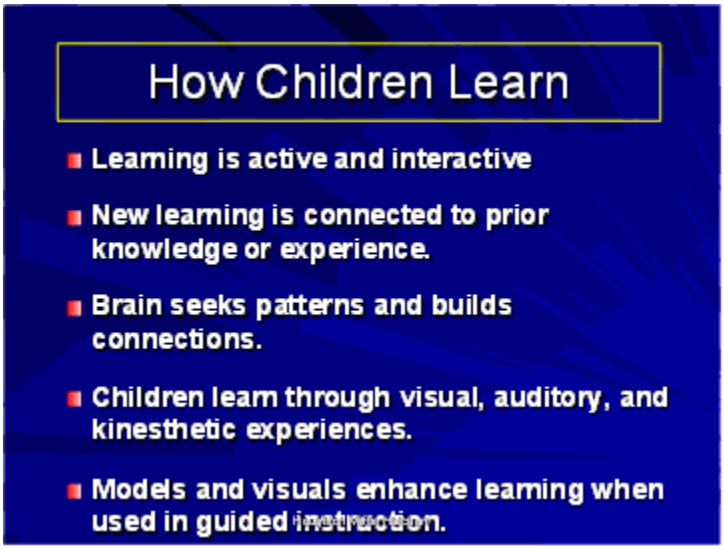

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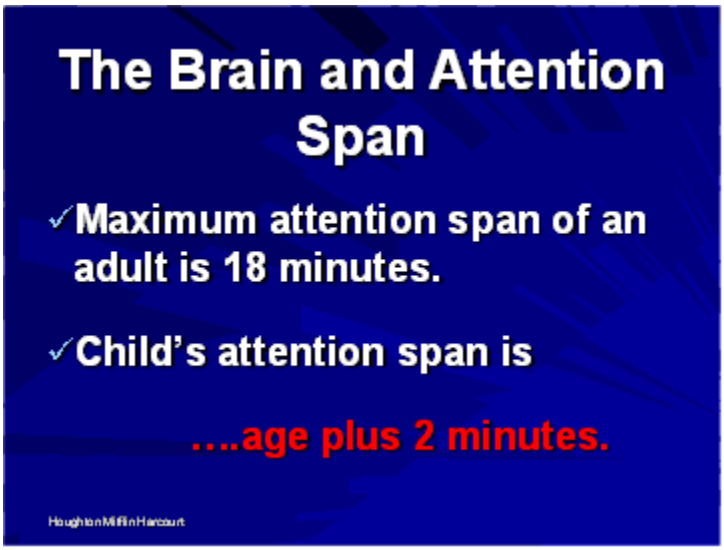

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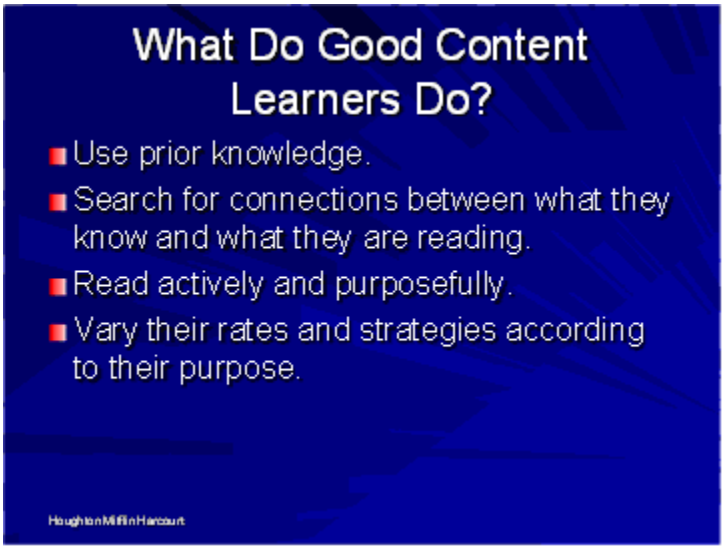

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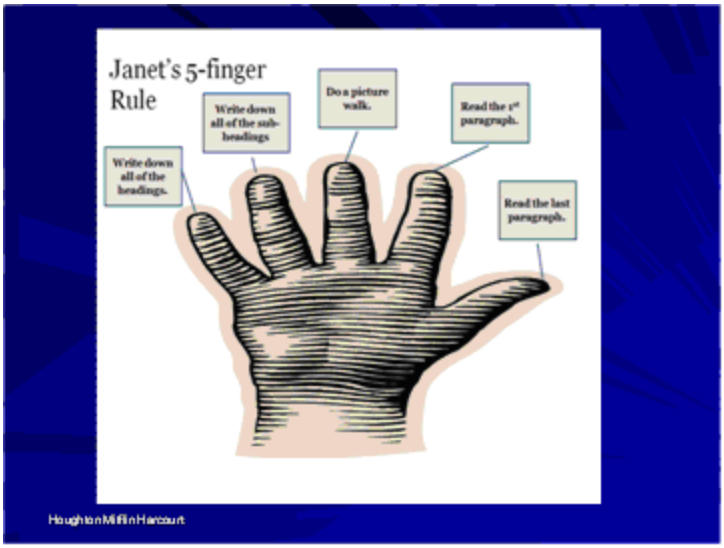
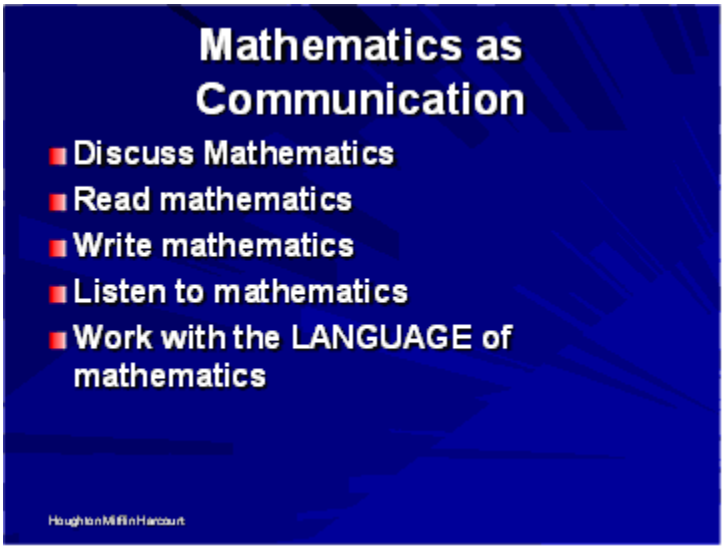

Janet's 5-finger Rule
Write down all of the headings.
Write down all of the sub-headings
Do a picture walk.
Read the 1st paragraph.
Read the last paragraph.
Houghton Mifflin Harcourt

SLIDE 11


Mathematics as Communication
Discuss Mathematics
Read mathematics
Write mathematics
Listen to mathematics
Work with the LANGUAGE of mathematics
Houghton Mifflin Harcourt

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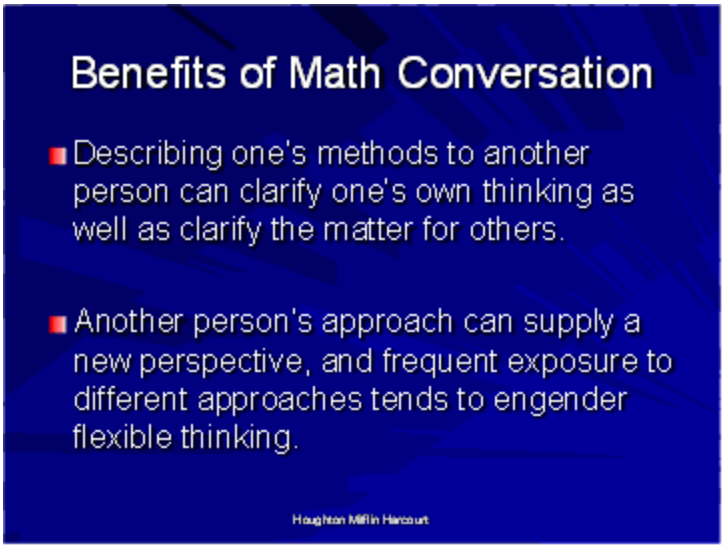

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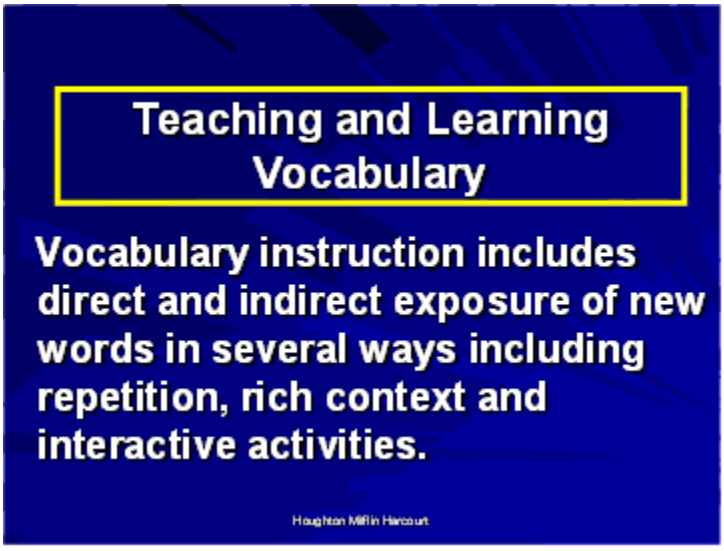

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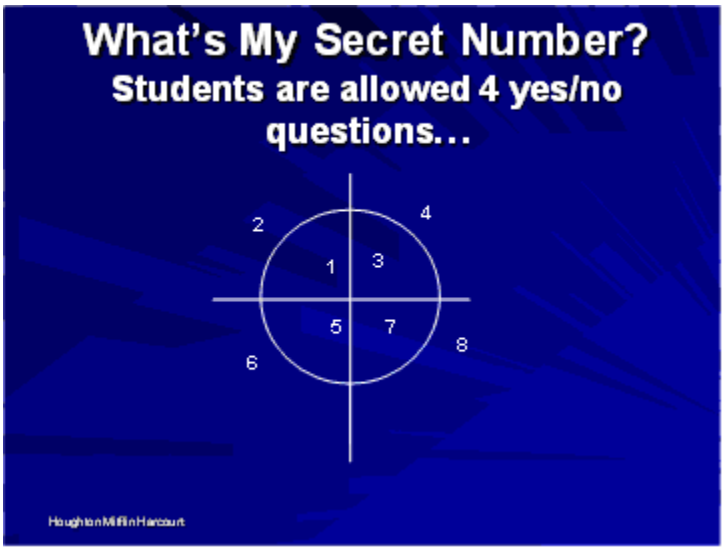

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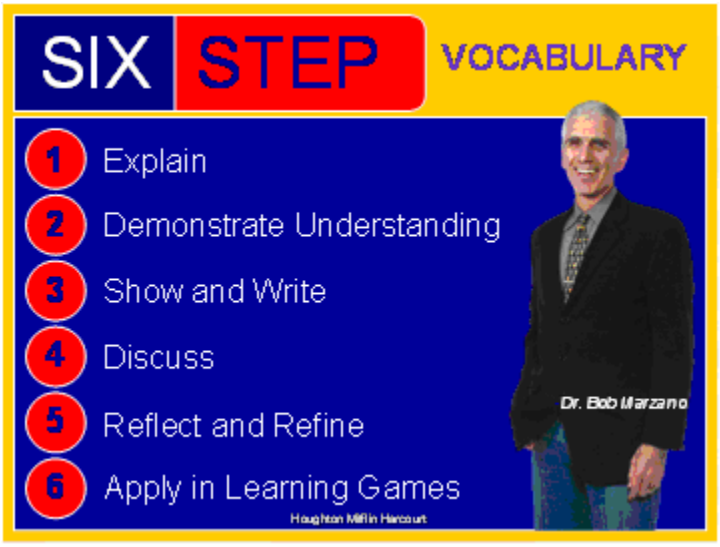

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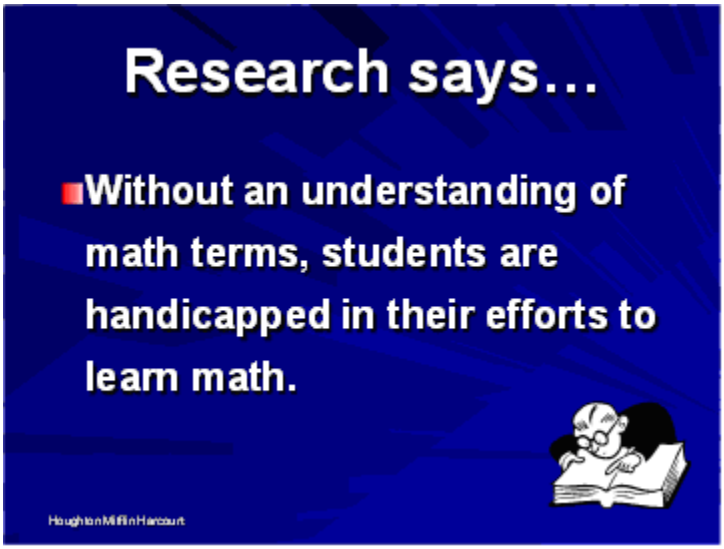

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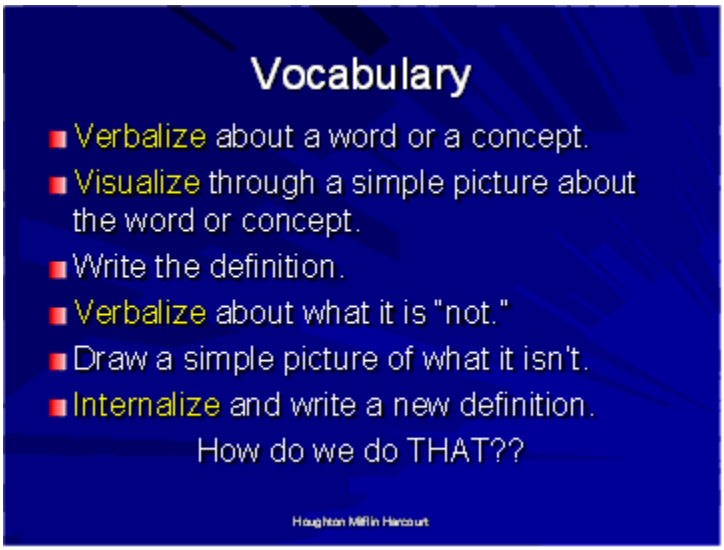
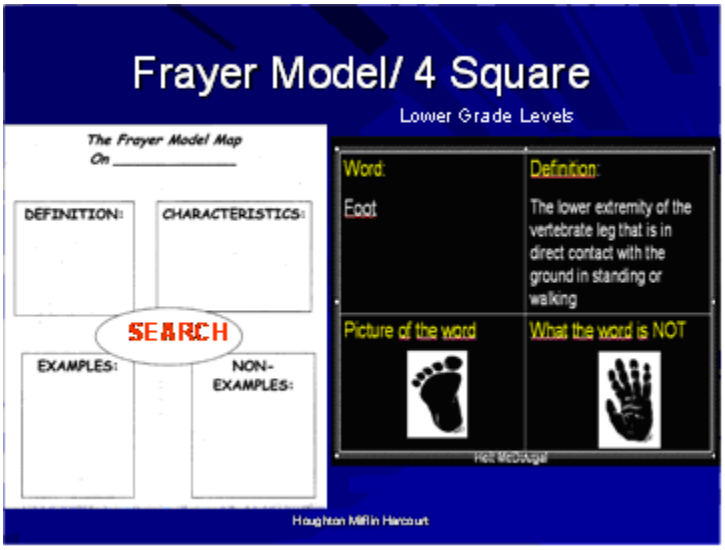


SLIDE 18



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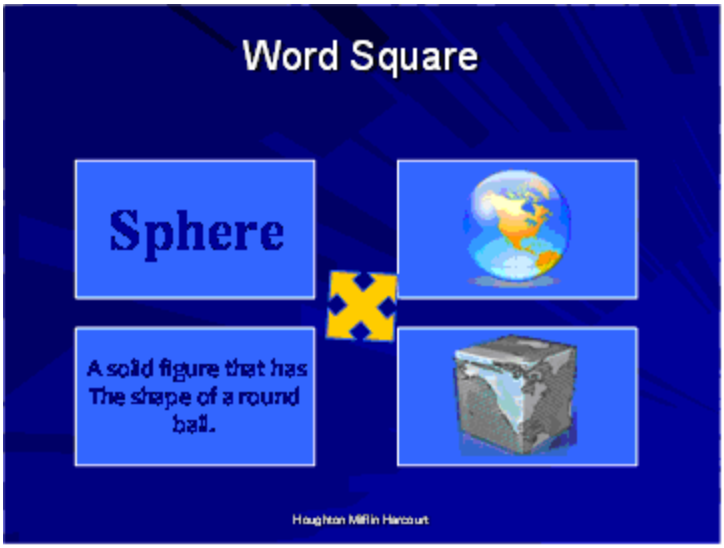
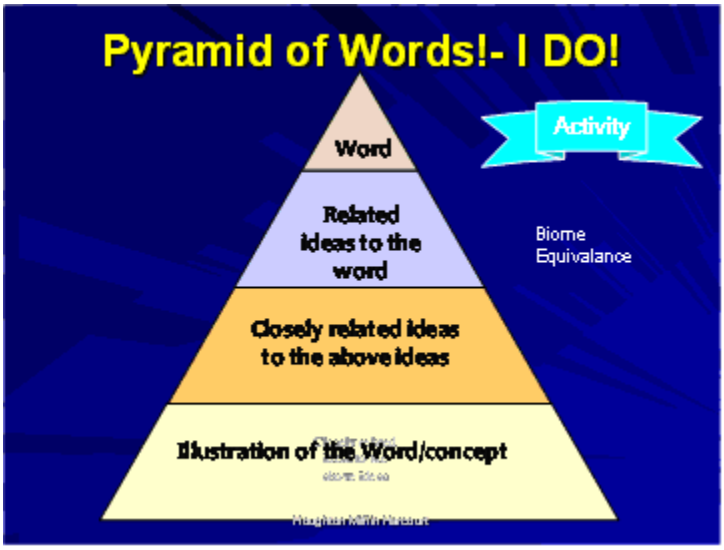
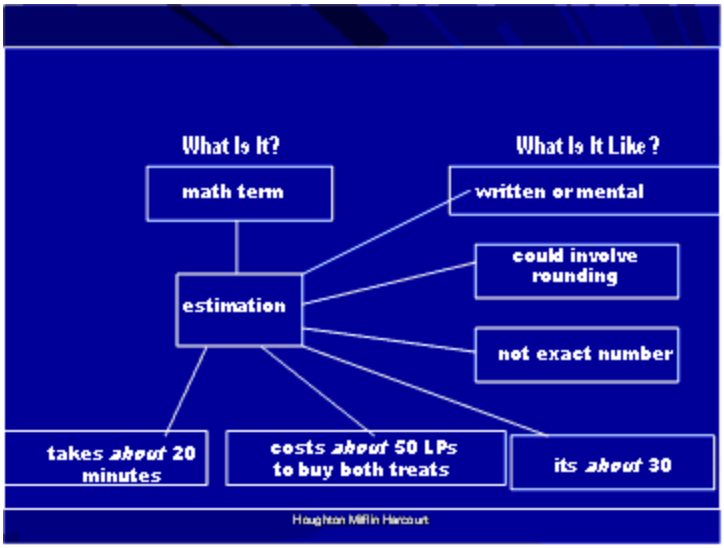

Word Square
Sphere
A solid figure that has The shape of a round ball.
Houghton Mifflin Harcourt

SLIDE 20


Pyramid of Words!- I DO!
Activity
Word
Related ideas to the word
Closely related ideas to the above ideas
Illustration of the Word/concept
Biome
Equivalance

SLIDE 21



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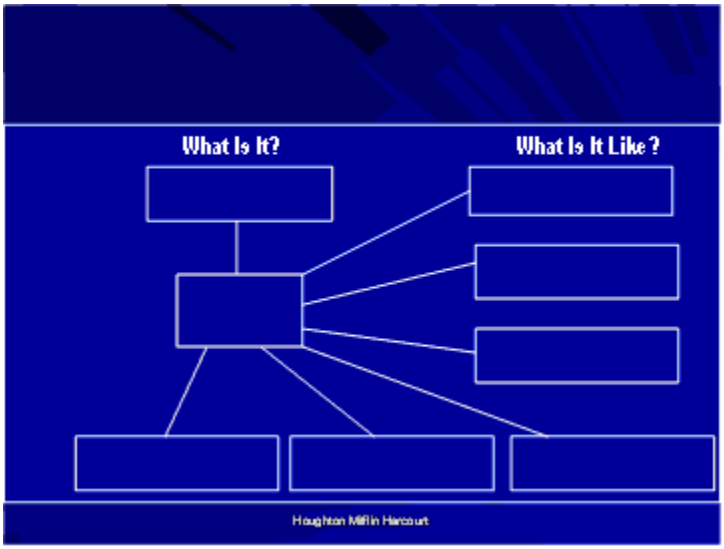

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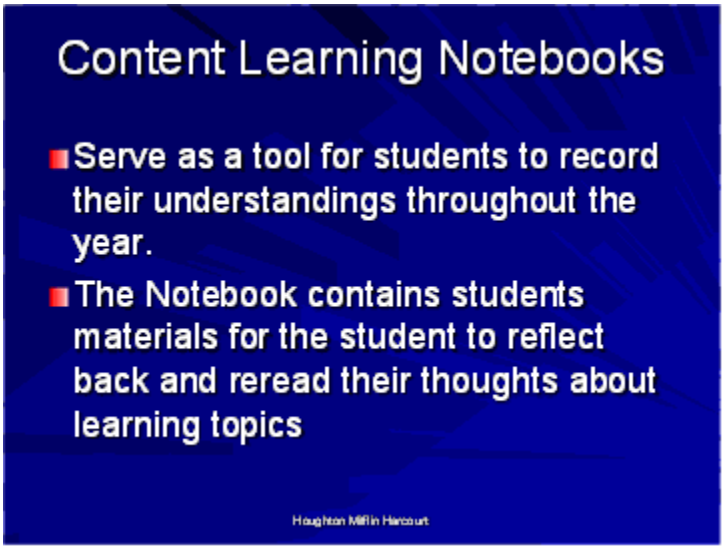

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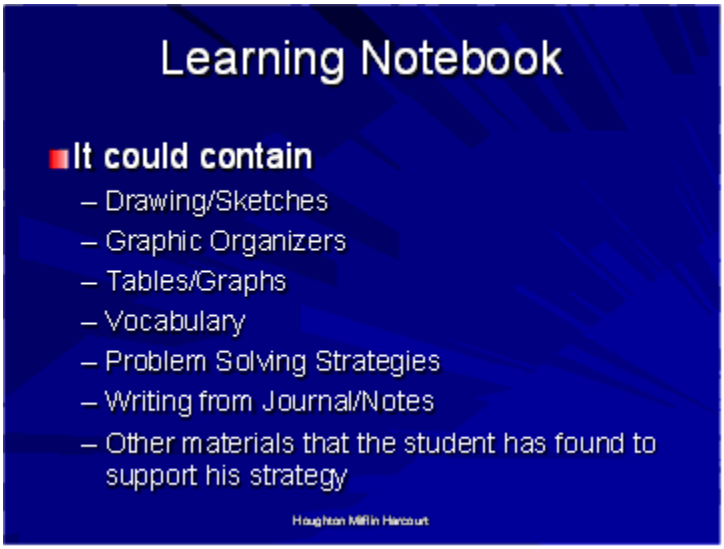

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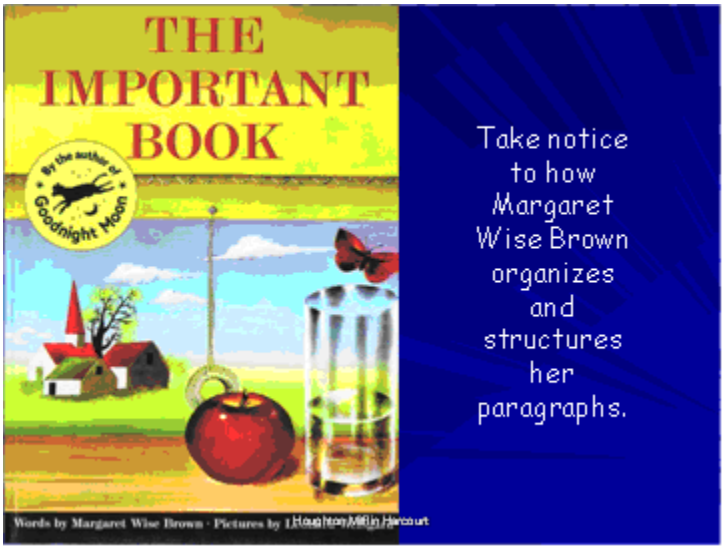

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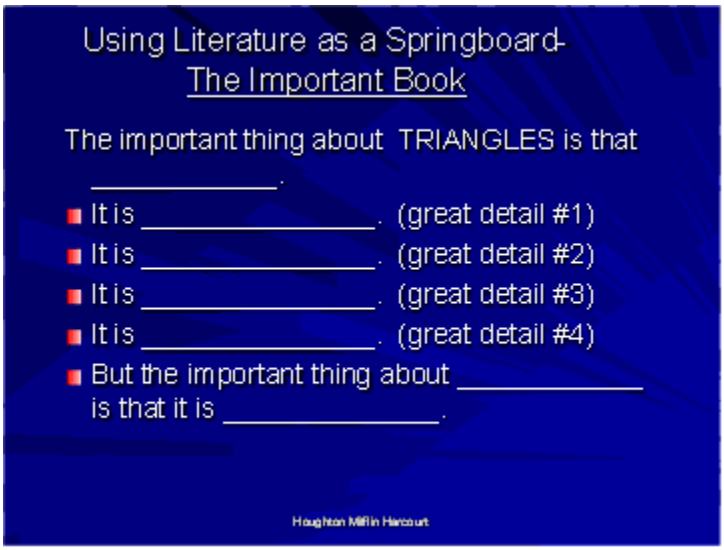

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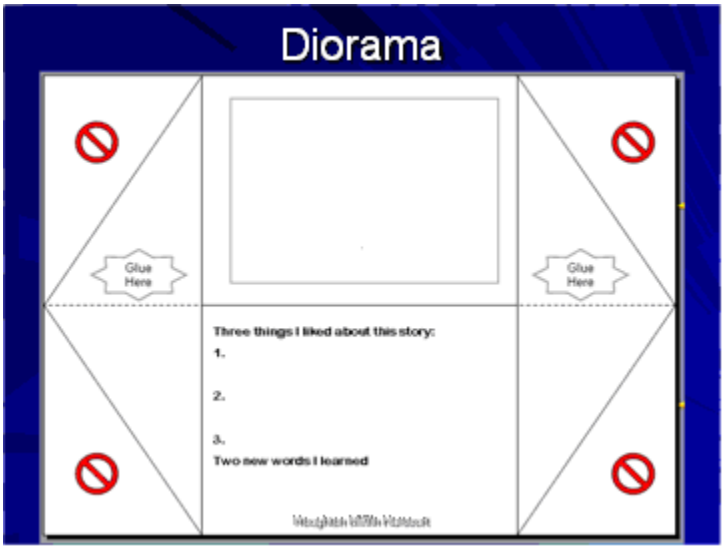

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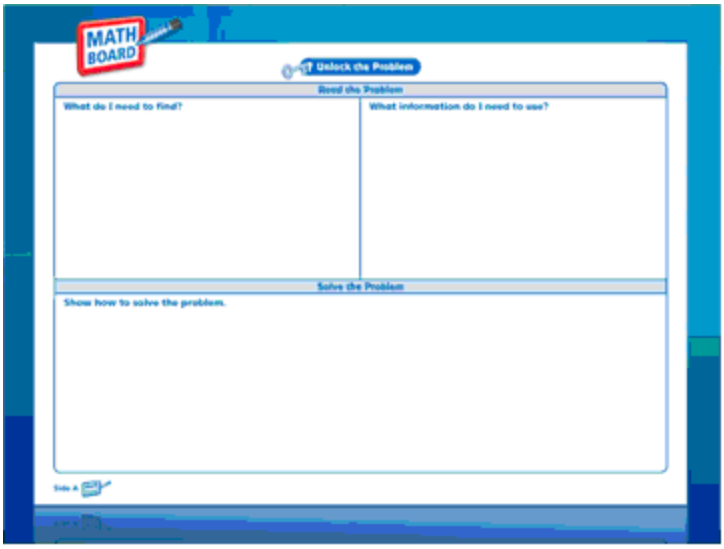
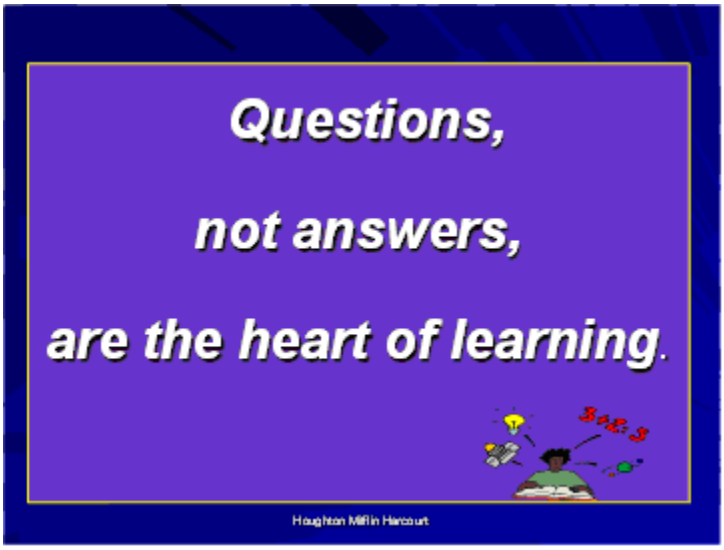
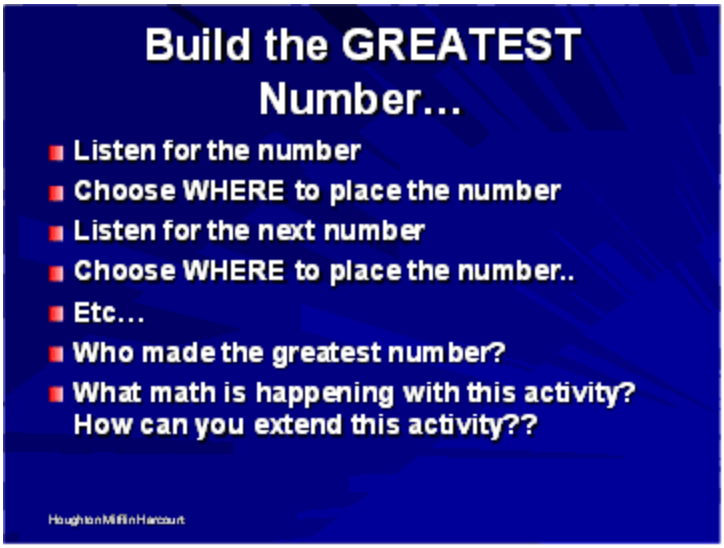

MATH BOARD
Unlock the Problem
Read the Problem
What do I need to find?
What information do I need to use?
Solve the Problem
Show how to solve the problem.

SLIDE 29


Questions,
not answers,
are the heart of learning.
Houghton Mifflin Harcourt

SLIDE 30



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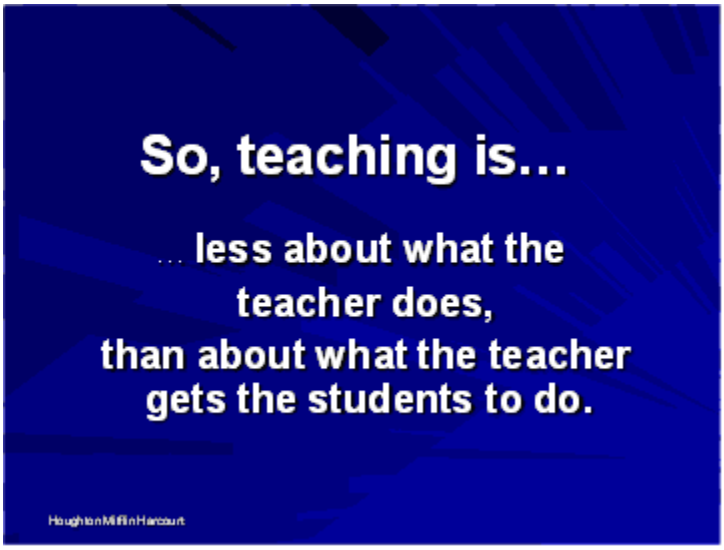

SLIDE 32

Problem Solving in Real-Life Situations: An Integral Part of Mathematics Instruction

Rabih El-Mouhayar

Abstract:
Recently, problem solving became a focus of the mathematics curriculum. This focus is considered as a shift from traditional teaching - through algorithms and a focus on content - towards an emphasis on mathematical inquiry. This shift may be due to the advantages of involving students in solving problems. It will help students to become flexible and reflective in their thinking. Students will also become confident in using their knowledge. In addition, since problem solving is a daily activity for most people, it will help preparing students for real life situations which require effort and thought to find effective strategies to solve problems.
The aim of this workshop is to engage high elementary and middle school teachers in solving diverse mathematical problems related to real life situations and to discuss the strategies used to solve these problems. Furthermore, the teachers will be requested to make modifications in the content of these tasks to become suitable to specific grade levels.

Introduction:
Teaching through problem solving indicates that students learn new mathematical concepts and procedures by solving problems (Van De Walle, Karp, Williams, 2010).

Those problems become meaningful when related to real-life situations. Based on this approach, many research studies and teaching experiments were done. Some of these studies explored how problems contributed to students' learning (e.g. Friel, 1998; Maida & Maida, 2011). Other studies focused on teacher's role in implementing mathematical problems in their classrooms (Rigelman, 2007). Finally, some studies focused on describing the teaching experiments that involved students in problem solving and on the features of the mathematical problems and the corresponding level of cognitive demand (Stein, Smith, Henningsen, & Silver, 2009). Based on those studies, mathematics teachers should change their philosophies of how students learn and how they can help their students learn. For this reason, the following session was introduced to the teachers.

Strategy and Description of session:
Mathematics school teachers were involved in a discussion about the value of teaching through problem solving. Teachers also discussed the skills that students should develop in order to become good problem solvers. After the discussion, teachers were involved in solving a mathematical problem concerning fractions.
The problem was introduced to the teachers as follows:

Jenny was mixing herself a glass of chocolate milk. "You certainly have enough chocolate syrup in the glass," remarked Kevin, who then found a glass of milk of his own to drink.
"Only a third of a glass of syrup", said Jenny. "And you're certainly taking your share."
"I only have one-fourth of a glass," estimated Kevin.
"But Kevin, your glass holds twice as much!" (*height is twice and area of the base is the same*)
"Tell you what", said Kevin, after they both had mixed milk and syrup in their glasses. "Let's combine our drinks in a larger pitcher, and then split the whole amount."
While Jenny is trying to decide whether or not this arrangement is to her advantage, can you say what part of the combined mixture would be syrup?

This problem was introduced in an article entitled "The sweetest chocolate milk" in the journal "Mathematics Teaching in the Middle School" written by Newton (2010). This problem was chosen since it is a non-routine problem - learners do not know how to solve it immediately. Using such problems in teaching involve students in learning since they have to draw on their previous knowledge to explore the problem and thus build connections to the new knowledge being addressed by the teacher.

Teachers were asked to use pictures, numbers, or words to show their solution strategy. They were also asked to find as many approaches as possible to solve the problem. The participants were in groups of two or three teachers. After 20 minutes of group work, one of the teachers volunteered to write the group strategy on the board. After that a class discussion took place and then teachers were given more time to search for other strategies. At the end of the session three different strategies were discussed by the teachers.

Conclusion:

The discussion about the value of teaching through problem solving that occurred at the beginning of the session followed by solving a challenging problem related to a real-life situation which is familiar to the participants and later discussing different strategies to solve the problem helped the teachers in appreciating the value of teaching and learning through problem solving.

References

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Maida, M. & Maida, P. (2011). Problem solving around the corner. *Mathematics Teaching in the Middle School*,16/8, 466-472.
Newton, K.(2010). The sweetest chocolate milk. *Mathematics Teaching in the Middle School*, 16(3), 148-153.
Rigelman, N. (2007). Fostering mathematical thinking and problem solving: the teacher's role. *Teaching Children Mathematics*, 308-314.
Stein, M., Smith, M., Henningsen, M, & Silver, E. (2009). *Implementing standards-based mathematics instruction. A casebook for professional development*. Second Edition. National Council of Teacher of Mathematics.
Van De Walle, J., Karp, K., Bay-Williams, J. (2010). E*lementary and middle school mathematics teaching developmentally*. Seventh Edition. Pearson.

Teaching Math Dynamically: GeoGebra and Flash as Software Tools that Come in Handy

Hussein Salloum & Ibrahim Ammar

The primary purpose of this session is to expose participants to dynamic Math teaching through the use of GeoGebra tool in order to help students visualize deep geometry investigations. GeoGebra is a dynamic geometry software in which constructions can be made with points, vectors, segments, lines, polygons, conic sections, and functions. All of them can be changed dynamically afterwards. Participants will be given a close idea on how to use dynamic techniques to explain complex geometric concepts by animating geometric figures. Illustrations will include real case problem solutions given at different scholastic levels.

The session is planned as follows: (a) Brief introduction and initial exploration of the GeoGebra (5 minutes). (b) Basic examples of dynamic tracing of the loci of plane geometry problems given at the secondary school level (15 minutes). (c) An illustration of the evolvement of a family of curves through the introduction of a parameter into curve equations to emphasize its importance (10 minutes). (d) Allow participants to perform a preset real example (15 minutes). (e) Allow participants to watch a step by step example starting from scratch (15 minutes). (f) Show participants dynamic geometry applications covering envelops and evolutes of curves (10 minutes). (g) Exhibit Adobe Flash animations to help explain the nature of remarkable points of parametric curves (5 minutes).

Online Platforms: Beyond Procedural Competence
Haitham Solh

The primary purpose of this presentation is to introduce participants to a variety of ways in which they can use the online platforms to target students' conceptual understanding. The session will start with a discussion on the merits of collecting homework and quizzes online. An introduction to some of features of three online platforms used by major publishers in association of their textbooks (MathXL, WileyPlus, Webassign) will follow. The presenter will engage audience in solving homework on a given platform to show the software program's capacity to train students to perform procedures. The presenter will then propose/present how to use additional features of the software to include conceptually-oriented questions, problems, and presentations. A topic of interest to the audience (Functions) will be introduced via the additional features of the software, and audience will be asked to compare and contrast the approach explained with the traditional lecture approach. The session will end with a Q&A and an open discussion.

Conceptual Math Through Play
Israa Fawaz

Abstract:
Mathematics teaching and learning has transformed to address major concepts that should emphasize on real-life concepts and integration. Throughout this workshop, participants examined different objectives that promote conceptual understanding. The session started with a problem of the day that triggered the participant's critical thinking and moved to raise a discussion on the importance of building conceptual understanding. Then, after breaking up with mental calculations and new strategies to be taught, participant played some challenging games focusing on the concept of place value, the four operations, and the palindromes. From time to time, attendees were asked to reflect on their journal.
Introduction:
This workshop aimed at providing the participants' with various ideas regarding how to allow students to understand mathematical concepts through successful games and activities. As presenters, we planned to engage our attendees in a variety of learning engagements that carry out a conceptual focus related to real-life for the sake of attaining deeper understanding of Math concepts. It was an active workshop for it includes advanced strategies that could be easily implemented in any Math class and aims at enhancing high-order thinking skills. Reflection took an important role as well as group discussion to share and learn from others experiences.
Resources used:
Concept-Based Curriculum and Instruction by Erickson
Internet resources

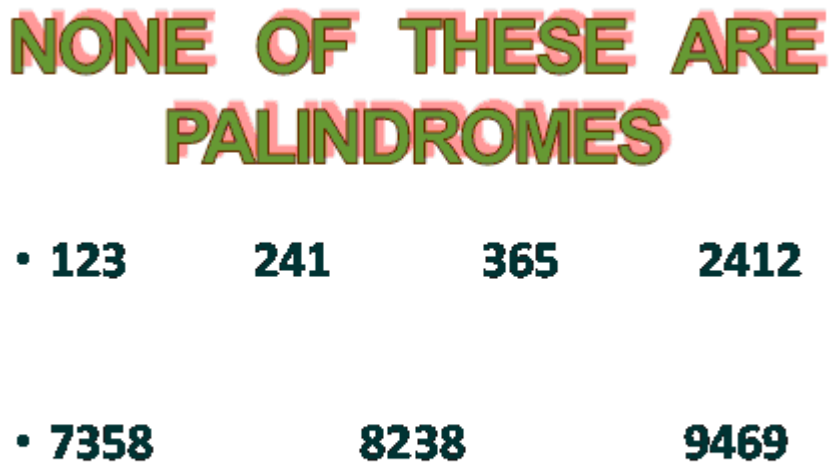
SLIDE 1

SLIDE 2

ALL OF THESE ARE PALINDROMES

- 323 141 565 2112
- 7557 8338 9449

SLIDE 3



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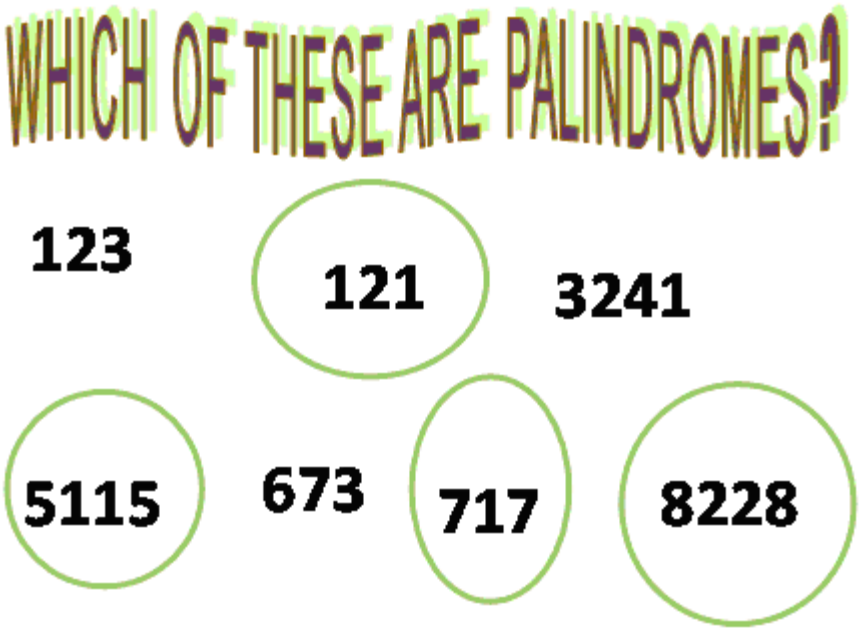

Multiply 2-Equal Numbers that end by 4

- ☐ To multiply 54 x 54:
- ☐ **First:** Square 4: $4^2 = 16$. So, 6 is the ones digit of the final product, and the 1 remains.

- ☐ **Second:** Multiply the tens digit of the given number by 8 and add the remainder.

5 x 8 = 40

40 + 1 = 41

So, 1 is the tens digit of the product and 4 is the remainder.

- ☐ **Third:** Square the tens digit of the given number, and add the remainder.

$5^2 = 25$

25 + 4 = 29

So, 29 is the number of hundreds of the product.

Then, the product is 2,916.

Multiply:

- ✓ 14 x 14 = **196**
- ✓ 24 x 24 = **576**
- ✓ 34 x 34 = **1,156**
- ✓ 44 x 44 = **1,936**
- ✓ 64 x 64 = **4,096**
- ✓ 74 x 74 = **5,476**

Name: _____

Multiply two equal numbers that end by 4.

1. ----------
2. ----------
3. ----------
4. ----------
5. ----------
6. ----------
7. ----------
8. ----------

Palindromes

If we take the number 7557, we can write it as follows:

7557 = 1,000 x 7 + 100 x 5 + 10 x 5 + 7

= (100 + 10)5 + (1,000 + 1)7

= 110 x 5 + 1,001 x 7

= (10 x 11 x 5) + (91 x 11 x 7)

= (10 x 5 + 91 x 7) 11

This means that 7557 is divisible by 11without a remainder, because we were able to use 11 as a common factor.

Integrated Mathematics into the Curriculum
Farah Darazi

The integration of academic subjects is not a new concept; it has been around for over a century because there are many benefits. The integration of math into other subjects makes students think about the "real world" which is a goal of the new math standards all over the world. It also makes students start to think about why things happen, giving them a practical approach to learning and using mathematics. This integration also helps answer the common question posed by many students "When are we ever going to use this." Integration allows students to see the usefulness and importance of mathematics which therefore enables them to develop new understandings and skills.

Thus, the purpose of the workshop is to provide opportunities to teach how mathematics can be taught through relevant and realistic context and to identify and reflect on "big ideas" within and between the different strands of mathematics and other subject areas. In addition, the workshop will be addressing different learning styles and intelligences through a bunch of interesting and challenging activities. As for the attendees, they will be taking the role of the educator at specific identified instances and the role of the young learner at others. This session will include authentic and easy-applicable activities for Math teachers to use and consequently achieve profound students' development of real life concepts and meaningful connection with language in elementary mathematics classrooms.

The session is planned as follows: (a) To break the ice, participants will be moving in the room searching for people having the same number like them but written in a different form (standard, expanded...) and join them. (5 minutes); (b) Participants will be reading the first slide of the PowerPoint that shows the content of the workshop and setting the essential agreements. (3 minutes); (c) Participants will use their math journal to display their prior knowledge concerning the concept "Integration". (3 minutes); (d) Participants will take time to ask questions and post them on the burning (tension) wall. (3 minutes); (e) Participants will be divided into groups of five and engaged in a set of activities that shows math integration with different subject areas. They will be asked to provide geometry lessons that are connected to the real world and can be easily taught with other subjects ranging from science to social studies. (10 minutes); (f)Taking the role of the students, each group of participant will present their findings. (30 minutes). This activity will be followed by a brief discussion, including mention of how could students make their thinking visible through language communication skills; (g) Participants will be watching a slide show about how to integrate math with all subject areas. Then, participants will read creative Math projects for elementary students that shows such integration.(10 minutes); (h) Participant will go back to the tension wall, burn the questions that have been answered during the workshop, and discuss the questions that

are still ambiguous. (7 minutes); (I) As a closure, the workshop will close with an exit pass on which each attendee will post a statement that reveals a change that they are thinking to apply in the near future in their Math class.(4 minutes). Note: All handouts will be given at the exit.

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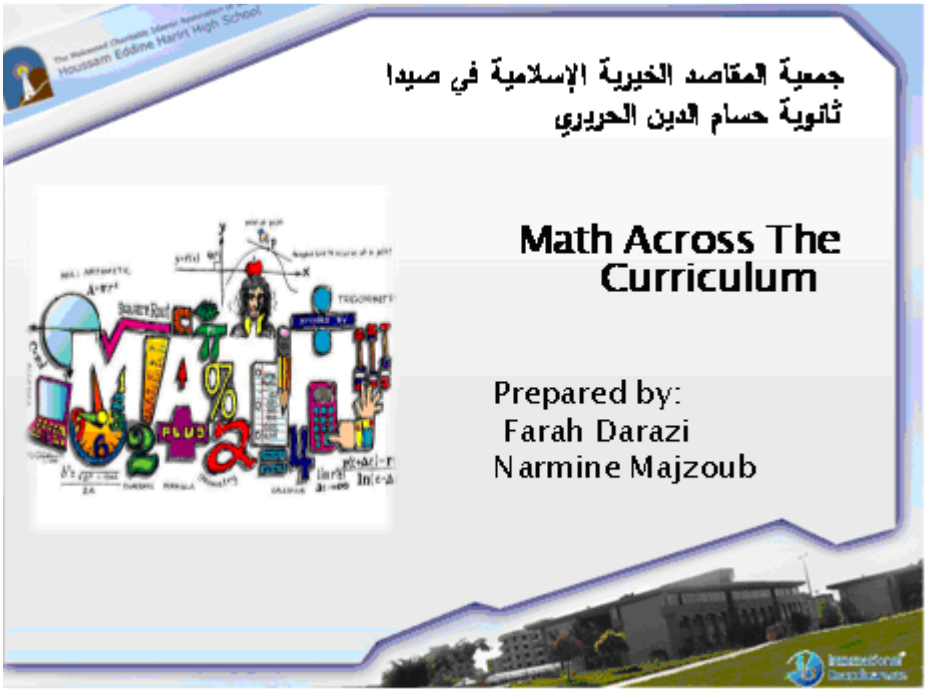

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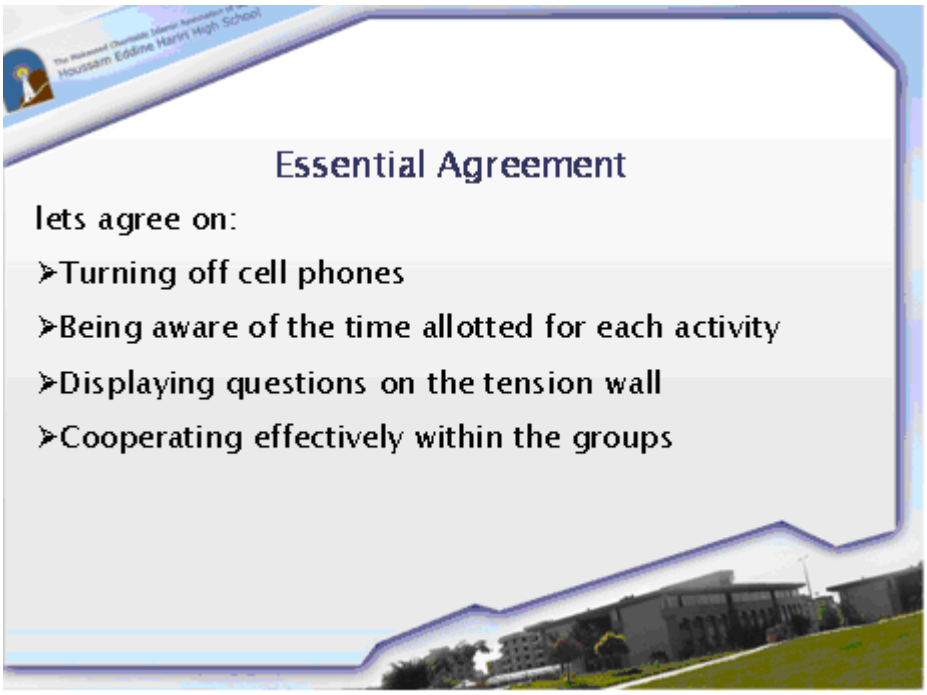

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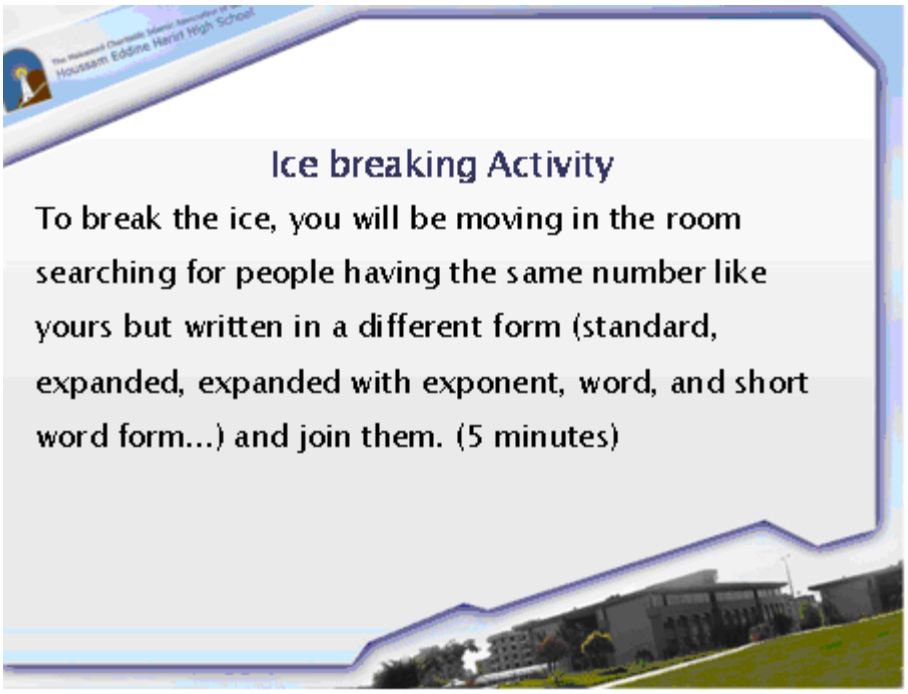

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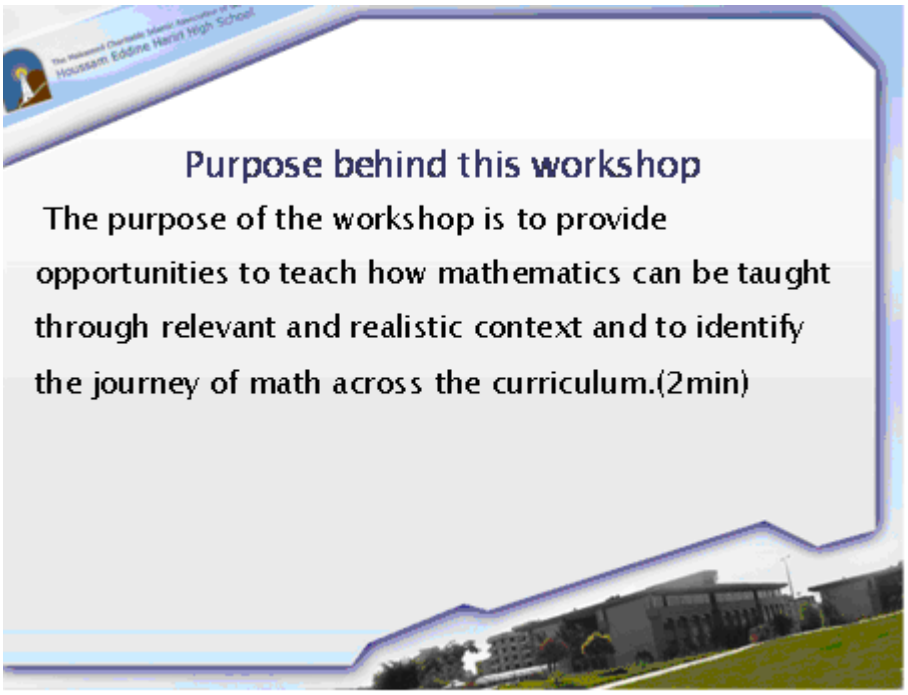

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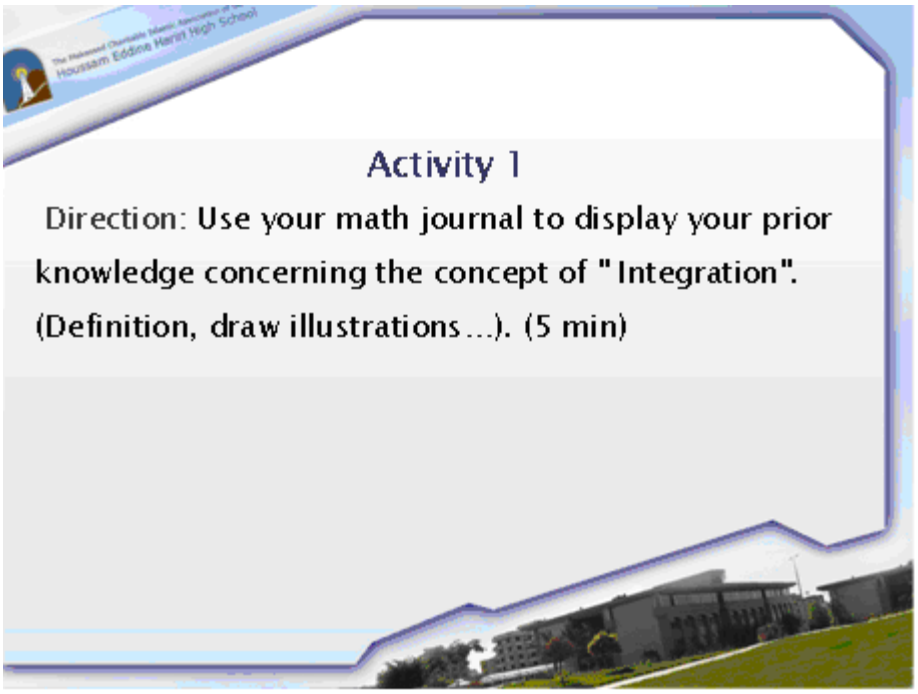

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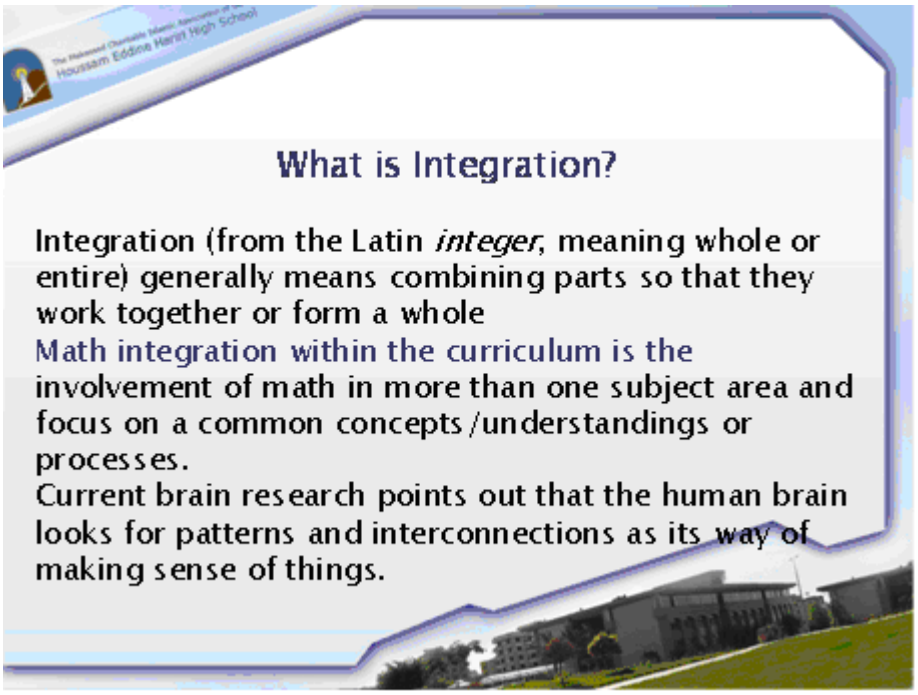

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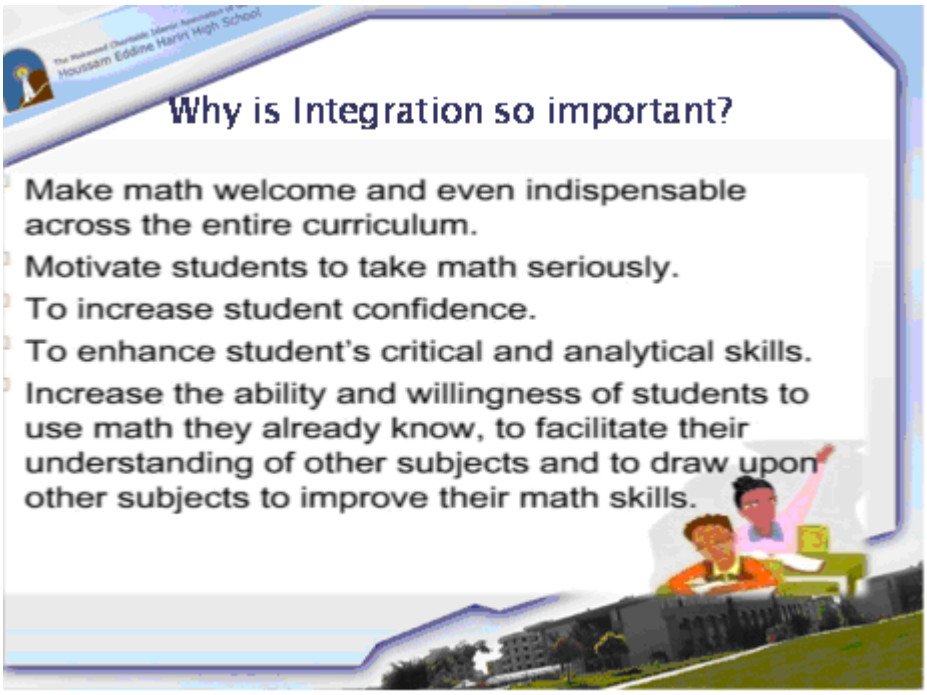

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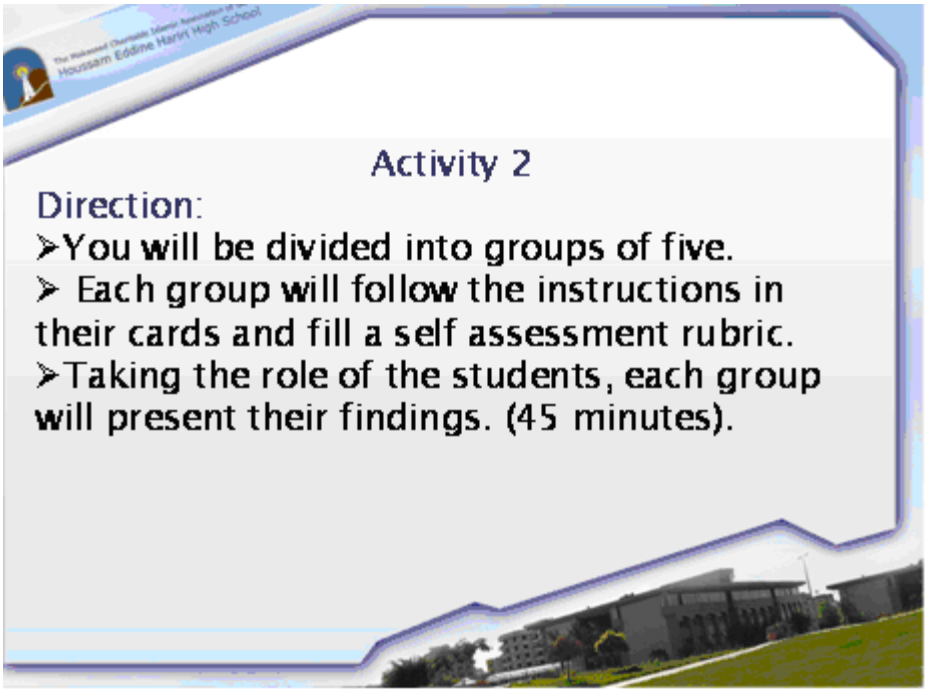

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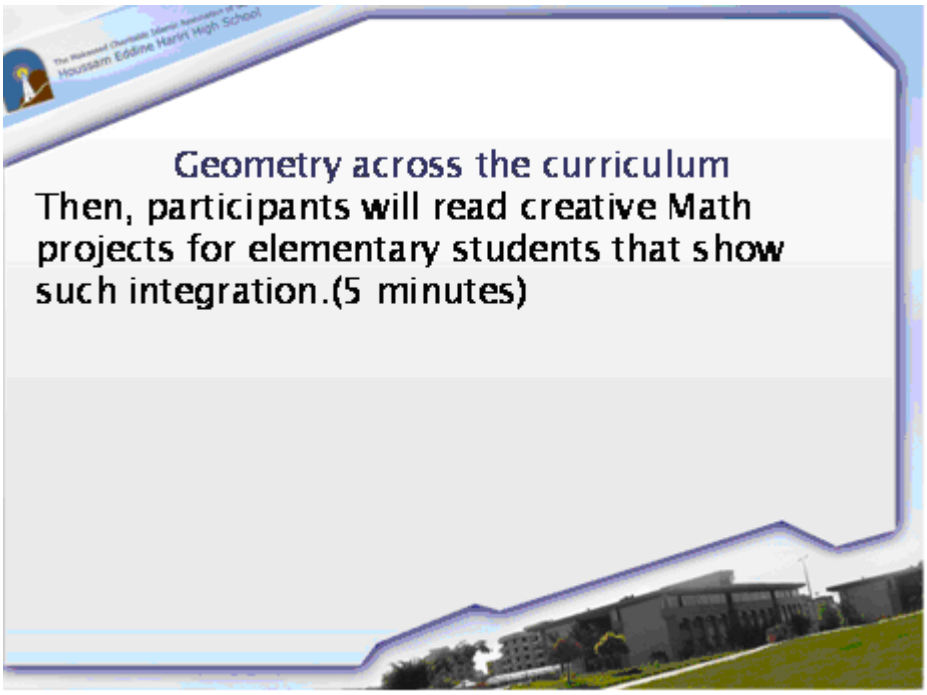

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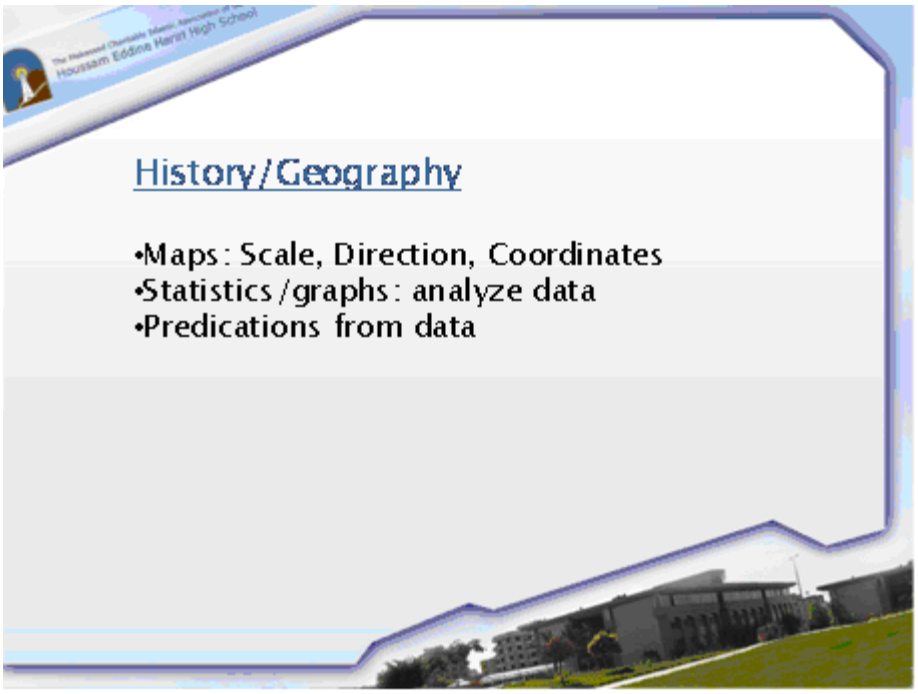

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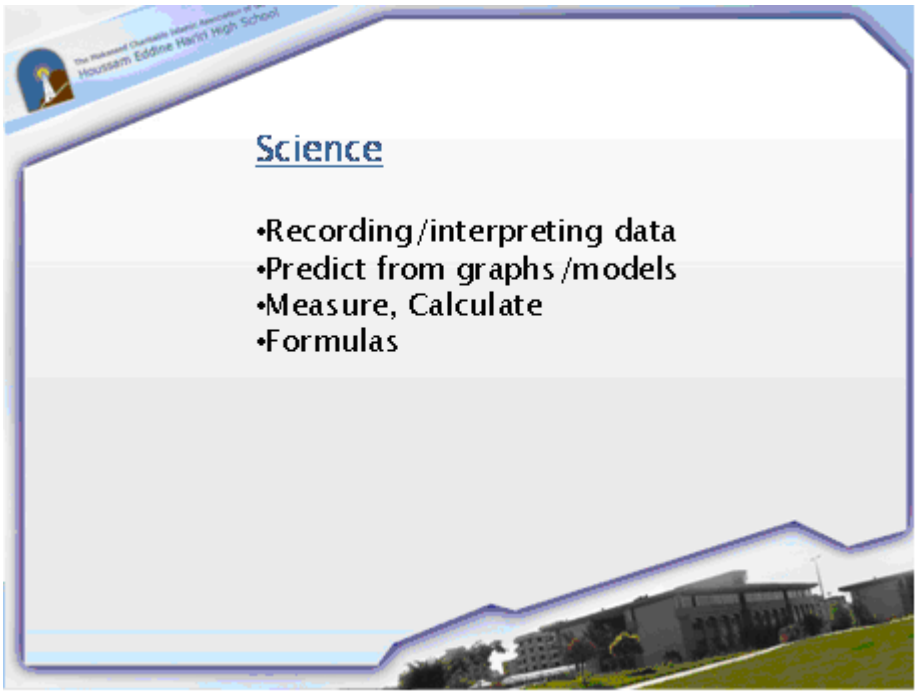

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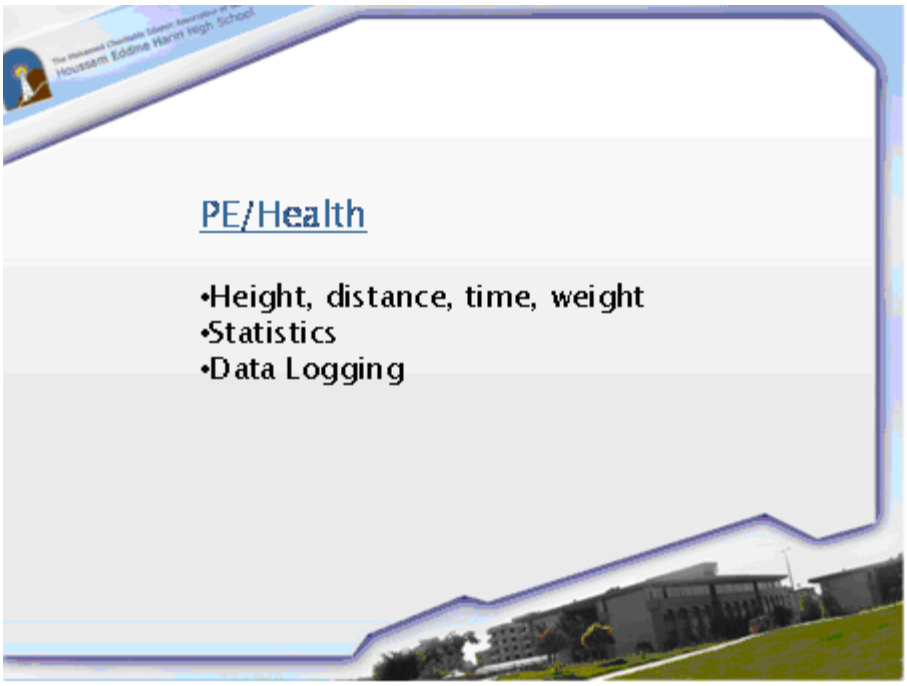

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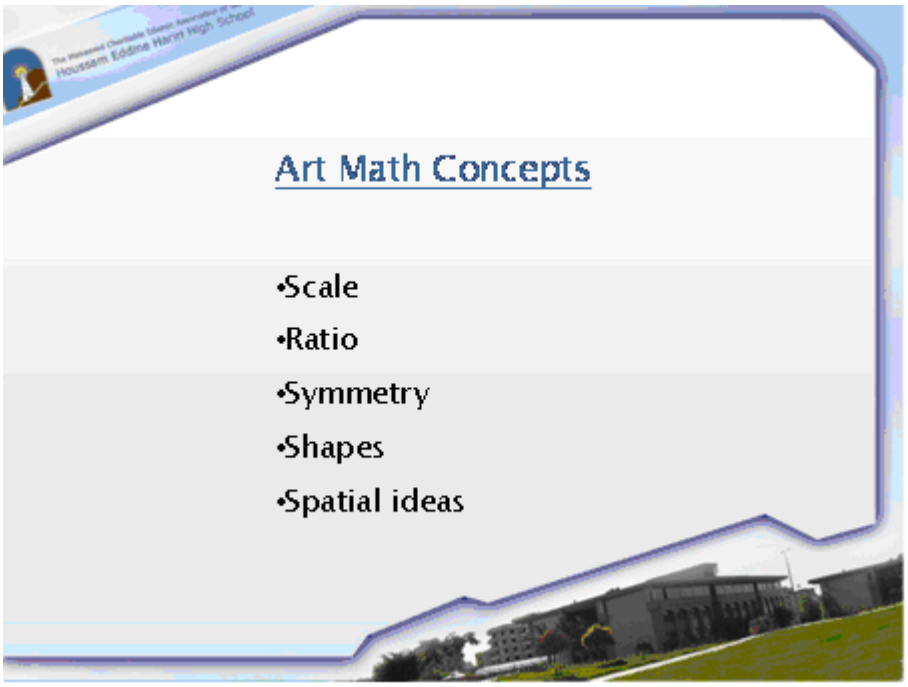

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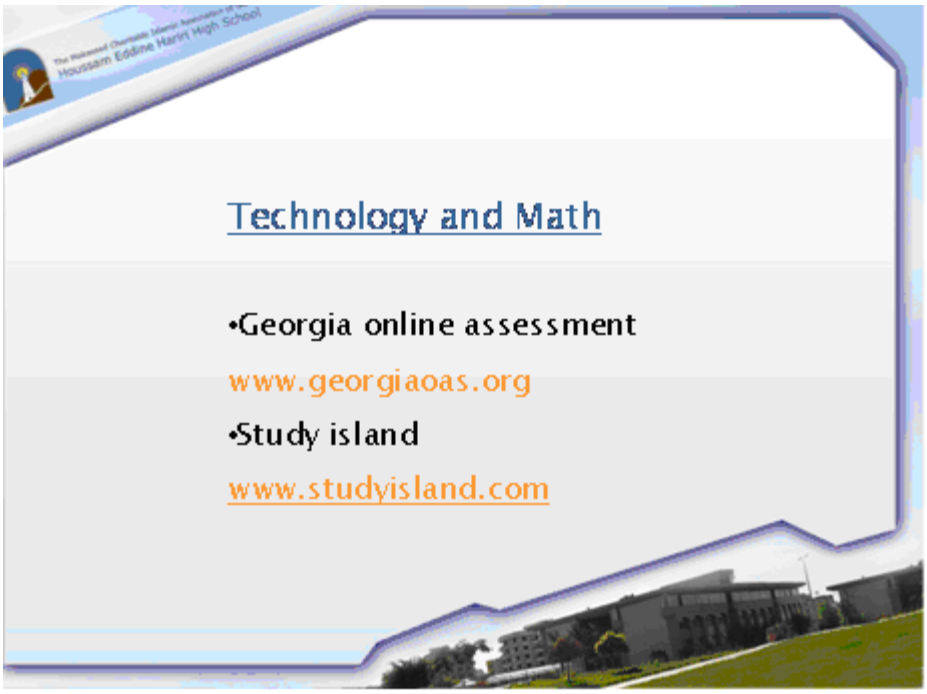

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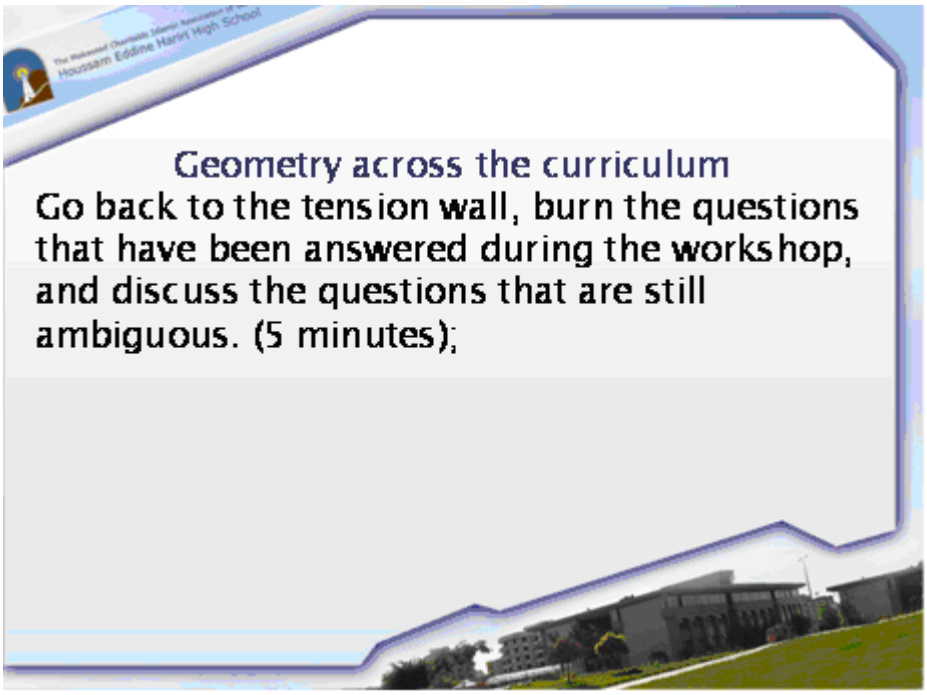

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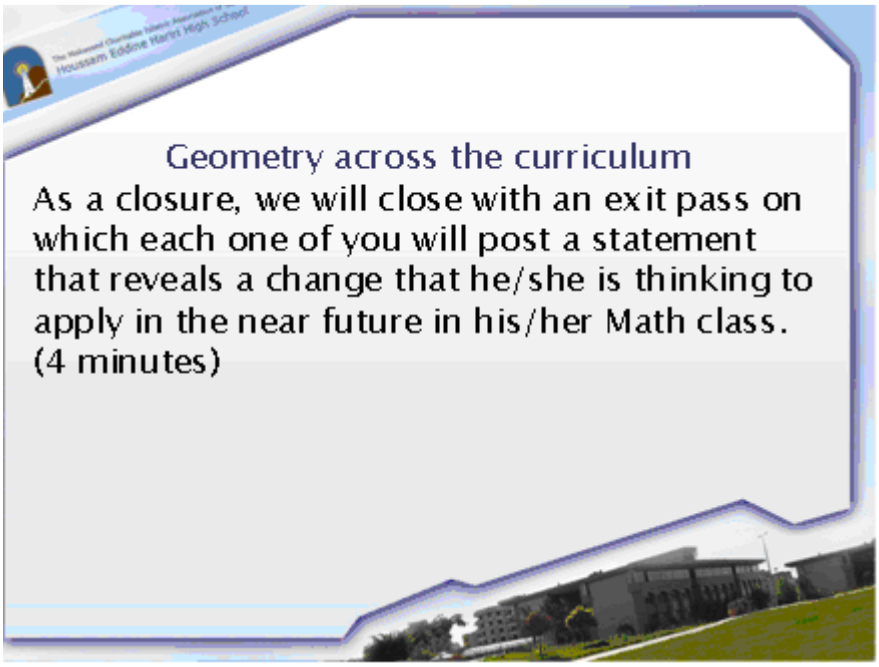

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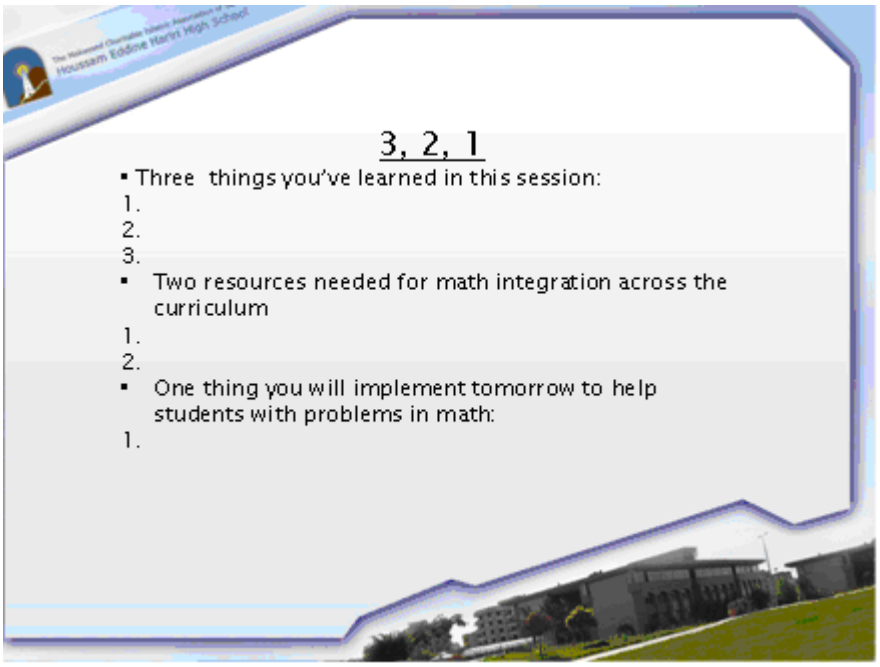


SLIDE 19

Science

Early Childhood Investigations Through the Inquiry Cycle

Kat Abkemeier & Hiba Babylon

The primary purpose of this session is to increase participants' ability to explore topics with young children using scientific methods that are more authentic. Participants will have the

opportunity to experiment with artifacts of student work, videos, lesson plans, and hands on activities. Since the inquiry cycle is quite an abstract concept, young children must be provided with varied experiences manipulating or exploring information from a scientific perspective. It is therefore essential for the early childhood educator to design meaningful and frequent investigations into topics that can be studied using scientific thinking. By providing these opportunities, children can begin applying scientific principles to everyday life, and educators are rewarded with the chance to take a deeper look into how their student's can think scientifically.

The session is planned as follows: (a) As a warm up activity participants will work in small groups to organize an authentic example of a lesson taught through the inquiry cycle in a preschool classroom (15 minutes); (b) A presentation about the application of a "kid friendly" inquiry cycle in a local preschool classroom (20 minutes); (c) In small groups, participants will be given a topic and be asked to apply it to the "kid friendly" inquiry cycle (20 minutes); (d) Participants will present their ideas (10 minutes); (e) A brief discussion on other scientific approaches that can be used in the early childhood classroom (10 minutes).

Antigens & Antibodies
Zarifeh JarJour

The purpose of this presentation is to demonstrate that antibodies help in preventing sickness by destroying antigens that enter the body is to clarify the way antibodies and antigens work. The key to a healthy immune system is its ability to distinguish between the body's own cells (self) and foreign cells (non self).

to, and thus inactivate, foreign particles. The particle is called the antigen. It is frequently but not always a protein. The binding of antibody to
An antibody is a protein produced by a host to bind antigen is very specific, so that, if all goes well, the antibody binds to that specific antigen only. The part of the antigen molecule to which the antibody binds is called the epitope.

Each antibody binds to a specific antigen; an interaction similar to a lock and key.

http://en.wikipedia.org/wiki/Antibody

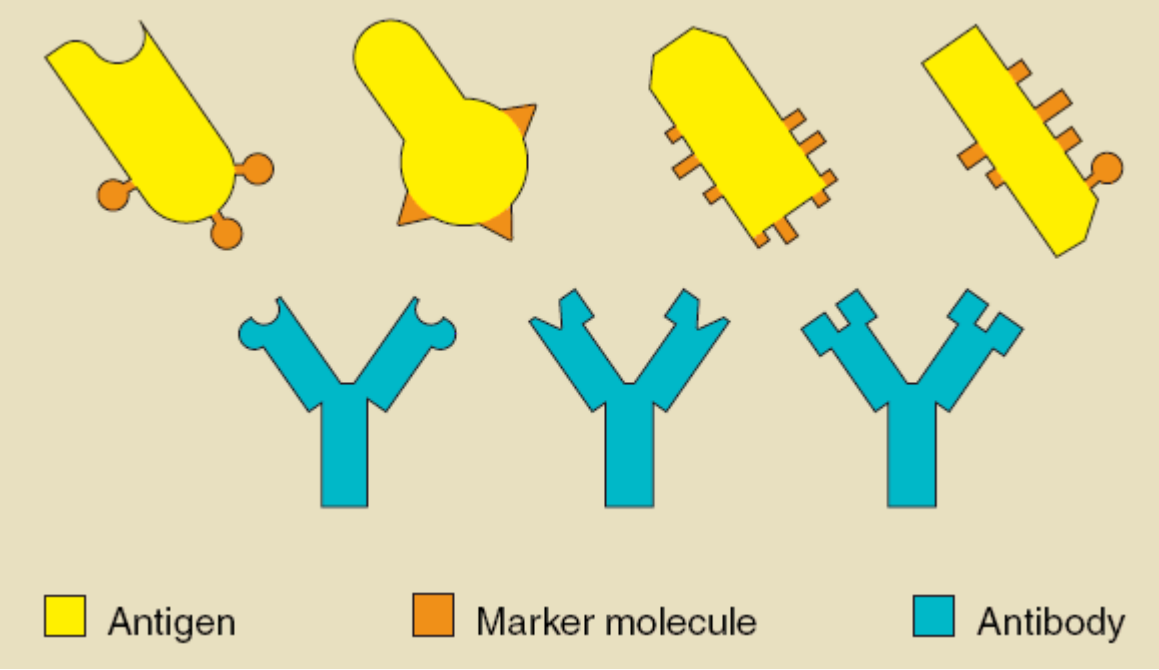
'Antibodies Demo', is one of a set of activities of a museum show "Zoom in Life" produced by the Center of Nano scale science at Pennsylvania State University, and the Franklin Institute, Science Museum Philadelphia, Pennsylvania. This show investigates how the nanometer sized parts of our body function to make life possible.

The purpose of this presentation is to demonstrate that antibodies help in preventing sickness by destroying antigens that enter the body.

The session will proceed as follows:

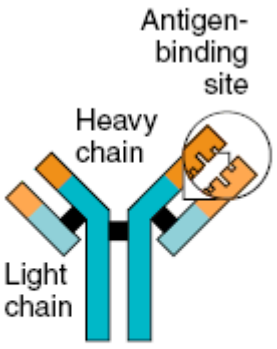
A small introduction about the center of Nano scale science, the author of this presentation, (10min). Introducing the subject (10 min). Using “fake” antigens (i.e. influenza, chicken pox, rabies, etc.) That get them sick, and then running the experiment to explain the “Matching” (20 min). Participants will work in groups of four. On adding the antibody and looking for the changes that may occur in the test tubes, which indicates that antibodies matched the antigen. Later, the plexi glass models (Macro scale) are used to explain the matching site of the antigen and that of the antibody (15min). Discussion and summing up (10 min)

The key to a healthy immune system is its remarkable ability to distinguish between the body’s own cells (self) and foreign cells (nonself). The body’s immune defenses normally coexist peacefully with cells that carry distinctive "self" marker molecules. But when immune defenders encounter cells or organisms carrying markers that say "foreign," they quickly launch an attack.



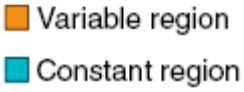
Anything that can trigger this immune response is called an *antigen*. An antigen can be a microbe such as a virus, or even a part of a microbe. Tissues

or cells from another person (except an identical twin) also carry nonself markers and act as antigens. This explains why tissue transplants may be rejected.



Antibodies are the proteins that can recognize (match) specific antigens. An antibody matches an antigen much as a key matches a lock. Whenever antigen and antibody interlock, the antibody marks the antigen for destruction.

Each antibody is made up of two identical heavy chains and two identical light chains, shaped to form a Y.



The sections that make up the tips of the Y's arms vary greatly from one antibody to another; this is called the variable region. It is these unique contours in the antigen-binding site that allow the antibody to recognize a matching antigen.

The stem of the Y links the antibody to other participants in the immune defenses. This area is identical in all antibodies of the same class--for instance, all IgEs--and is called the constant region.

Antibodies belong to a family of large protein molecules known as *immunoglobulins*. Different classes play different roles in the immune defense strategy. Scientists have identified nine chemically distinct classes of human immunoglobulins: four kinds of IgG and two kinds of IgA, plus IgM, IgE, and IgD.

Immunoglobulins G, D, and E are similar in appearance.

IgG, the major immunoglobulin in the blood, is also able to enter tissue spaces; it works efficiently to coat microorganisms, speeding their destruction by other cells in the immune system.

IgD is almost exclusively found inserted into the membrane of B cells, where it somehow regulates the cell's activation.

IgE is normally present in only trace amounts, but it is responsible for the symptoms of allergy.

IgA--a doublet--guards the entrance to the body. It concentrates in body fluids such as tears, saliva, and secretions of the respiratory and gastrointestinal tracts.

IgM usually combines in star-shaped clusters. It tends to remain in the bloodstream, where it is very effective in killing bacteria.

Source:

National Cancer Institute, USA.

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particle is called the antigen. It is frequently but
not always a protein. The binding of antibody to
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http://en.wikipedia.org/wiki/Antibody

Antibodies (also known as **immunoglobulins**[1], abbreviated **Ig**) are gamma globulin proteins that are found in blood or otherbodily fluids of vertebrates, and are used by the immune system to identify and neutralize foreign objects, such as bacteria andviruses. They are typically made of basic structural units—each with two large heavy chains and two small light chains—to form, for example, monomers with one unit, dimers with two units or pentamers with five units. Antibodies are produced by a kind ofwhite blood cell called a plasma cell. There are several different types of antibody heavy chains, and several different kinds of antibodies, which are grouped into different *isotypes* based on which heavy chain they possess. Five different antibody isotypes are known in mammals, which perform different roles, and help direct the appropriate immune response for each different type of foreign object they encounter.[2]

Though the general structure of all antibodies is very similar, a small region at the tip of the protein is extremely variable, allowing millions of antibodies with slightly different tip structures, or

antigen binding sites, to exist. This region is known as the*hypervariable region*. Each of these variants can bind to a different target, known as an antigen.[3] This huge diversity of antibodies allows the immune system to recognize an equally wide variety of antigens. The unique part of the antigen recognized by an antibody is called the epitope. These epitopes bind with their antibody in a highly specific interaction, called induced fit, that allows antibodies to identify and bind only their unique antigen in the midst of the millions of different molecules that make up an organism. Recognition of an antigen by an antibody *tags* it for attack by other parts of the immune system. Antibodies can also neutralize targets directly by, for example, binding to a part of a pathogen that it needs to cause an infection.[4]

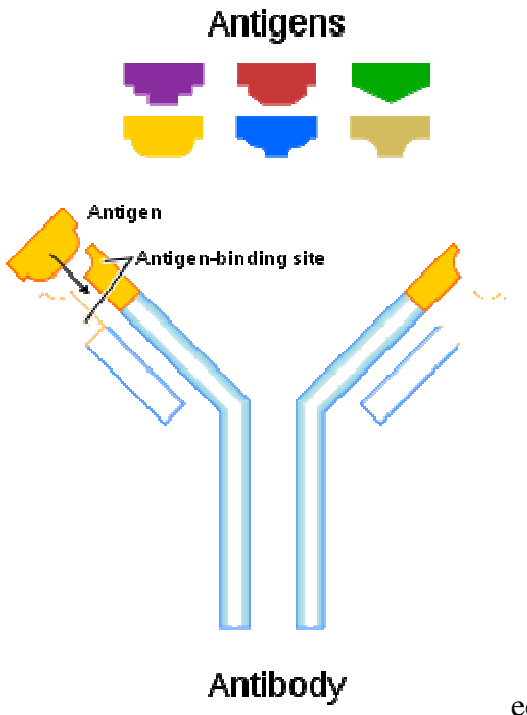
The large and diverse population of antibodies is generated by random combinations of a set of gene segments that encode different antigen binding sites (or *paratopes*), followed by random mutations in this area of the antibody gene, which create further diversity.[2][5] Antibody genes also re-organize in a process called class switching that changes the base of the heavy chain to another, creating a different isotype of the antibody that retains the antigen specific variable region. This allows a single antibody to be used by several different parts of the immune system. Production of antibodies is the main function of the humoral immune system.[6]

What is the difference between an Antigen and an antibody

Antigens are substances that provoke an immune response (they're the ultimate target for the immune system). Antibodies are simply proteins that are secreted as a result of the antigen provoked immune response. In short, antigens cause the disease and antibodies cure it.

http://www.synapses.co.uk/science/fluvirus.html

Each antibody binds to a specific antigen; an interaction similar to a lock and key



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Any of the various substances that when recognized as *non-self* by the adaptive immune system triggers an immune response, stimulating the production of an antibody that specifically reacts with it.

Antibodies Procedure

GOAL: Demonstrate to visitors that antibodies help in preventing sickness by destroying antigens that enter the body.

MATERIALS:

Micro-scale: Six test tubes
Test tube rack
500mL squirt water bottle
Borax Solution
Acidic Solution (sprite?)
Phenolphthalein
Acidic Indicator (congo red?)
2 dropper bottles for indicators
2 500mL water bottles for solutions
Disease name labels (for test tube rack)
Paper towels

Waste bucket
Macro-scale: Plexi antibodies
Antigen shapes

PROCEDURE:

Set-up:

1. Fill 4 of the 6 test tubes with water, halfway. Fill test tube number 5 with borax solution. Fill test tube number 6 with acidic solution.
2. Have paper towels, squeeze bottle of water and waste bucket available.

During the presentation:

Micro-scale

1. Discuss with the visitors what antibodies do in the body and how they help to prevent sickness. Explain that when a foreign substance enters a body, it is called an antigen.
2. Explain that the test tubes are filled with "fake" antigens that can get them sick (i.e. influenza, rabies, chicken pox, etc.).
3. Tell the audience that you have antibodies that match with one of the antigens in the test tubes.
4. Have an audience member put 1-2 drops of the antibody (phenolphthalein) into each test tube and then ask the audience if they noticed any changes. The test tube containing the borax solution will turn bright pink.
5. Explain to the audience that the antigen that turned pink (i.e. common cold), changed color because it matched the shape of the antibody.
6. Have another audience member put 1-2 drops of another antibody (acid indicator) into each test tube and repeat steps 4-5.

Macro-scale

1. Explain to the audience that the reason why the antigen and antibody matched is because they were similar in shapes.
2. Have a volunteer make a "Y" by extender their arm out. Place a plexi tube antibody in each hand and ask them to pick up the corresponding antigen on the cart.
3. Have another volunteer do the same demonstration, but with a different shaped antibody.
4. Explain that only certain antibodies will match with certain antigens depending on the shape.

Helping Teens Turn Green

Sawsan Kibbe

The aim of this session is to engage teachers in a variety of activities to increase the environmental awareness and actions among students, and to inspire them to participate in local and international environmental activities. The session will provide teachers with the opportunity to exchange ideas to promote effective awareness campaigns and action plans. Participants will take the role of the learner to explore some action plans that enthused students to become active environmental citizens and to contribute towards the future of the planet. To promote sustainable consumption patterns among young consumers and to develop a culture of planting and caring for trees, participants will explore various environmental campaigns that they can pursue when they return to their schools to help their students adopt more sustainable practices.

The session is planned as follows:

a. Brief introduction (5min) stressing the importance of shaping the attitudes, values and behavior of students.
b. Participants will actively (5min) discuss their experiences with various actions plans.
c. Participants will discover how to engage students in mind-on and hands-on experiences to increase environmental awareness among students. (20 min)
d. To keep students informed of current environmental issues and challenges, participants will discover how to direct students to educationally appropriate articles and online magazines (10 min)
e. Participants will take the role of students and design environmental games (15 min)
f. Participants will examine pictures, animations and videos of actual student campaigns and activities both locally and internationally. (15 min)
g. Discussion (5 min)

Les Sciences: Un Univers Artistique et Langagier
Farah Hankir

La SVT est une matière humaine avant d'être une discipline à enseigner au collège. Cette matière englobe tous les sujets rencontrés dans notre vie quotidienne ; elle traite la vie des êtres vivants : la production, le développement, la respiration, la nourriture…comme elle évoque les problèmes contemporains tels le développement durable, l'écologie, l'environnement, la pollution…

On ne peut pas séparer la SVT de la philosophie, ni de la langue, ni de la géographie, ni de la technologie, ni même des mathématiques. La question qui se pose alors est comment lier la SVT à l'art plastique, au théâtre et à la musique ?

A travers cette formation, les participants partageront des expériences et des activités dont l'objectif est d'utiliser diverses compétences interdisciplinaires afin d'aboutir à un enseignement plus attractif et amusant.

II-Le concept général de la session :

L'apprenant du XXIème siècle se trouve submergé de données scientifiques et d'informations. Il doit savoir trier ces informations pour avoir une 'tête bien faite' et réaliser des projets interdisciplinaires sur des sujets contemporains. Pour en garder la trace et pouvoir les identifier, l'élève doit être capable de réaliser un carnet de voyage dans le monde vivant: ce sera le carnet de biodiversité.

I- La stratégie du travail.

-**Présentation générale** :
-Présentation personnelle +évocation de l'objectif de la session
-définition des sciences et présentation des documents scientifiques
-Projection de vidéo :" Jad EL MALEH" traitant le thème de l'école
-Demander aux assistants de se présenter en relevant ce qui a suscité leur attention dans cette vidéo (les réponses seront accrochées)
-analyse des citations sous forme d'un jeu ludique.

1- **L'art d'enseigner et de lier les sciences à l'art.**

- la définition de l'art
- Projection d'une vidéo « c'est pas sorcier »
- Discussion autour de la vidéo et de l'objectif de mêler sciences et art.
- Proposition d'idées concrètes permettant, à travers l'art plastique, de formuler, d'enregistrer et d'expliquer les concepts scientifiques.
- Présentation d'un slam et d'une méthode de travail .

2**- Sciences et théâtre**

A- Discussion: pourquoi doit-on mêler les sciences à l'art?

- Projection d'une vidéo de « Gad el Maleh » dont le thème : les jeunes et la drogue
- Discussion suite à la vidéo et propositions de quelques méthodes d'application

Evocation d'une expérience personnelle(photo des élèves lors du travail)

B- Voir un extrait de « c'est pas sorcier » pour avoir une idée sur des présentations artistiques.

3-**Travail de groupe :**

I-Division des participants en 5 groupes. Chaque groupe aura un travail visant à combiner les sciences à une autre discipline

A- **groupe 1:** sciences ,langue et calligramme

B- **groupe 2**:sciences et langue

C- **groupe 3**:Sciences et théâtre

D- **groupe 4:**sciences et art plastique

N:B: les participants seront divisés en groupe suite à un jeu

II- commentaires sur les travaux et sur la formation en générale

III- distribution de sites et des références

IV- évaluation de la séance .

Problem-Based Science
Rasha Hammoud

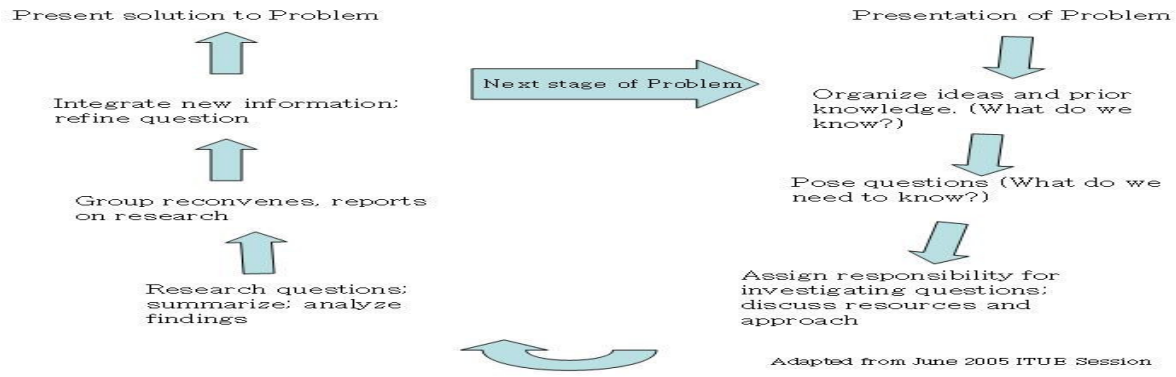
Abstract: Engaging learners in the excitement of science and teaching them to become creative problem solvers have long been goals of science education reformers. But confusions lie in how problem solving in the science class really looks like and how teachers can implement it. This session translates problem solving theories into classroom practices. Participants will see the science concepts they teach through new eyes. They will share activities that will allow them to reflect on their teaching practices. They will also learn strategies that will help them design/create environments of investigation in their classrooms. Participants, in addition, will be investigators as they learn how to pose researchable problems and identify goals for their investigations. Moreover, the participants will be provided with samples of science teaching ideas and tips to promote problem solving.
Introduction: The participants were engaged in diamond ranking activity that brought their beliefs as well as challenges concerning science teaching into discussion. They had to arrange these beliefs/concepts from the most important to the least important.
Strategies: The participants were engaged in learning through different strategies that they can also use in their classrooms. The key strategies were: diamond ranking, observing/comparing/and concluding charts, grouping, and investigating through hands on activities. The purpose behind the selected strategies was to create tensions and questions that would be keys for problem solving in science.
Description of the session: The sessions started by asking the participants to arrange, in groups of three, their beliefs in science teaching from the most important to the least important in the form of a diamond. The participants were highly engaged as they completed this task since it resulted in bringing pedagogical discussions and sharing some frustrations or challenges the participants have. This also led to sharing the participants' expectations of the

session. The participants were then engaged in reading about the inquiry-based approach. In differentiated groups, the participants read about the concrete, abstract, and symbolic learning. Their reflections set a common understanding on engaging learners in authentic experiences to create inquiry and problem solving. After that, the participants viewed and discussed some tips on why inquiry is key in science teaching. This allowed the participants to share their different experiences since they had different backgrounds and teaching practices. Some participants were asked to explain or give examples on how they teach a certain science concept through inquiry. The discussion guided the participants to reflect on the level of inquiry they implement regarding their own roles and the roles of the students. The following chart shows the different levels of inquiry.

	Pre-lab	Pre-lab	Lab	Post - lab	Post - lab
Inquiry Level	Proposes problem	Plans procedures	Carries out procedures	Supplies conclusion	Lab Outcomes
0	Teacher	Teacher	Teacher	Teacher	Teacher
1	Teacher	Teacher	Teacher	Teacher	Teacher/ Student
2	Teacher	Teacher	Teacher	Student	Student
3	Teacher	Teacher	Student	Student	Student
4	Teacher/ Student	Student	Student	Student	Student
5	Student	Student	Student	Student	Student

Modified from Science Teaching Forum 2007. American Physiology Society Professional Development Fellowship. Original from Frank Sutman, Temple University 1998

Next, the session focused on the classroom environment that would create opportunities for problem raising and solving. In pairs, the participants compared two different classroom scenarios and situations that showed two different environments concerning the role of the teacher and the learning moments. The participants were very reflective as they commented on the learning environment that teachers are responsible for creating. The discussion focused on the opportunities a teacher has to create to allow the students to pose problems and ask questions to be engaged in their leaning. The following organizer is a sample of inquiring into a certain problem. The participants were asked to share any other samples that they know or use.



After that, the participants deepened their knowledge on investigative and non-investigative issues through using a T-chart and placing the questions/issues according to their quality. They were highly engaged as they started thinking of the quality of each question and the teacher's purpose or objective behind it. Finally, the participants applied the new perspective they gained on inquiry in hands on activities using different tools to pose problems and set investigation plans. They worked in differentiated teams of four or five. The content included plants and the human body. They played the role of students as they used organizers to write down their observations and justify their thinking. In addition, they posed problems and came out with questions that drove their inquiries. The participants were given copies of all the material they read and the activities they conducted. In addition, they were provided with a handout on the tips of inquiry. The participants reflected on the whole session using the two stars and a wish strategy.

Conclusion: The strategies and tips used in this session model how inquiry in the classroom looks like. As participants think together, observe, compare, contrast, group, and ask questions, they realize the deep and critical thinking they want their students to acquire and apply. The strategies used make thinking visible to both students and teachers. They are also good tools for representing the science concepts as thinking and investigation processes, contrary to being mere facts. The participants found these strategies very useful to promote inquiry and create problem posing environments.

References:

Alan Cross & Adrian Bowden; Essential Primary Science
Patricia Wolfe; Brain Matters Translating Research into Classroom Practice
Robert Fisher; Teaching Children to Think
Christine Chin; "Open Investigations in Science: Posing Problems and Asking Investigative Questions"
http://www.hasti.org/2010/Inquiry-based%20Science.ppt
http://hea-www.harvard.edu/ECT/Inquiry/inquiryintro.html

Mathematics & Science

Measurement Problem Solving as a Context for Integrating Language and Mathematics

Calin Duke & Nisreen Ibrahim

The primary purpose of this session is to increase participants understanding of integrating math and language arts. Presenters will demonstrate to fellow educators not only the reasons for transdisciplinary education, but more importantly illustrate how easy, practical and logical it can be. Another goal of this session is to review, create, utilize and apply relevant assessment tools in a transdisciplinary lesson. The activities included in the session will support this goal by involving participants in a hands-on approach. Participants will be asked to solve a hand-on measurement problem. They will be provided with measurement tools to help them find a solution. Presenters will model writing the thought process of solving this problem so that participants can see not only how natural integration can be but, more importantly how writing can greatly aid students' understanding of math and their own metacognition. Conversely, participants coming from a language arts background can have a hands-on example of how mathematics can aid with writing skills such as using transition words, organizing paragraphs and summarizing.

The session is planned as follows: (a) Brief introduction and share agenda of session (3 minutes). (b) Participants will discuss the learning objectives for the math problem "How to Build a Bigger Yard: If you were given x amount of fencing what is the greatest area you could create?" (7 minutes). (c) Presenters and participants will briefly review different assessment tools that could be used for this activity. Participants are provided with an assessment menu to prompt them (3 minute). (d) Participants and presenters will practice creating a relevant rubric. Presenters will show participants how to create criteria for each level based on the learning objectives. Presenters will provide participants with finished rubrics for assessing both the math and language arts learning objectives for this activity (19 minutes). (e) Presenters will divide the participants into two groups: assessors and problem solvers. The problem solvers will work in pairs to solve the math problem while the assessors use the assessment tools discussed earlier to assess them (observation and rubrics) (19 minutes). (f) Presenters and participants will summarize the main issues that came up during the session and reevaluate and revise the rubric as needed (3 minutes). (g) Presenters will share an example of a student's paper "How I solved the problem 'How to Build a Bigger Yard." The participants will make observations of what key writing elements they see utilized by the math session (14 minutes). (h) Presenters will discuss the importance of using the results of the assessments to monitor student progress, assess student knowledge, and evaluate teaching practices. Also, presenters will discuss the importance of sharing the results of the assessments (students, parents,

colleagues, administration, etc). (5 minutes) (i) Presenters will have a question and answer session about topics/ideas discussed in the workshop (2 minutes).