



## **Impact of Note Taking in Higher Education: A Case Study of Bilingual Students of Saudi Arabia**

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### **Authors' contributions**

*This work was carried out in collaboration between two authors. Author GI designed the study, performed the statistical analysis and wrote the first draft of the manuscript. Author RP managed the analyses of the study and literature searches. Both authors read and approved the final manuscript.*

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### **ABSTRACT**

The main focus of the present study is to address the impact of note taking in higher education on the academic success of the bilingual students whose native language is not English. Although note-taking is frequently described as an important skill for university student success, there have been very few note taking research involving bilingual students in the Middle East. The main concern of the authors is to probe the relationship between note-taking strategy and students' listening comprehension (LC) ability especially in student centered approaches that provide learner with the best and efficient way of learning while in the classroom and after they graduate. To conduct the study (N=66) undergraduate students of communications skills from different disciplines e.g. Business, Law, Computer, Architecture and Humanities from Prince Sultan University, Saudi Arabia were selected for the experiment. They were then randomly divided into groups: instructed note-takers, and non note-takers, to investigate the impact of guided/ instructed note taking skill on the improvement of student's comprehension, critical thinking, retention and recall. The results in the present study showed that learning and applying note taking techniques improved comprehension of the content as well as the test scores of the students in exam.

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*Keywords: Note taking; bilingual students; effective learning; lifelong learning; listening comprehension.*

## 1. INTRODUCTION

The study aims to research an effective strategy of note taking and note making to enhance bilingual students learning. This strategy will make them independent learners with refined critical listening and thinking skills for a lifelong learning.

Furthermore, the students need to possess a number of features to be lifelong learners such as knowledge-seeker, self-confidence, persistence, and positive view towards value of learning. The other required skills include self-management skills like being well organized, time-management, help seeking and art of collaboration with peers. The lifelong learning also includes a note-taking skill that means writing notes in class and summarizing them in own words using different sources and high thinking order. The individual hardly remembers each and every word of the content described by the teacher during the lecture. Therefore, note taking helps students absorb important points of the lecture. This also facilitates to streamline and reorganize and review contents. The students can reflect back on the understanding of the concepts and better retention through notes.

The note taking starts with theoretical knowledge, but it takes practice to become an efficient and skilful note taker (Cohen et al [1]). The purpose of the note-taking empirical research is to improve, a) student's comprehension, b) clarity of the concepts so that they can write information in their own words and c) better retention to recall and d) critical listening and critical thinking skills.. Further it was observed by the resercher that a very small number of students take notes in the class. The tracking of the results of the students also indicaes that who had been involved in taking notes during class, had shown marked progress in their grades regarding midtermscores.

The teacher facilitates students towards effective learning through variety of teaching strategies like lectures, power point slides, and group discussions about various concepts. The verbal feed backs, video discussion, prompt writing assignments, open book quiz, presentations and online quizzes are also very effectgive stratafgies. These stratagies improve listening skills for better understanding, enhance students

reading and understanding skills in the class,develop critical thinkng skills, inspires for knowledge and use of information technology. The teacher is a facilitator to bridge the gap between understanding, reorganization of the concepts and its retrieval in an effective way to create a positive impact on students' academic and life long learning skills.

Following theortical model best explains the process of note taking for students effective learning:



**Fig. 1. Process of note taking**

### 1.1 Significance of the Study

Due to crowded classes, comprehensive course contents, time restrictions and limited opportunities, in terms of the objectives of higher education, it is necessary to develop learners' note-taking skills as one of the predictors of success for commonly used lecturing method. The study aims to research an effective strategy of note taking and note making to enhance students learning. This strategy will make them independent learners with refined critical listening and thinking skills for a lifelong learning. The purpose of the present study is to investigate the impact of note-taking while listening on comprehension skills. It tries to find out the effect of note-taking while listening on the comprehension and recall of informative, philosophical and narrative lectures that the learners listen to.

### 1.2 Research Questions

In line with this purpose, the present study seeks answers to the following research questions:

- 1) How does note-taking while listening affect listening comprehension?
- 2) How does note-taking affect student grades?

### 1.3 Research Methodology

The study was basically a quantitative and experimental in nature. The study has taken the sample of 66 bilingual students of two sections of communications skills from different disciplines e.g. Business, Law, Computer, Architecture and Humanities whose native language was Arabic from the different sections of communication course from the Prince Sultan University, Riyadh.

The section A was designated as experimental group and Section B was chosen as a control group. The data were analyzed through descriptive statistics.

Experimental group was explained the following steps: Students were provided awareness and guidelines about the importance of taking notes and reorganizing them. Main area of focus was to educate students on various note-taking styles as a tool to understand complex concepts, enhance critical thinking, and develop active listening, enhancing writing skills, reorganizing information, better retention and retrieval for lifelong learning skills. Students were introduced different methods of note taking on the white board like Cornell method, mind mapping, charting method and linear notes style.

The students were told to follow the provided rubric after the completion of each chapter and submit their notes for checking and grading.

**Table A. Rubrics for note taking**

<b>Rubric Note Taking Points Table</b>	
2 points	Information with vague information
3 points	Complete information with organization but no examples
4 points	Complete information with organization and examples
5 points	Complete information with organization and examples with high thinking order

Students were guided about the importance of these techniques. They learnt that how to track progress automatically from the comparison of their notes observing their development as an independent learner. Note taking and note making strategy will enhance their skills to write

and organize the contents for the better retention. The control group had not been explained anything about the note taking technique.

### 1.4 Literature Review

The academics have investigated in detail the impact of note taking on overall academic learning and published amount of scholarly literature. Crawford [2] investigated the connection between note taking and test scores in school courses of psychology and the general field of education. Students recorded notes utilizing their standard note taking practices. He obtained positive correlation between the number of ideas recorded in personal notes and the grades obtained in a quiz. The correlation between total points of the notes and the quiz were consistently much stronger). According to Ward and Tatsukawa [3], the note-taking has two functions. Firstly, the notes created are valuable for reviewing and secondly, the procedure of note-taking itself helps students learn the material. There are number of other advantages as good time is consumed with concept while recording and reproducing notes, concepts rest in mind during noting and concepts re-encoded from the start rationally to better think, apply and recall.

According to Dunkel and Davy [4] there is general agreement among American students and teachers alike that taking notes on lectures aids the way toward learning and retaining the information. They conducted survey of 164 students, 92% of the international students and 94% of the American surveyed through a questionnaire on the value and practice of taking notes. Their study reported that note taking is a significant activity that contributes in the process of learning and recalling the materials. The notes-taking is an effective habit best explained by the term Metacognitive. Metacognitive describes information processing theory to indicate an executive function, strategies that involve planning for learning, thinking about the learning process as it is taking place, monitoring of one's production or comprehension, and evaluating learning after an activity is completed (Purpura (1997); cited in Brown [5]). The study of Slotte&Lonka [6] regarding note quality showed that the participants who summarized the content of the text resulted in better performance in all tasks in contrast with those who produced notes following the text order or verbatim notes. The amount of note-taking was also positively related

to text comprehension. They reported that in spontaneous note-taking summarizing is different from using other strategies which require the elaboration from words to importance units in one's own words. These strategies prompt a deeper level conceptual description than replicating, verbatim notes and underlining contents. The notes-taking during lectures causes higher accomplishment and same results are gained by reviewing Kiewra [7]. The complete notes present the main ideas of the lecture along with supporting details. The partial notes such as outline or guided notes are a deliberate incomplete form of the instructor's delivered lecture. Both types of instructor-provided notes have been reported to have a positive impact on learning. The students can focus more on lecture activities related to the notes, and better process the key information included in the notes Kiewra [7]. The power point summaries provide good notes to the students. The missing of note-taking process in such case is not harmful rather it is the actual taking and restructuring of notes. The note taking and restructuring process is very vital and an exercise in "active learning" that can develop students' education (Chickering and Gamson [8]). Therefore literature report that Individuals retain materials that they have generated better than materials that have been created by others and given to them (Foos, Mora and Tkacz [9]). Furthermore, students also remember during note taking, particularly when they participate in deep comprehension of the source (Williams and Eggert [10]). Moreover, the more students record, the more they remember and the better they perform on exams (Johnstone and Su [11]).

About 98% of college students engage in some form of note-taking during lectures. They account for exam performance better than wider-scope predictors such as verbal ability and Grade Point Average (GPA). This study examined the relationship between lecture note taking behaviors and academic performance. The relationship is found among lecture note taking behaviors, information-processing ability, and more global measures of ability (i.e., GPA and ACT American College Test) Previous research had not investigated working-memory ability and specific note taking behaviors. Four types of information were gathered from the 32 undergraduate students participating in this experiment: (a) score on a test of information-processing ability, (b) analyses of notes taken during a designated lecture, (c) score on a test pertaining to that lecture, and (d) score on a

course exam covering several other lectures. In addition, GPA and ACT scores were drawn from each student's records. Results confirmed that amount of note taking is related to academic achievement. It is also established that ability to hold and manipulate prepositional knowledge in working memory is related to the number of words, complex propositions, and main ideas recorded in notes. The stepwise multiple regression analyses indicated that this information-processing ability was a more significant predictor of complex propositions and words recorded in notes than were global measures of ability such as GPA or ACT scores. This research is of practical importance because pedagogical activities may reduce cognitive strain associated with note-taking and because information-processing ability is, in part, controllable (Kiewra et al. [7]). The researchers have attempted many studies in last few years to confirm that note-taking helps students' learning outcome. The notes are perceived as good as the research material for review (Ladas [12]). Note taking is perceived as a critical activity which upgrades learning in learning settings. Notes are basic for reviewing what has been heard or seen, and can promote reflection afterwards (Nguyen [13]). According to Boyle [14] earlier studies have validated that explicit teaching of note-taking skills has enhanced the quality and quantity of notes. Teachers should include note-taking skills within the curriculum (Evans, Pelham and Grudberg [15]). The students who take notes score higher on both immediate and delayed tests of recall and synthesis as compared to students who do not take notes (Kiewra et al. [7]).

## **2. NOTE-TAKING IN THE DIGITAL AGE**

Advancements in technology such as tablet computers, mobile applications, and recorded lectures are altering classroom dynamics and affecting the way students compose and review class notes. Because of these technology advantages, some students may prefer digital note-taking vs traditional handwritten notes (Elizabeth, Moore, Stacy and Jeff [16]). These tools may improve a student's ability to take notes, but they also may hinder learning. When we look at the practice of note taking, it involves many processes. The note taker pays attention to the speaker, understands the content and note down what is important. Note taking is not just a simple act of writing down the information but actually it becomes complicated when a note taker has to understand, synthesize and record

information under the pressure of time and to catch the pace of writing with the speaker. It's a common observation that writing and typing takes more time in recording information than speaking.

Today's world is a world of technology and is widely used to shape the knowledge of the students in a variety of ways. According to Muller and Oppenheimer [17] learning is not just transcription of the information rather it is more than that. When we expect learners to synthesize content, draw conclusion, assess and evaluate evidence to apply in diverse situation, we require more deep and effortful cognitive learning styles.

Further a study by Piolat et al. [18] provides us the evidence that students taking handwritten notes on factual and conceptual questions showed improved performance than students who digitally typed notes.

Though many computer based note-taking applications have been developed to enhance students content structuring and memory, yet their effect on learning has not been assessed effectively. Bauer and Koedinger's [19] study aimed to evaluate the effect of copy paste feature of note taking application on the development of learning. The findings of the study showed that the use of copy paste application can create negative impact on learning process. Further they revealed that the pasters' could incline towards wordier notes associated with the concept without considering its significance or insignificance. There may be chances that students' record notes just by surface structure and not even by reading the content.

In this rapidly changing technology society students need to learn to use diverse digital tools of note taking. Though many applications like Microsoft OneNote, Ever note and Note shelf had been introduced to facilitate note taking skill of the learners but still there is a great need to provide evidence based recommendations to the learners and the teachers to know which techniques can be considered effective to enhance note taking as a lifelong learning skill.

### 3. FINDINGS AND RESULTS

The study reveals very fruitful insight and interesting findings from the well-planned experiment. The students in the experimental group were more attentive towards explanation of the concepts, critical questions and the

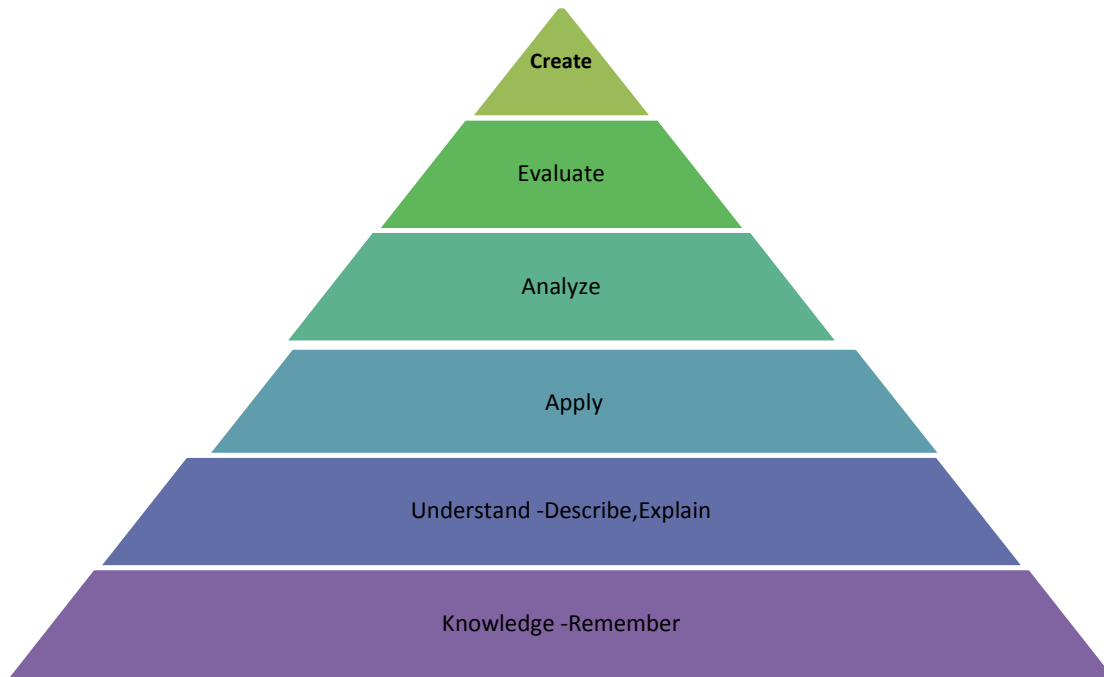
information as compared to control group. They had the freedom of taking and making notes in any medium like linear, cornell, mind mapping or any random method. The students were asked to submit notes after the end of each chapter. They were checked and returned with remarks for improvement. Few of the students from control group were also observed taking notes during the lecture. It was observed that highly motivated students showed great interest in adopting note-taking technique to get excellence in their grades. The students, having comprehension and writing pace challenges, faced difficulty in taking notes in class. The comparison of the data of the experimental and the control group revealed an improvement drift of the students who followed note taking and note making strategy.

A short survey questionnaire (attached in appendix) was given to the students to get feedback. It showed considerable agreement on the fact that note taking and note making skill can be helpful in improving their grades. 58% of the students summarize their notes in their native language, 92% found this technique as a very effective study tool, 75% suggested that note taking skill should begin from Preparatory Year Program.

The aim of the study was to investigate how to make students independent learners with better understanding of the concepts. The findings of the opinion based question are as follows:

- It made the information more easier to remember.
- It is important for me because I write concepts in my own language.
- It helps me to remember important points in lecture.
- Writing in own words helps to remember better.
- The grades in the first midterm become very good because of note taking skill.

The results in the present study showed that learning and applying note taking techniques improved comprehension of the content as well as the test scores of the students in mid term exam. The study found that due to note taking and note making skill, students have shown obvious improvement in some of the specific domains like remembering, comprehending and analyzing. Bohay et al. [20] tested the influence of active engagement as note taking and its review, the findings of the study suggested that note taking demonstrated great benefit at the deeper level of understanding.



**Blooms's Revised Taxonomy**

### 3.1 Descriptive Statistics

Table 1 of descriptive statistics shows trends of student taken part in notes taking learning as experimental group and those who are in control gorup. The experimental group one students taking notes average score is 17 and control group two students not taking notes average score is 15 out of 20 attainable score. This indicates healthy impact of note taking learning on students. The standard deviation of experimental group (2) and of control group (3) also shows the high consistency of score by experimental group.

**Table 1.**

<b>Descriptive Statistics N#66(S.1 note taking and S.2 not note taking)</b>				
<b>S.</b>	<b>Mean</b>	<b>Std deviation</b>	<b>Minimum</b>	<b>Maximum</b>
1	17.3	2.0	12	20
2	14.7	3.0	9	19.8
32			14.7	
33			17.3	

Figure in the appendix 1 presents in detail all the grades obtained by control and experimental group.

- Bilingual student who take or make notes become more independent and confident learners.

The findings suggest that:

- Providing instructions to students for note taking technique improved their comprehension of the contents as well as test scores in mid term exams.
- Note taking skill creates positive impact on the academic success of the bilingual students.

The significant results of the study indicate that students are capable of being highly successful when given a foundation of note taking technique with rubric to grade notes. They can experience growth over time by improving note taking skills. The study found that students have become more proficient in directing their own learning. They showed interest to select their own format of taking notes like mind map,

cornell method, linear method or any random style. In a study Wan and Yu [21] found that students teaching note taking strategy significantly improved their performance in note taking and reading comprehension and below average students showed the greatest gains in note taking skills with instructions.

On the otherhand, The students less interested in taking notes ultimately depend on their rote memory without understanding the complex concepts because of the lengthy contents.They are totally dependent on the text book and slides and not able to relate information with their real life situations and critical thinking .The bilingual study method takes plenty of time for them to review from the book, comprehend, reorganize targeted information and retrieve.This leads towards shallow learning, low motivation and minimized critical thinking.The absence of strategy to reorganize information for better retention make students overburdened of the contents This creates a negative impact on their mental abilities and also affect their result or GPA. The levels of blooms taxonomy are understood to be successive, so that one level must be mastered before the next level can be reached [22].

According to the results of the study, there were higher levels of comprehension in favour of the participants who took notes while listening to the lectures. It is recommended that learners be trained to acquire active learning, active listening and note-taking skills.

#### **4. CONCLUSION AND SUGGESTIONS**

Research on note taking indicates that taking notes during lecture and reviewing those notes either in class or afterward have a positive impact on students learning.Students who takes notes scores higher grades compare to others non note taking students. Time prior to exam review of note taking facilitataes both recall of factual material and the synthesis and application of new knowledge.The reserachers in the research attempted to review some of the stretgies for improving student effctive note taking and listening comprehension skills. Effective note taking is an important academic activity remains an integral part of the learning process, even on our high-tech campuses and for bilingual students. While some strategies might have changed over time, students will always need help in fine-tuning their skills, and if we want our students to be successful learners, it

can't hurt for us to offer a little guidance. The good teacher always tries to develop effective study skills in the students. Such teacehrs enable the students to succeed beyond college level to the workplace and to involve them in active learning process. The note taking is also a less easy process, and involves a complex set of skills and communication between instructor and the students. The good teachers understand well that bilingual students find it difficult to identify the important concepts to record and insignificant concepts to give less importance. The students are not able to catch up with teacher's pace in class because of the comprehension and writing pace challenges. Cummulative effect of note taking with multiple lectures of other courses should be included in the investigation process to find the efficacy of this technique over time. Number of students needed to be increased to get more reliable results. It is suggested that note taking and note making skill should be integrated as a part of course content for Preparatory year students during their transition period towards college or university, so that they can learn and apply this technique to other courses as well.

#### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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## APPENDIX 1

### Note Taking Survey for under graduate Students

#### Research Study Description

This questionnaire is related to the research "Impact of Note Taking in Higher Education: A Case Study of Bilingual Students" which seeks to identify and examine the effect of note taking in higher education. The study aims to research an effective strategy of note taking and note making to enhance students learning. This strategy will make them independent learners with refined critical listening and thinking skills for a lifelong learning.

#### Note- taking:

Note taking is the practice of recording information captured from another source. By taking notes, the writer records the essence of the information, freeing their mind from having to recall everything.

#### Participants:

To conduct the study 66 bilingual undergraduate students of two sections of communications skills from different disciplines e.g. Business, Law, Computer, Architecture and Humanities from Prince Sultan University, Kingdom of Saudi Arabia were selected for the experiment.

#### Confidentiality:

Information will be kept confidential, and no personally identifiable information will be used in any publication or presentation resulting from the research. All survey information will be stored securely.

Please complete the information:

Age: \_\_\_\_\_

Major: \_\_\_\_\_

Native language: \_\_\_\_\_

1. Do you take notes in class, if yes which medium you prefer for taking notes?
  - a. Paper
  - b. Laptop
  - c. Any application for note taking
2. Which one of the following pattern of note taking you follow to take notes in class?
  - a. Linear method
  - b. Mind mapping
  - c. Cornell method
  - d. Any random style
3. Do you summarize your notes in your own words in your native language?
  - a. Completely
  - b. To some extent
  - c. Not at all
4. Before joining university did any of your teacher educate you how to take and make notes?
  - a. Yes
  - b. No

5. After joining university did your teacher explained about the benefits of note taking in the beginning of the semester?
  - a. Yes
  - b. No
6. Do you know the difference between note taking and note making?
  - a. Yes
  - b. No
  - c. To some extent
7. Do you think note taking is a useful technique to understand the concepts effectively?
  - a. Yes
  - b. No
  - c. To some extent
8. Do you think note taking & note making can be helpful in improving your grades?
  - a. Yes
  - b. No
  - c. No opinion
9. Do you think Note taking should be taught in PYP courses as a complete module?
  - a. Yes
  - b. No
  - c. No opinion
10. Do you think note taking can help you in your professional success?
  - a. Yes
  - b. No
  - c. To some extent

Any additional comment:

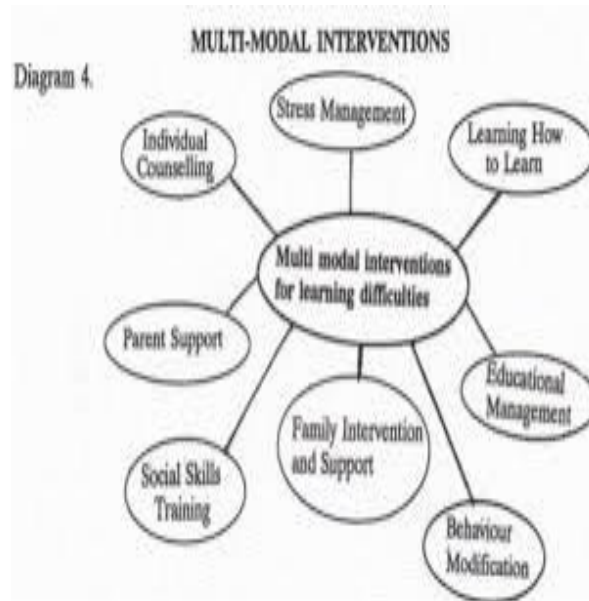
<b>List of Note Taking Students grades in MidTerm Examination (Experimental group)</b>	
<b>Student No.</b>	<b>Marks out of 20</b>
1	15
2	18
3	16
4	19
5	19
6	19
7	19
8	18
9	16
10	16
11	12
12	19
13	19
14	18
15	17
16	17
17	16

<b>List of Note Taking Students grades in MidTerm Examination (Experimental group)</b>	
<b>Student No.</b>	<b>Marks out of 20</b>
18	20
19	20
20	13.7
21	14.3
22	20
23	18.7
24	18.5
25	16
26	13.7
27	16.7
28	20
29	17.3
30	18.7
31	16
32	16
33	17.5

<b>List of Non- note taking Students grades in MidTerm Examination (Control group)</b>	
<b>Student No.</b>	<b>Marks out of 20</b>
1	12
2	12
3	13
4	15
5	17
6	19
7	16
8	15
9	17
10	14
11	13
12	10
13	15
14	18
15	15
16	17
17	13
18	19
19	10
20	16
21	09
22	19.8
23	10.7
24	12.5
25	12.3
26	10.7
27	12.7
28	19.7
29	16
30	18
31	17

## APPENDIX 2

### Mind map Guidelines and Instructions





○	<b>Forces in Creation</b>
○	1) Introduction a. What is force? b. What is gravity?
○	2) The Four Fundamental Forces of Creation a. Gravitational force - attracts objects to each other. Weakest of the four forces. b. Electromagnetic force - force that exists between particles with an electrical charge. c. Weak force - governs some radioactive processes in atoms d. Strong nuclear force - force that holds the center of the atom (nucleus) together.
○	3) The Gravitational Force a. Newton's Universal Law of Gravity 1. All objects with mass are attracted to one another by the gravitational force. a. all matter is attracted to all other matter b. applied to anything in the universe that has mass 2. The gravitational force between two masses is directly proportional to the mass of each object. a. strength of the gravitational force between two objects increases as the mass of either object increases. 3. The gravitational force between two masses is inversely proportional to the square of the distance between those two objects. a. when the distance is big, the force is small. When the distance is small the force is big.
○	4) Force and Circular Motion a. Centripetal Force - Force that is always directed perpendicular to the velocity of an object. This makes an object move in a circle. 1. Circular motion requires centripetal force. 2. The larger the centripetal force, the faster an object can travel in a circle. 3. The larger the centripetal force, the smaller the circle of motion
○	5) The Gravitational Force at Work in Our Solar System a. Planets are attracted to the sun. This is a perpendicular force, therefore the planets revolve around the sun.
○	6) Comets a. A comet's orbit is elliptical. b. They are not visible until they are near the sun, then they get so hot that the ice turns into gas. That is when we can see them.
○	

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