

HONS 497 Senior Honors Thesis Credits 2 (2 minimum required)

Directions: Please return signed proposal to the Honors Office **at least one week prior to your scheduled meeting with the Honors Council**. This proposal must be accepted by Honors Council the semester before presentation.

Student's Name: Joshua Ahn

Primary Advisor: Dr. Anneris Coria-Navia

Secondary Advisor: Dr. H. Thomas Goodwin

Thesis Title: The Use of Graphic Organizers in Note-taking and Review

Local phone: (630) 750-9292

Email: ajoshua@andrews.edu

Expected date of Graduation: Fall 2017

I. Provide goals and brief description of your project or research.

Note-taking and the subsequent review of those notes have generally been thought to be important strategies that contribute to student learning. Additionally, note-taking has been shown to be related to overall course performance (Kiewra, 1983). However, it has been shown that most college students tend to organize their notes in a linear or an outline form (Gubbels, 1999). While this has certain benefits, especially when it comes to simplifying information in a hierarchical manner, it has been shown that a linear organization has the tendency to restrict certain aspects of learning, especially in the relational sense (Kiewra et al., 1999). Furthermore, personal notes taken solely by the student have the tendency to be insufficient, despite the fact that they have the potential to increase student attention during lecture (Baker & Lombardi, 1985).

In an attempt to provide an optimal learning system, the SOAR study method, developed by Jairam and Kiewra, proposes study strategies that include selection, organization, association, and regulation of information (Jairam & Kiewra, 2009). Particularly in organization, the use of graphic organizers as a means of note-taking is presented as a way to encourage students to think relationally. These graphic organizers, which include hierarchies, sequences, matrices, and illustrations, particularly localize information and focus on relationships between related ideas, making it easier for students to connect associated concepts (Kiewra, 1989). Moreover, studies have shown that students actually garner more facts and connections through matrices than they do through outline notes with the same content (Kaufmann & Kiewra, 2010).

Thus, the goal of this research project is to assess the effectiveness of graphic organizers in note-taking during lecture as well as review afterwards, specifically in a college-level biology classroom. The population for this study includes all the students in a

Foundations of Biology class. They will be provided with an intervention involving graphic organizers for two different chapters in the class. During these chapters, they will only be given matrix-style notes (rather than the usual outline-style notes provided) for note-taking and review in an attempt to encourage relational learning. In order to test the efficacy of the organizational component of the SOAR study method and the use of these graphic organizers, student performance will be evaluated through the analysis of scores on related test questions and student attitude will be examined through an online survey. The results of this analysis will allow students and professors alike to work together to process and organize information in a way that is more efficient and effective.

II. *Outline your methodology. Please be specific. How does this achieve your goals and how reliable is it?*

The population for this study includes students in a Foundations of Biology class who have already been given a set of guided notes with blanks interspersed amongst the information for each chapter that are given in an outline format (provided by the professor). However, students will be given an alternative form of guided notes that are arranged into a series of graphic organizers in place of the outline notes for several selected chapters. The notes will be developed in such a way that will seek to spatially place the information in a manner that will emphasize the relationships between different subjects and main ideas, particularly when it comes to key differences, similarities, and progressions. These alternative notes will have information and blanks that are identical to the original notes that would have been given in previous chapters, but will differ in form and the organization of the aforementioned information. This is done in order to ensure that the type of organization that is encouraged in the SOAR method regarding graphic organizers will be the main area of interest rather than the impact of the actual content of the notes themselves. In order to encourage them to participate in the note-taking intervention, students will be allowed to turn their notes in with the quiz or test provided at the end of the week for a few bonus points on the corresponding test or quiz. Bonus points will also be given for turning in outline notes with the corresponding test or quiz in the other specified control chapters as well.

After the intervention, quizzes and tests that include questions from the observed chapter will be examined. Questions regarding the particular chapter will be selected, and each student will be scored based upon how many of these specific questions they were able to answer correctly. Scores will be taken out of the total number of these selected questions rather than the total number of points or questions available on the test or exam. These data will then be compared with other chapters in the class that are of comparable length and difficulty to the chapter in which the intervention took place as well as quizzes and tests from previous years. A similar procedure will be followed for both of these sets of tests and quizzes, where only questions regarding the observed chapter will be selected for analysis. Because the same students are being tested for both units and both trials are receiving a type of intervention in guided notes, whether they are in outline or graphic organizer form, we are able to say that both samples are identical. Thus, these achievement test scores will be analyzed mainly with the use of paired t-tests, which will indicate whether or not there is a significant difference between the mean scores of the units with graphic organizers and the corresponding units with outlines. Additional tests might include ANOVAs and correlations, which would account for other potential variables. These results will address the efficacy of

the graphic organizers in relation to the effectiveness of the outline notes on student performance in the Foundations of Biology class.

The collected graphic organizers will also be observed for completion and quality of work. Afterwards, students will be asked to complete an online questionnaire. They will be invited to participate in the survey following the intervention but their participation is voluntary. These data will be analyzed through a summary of the written comments as well as descriptive statistics. This will ultimately be done in order to assess how students feel about the use of these graphic organizers and to document student attitude and perception of this alternative study method.

III. Explain in what sense your project is original, unique, or beyond normal senior expectations. How does it relate to current knowledge in the discipline?

This study is built upon a fairly novel set of developed concepts and techniques known as the SOAR study method. An acronym standing for Selection, Organization, Association, and Regulation, the SOAR study method looks to directly address and improve several aspects of learning that have been problematic over the years (Jairam & Kiewra, 2009). This particular study deals with the organizational component of the method, as graphic organizers tend to be encouraged over linear outlines when it comes to note-taking in light of the fact that outlines have been shown to have a tendency to restrict relational learning (Kiewra et al., 1999).

There have actually been several lines of research regarding the use of graphic organizers in college-level courses, but many of the prior studies that have been performed do not completely simulate an actual classroom setting. Thus, this particular project is unique in the sense that many of the components involved, such as the tests and quizzes and the normally provided outline notes, were already a part of the class prior to the project and thus add to the setting of an actual classroom environment. Additionally, because this project is focused on the use of graphic organizers specifically within the Foundations of Biology classroom, it is an interdisciplinary amalgamation of both biology and education, setting it beyond the usual expectations of both biology and education majors.

IV. Include a substantive annotated bibliography of similar or related work.

Antoine, K. (2013). The effect of graphic organizers on science education: Human body systems. Thesis. Retrieved from http://etd.lsu.edu/docs/available/etd-06282013-234535/unrestricted/Antoine_thesis.pdf

This doctoral dissertation shed light upon the effectiveness of the use of graphic organizers in a high school Biology classroom. Overall, this study concluded that lectures utilizing graphic organizers was positively related to student achievement, particularly due to the fact that these organizers allowed for a more interactive lecture. The methodology was particularly pertinent to my study, as the researcher also chose to observe several units in which graphic organizers were utilized, comparing pretest and posttest scores of these units with those of other units that used a regular guided notes lecture.

Gubbels, P.S. (1999). *College student studying: A collected case study* (Unpublished doctoral dissertation). University of Nebraska-Lincoln, Lincoln, Nebraska.

This population for this study was five community college students in a general psychology class. The study habits of these five students were documented and studying logistics, study processes, self-perceptions, and more were recorded and analyzed. Ultimately, the researchers were able to find that commitment to learning, a more methodical study method, and proper academic and societal support had the largest impact in studying. Of particular interest was the observation that all five students chose to record their personal lecture notes in an outline format, which can allude to the tendency for students to record notes in a more linear form as opposed to a graphic organizer.

Hawk, P. P. (1986). Using graphic organizers to increase achievement in middle school life science. *Science Education* 70(1): 81–87.

This particular study examined the use of graphic organizers with in a middle school classroom with advanced sixth grade students taking a life science class that is normally taken by seventh graders. The researchers were able to find that the experimental group of advanced sixth grade students utilizing graphic organizers indeed displayed an improvement in the pre-test and post-test scores that was statistically greater than the control group of seventh graders not utilizing said organizers. This is significant to my study in that it further displays the wide-reaching efficacy of the use of graphic organizers, particularly in science classrooms, as this method is applicable to middle schoolers as well.

Horton, S.V., Lovitt, T.C., Bergerud, D. (1990). The Effectiveness of Graphic Organizers for Three Classifications of Secondary Students in Content Area Classes. *Journal of Learning Disabilities*, 23, 12-22.

This study investigated the use of graphic organizers with different types of students, such as disabled students or remedial students. In addition to these groups, a group of regular students was also tested, and it was demonstrated for all three groups that graphic organizers in a number of different circumstances led to a higher performance compared to self-study. This study also adds to the concept that graphic organizers have the potential to be effective for a wide variety of different types of students in addition to students of different ages.

Jairam, D. & Kiewra, K.A. (2009). An Investigation of the SOAR Study Method. *Journal of Advanced Academics* 20: 602.

This article outlined the SOAR study method, detailing and supporting each of the four different facets that are included therein. Additionally, the researchers included a study regarding the efficacy of the method, which tested the various sections of the method along with different combinations of the facets involved. Ultimately, the researchers were able to find that the SOAR study method led to great improvement in relationship learning. Of particular interest to my study was the section regarding organization, in which the subject of graphic organizers and why they are theoretically superior to outline format notes is elaborated upon.

Katayama, A. D., and Robinson, D. H. (2000). Getting students partially involved in note-taking using graphic organizers. *Journal of Experimental Education* 68: 119–133.

This study looked into the benefits of encoding in graphic organizer and outline notes. Through a methodology of spaced study and review, the researchers were able to observe that on the exam testing application, graphic organizers were more effective than outlines, with partial organizers appearing to be more effective than complete notes. Therefore, this study was relevant in the sense that it demonstrated how partial guided notes, especially in graphic organizer form, can lead to improved application of information due to the encoding benefits involved therein.

Kauffman, D.F. & Kiewra, K. A. (2010). What makes a matrix so effective? An empirical test of the relative benefits of signaling, extraction, and localization. *Instructional Science*, 38, 679-705.

This paper sought to outline the reasoning behind the effectiveness of matrix notes. Researchers were able to find that matrix notes were most effective when it came to learning facts and connections due to its ability to localize and organize related ideas and information. Additionally, this study was of particular interest due to the fact that it showed that certain matrices prove to be more useful than others, demonstrating that the localization of topics and categories within a matrix is oftentimes as crucial as the use of the matrix itself.

Kiewra, K.A., Kauffman, D.F., Robinson, D., DuBois, N., & Staley, R.K. (1999). Supplementing floundering text with adjunct displays. *Journal of Instructional Science*, 27, 373–401.

This comparative study observed the learning potential of just text as opposed to outline and matrix style displays. This study was very similar to my own in that the three modes of study (text, outline, and matrix) were informationally similar. The researchers were able to find that the matrix displays led to the greatest amount of relational learning compared to the outline and the text alone, while the outline display was still better than the text alone.

Kiewra, K.A. (1983). The relationship between notetaking over an extended period and actual course-related achievement. *College Student Journal*, 17, 381–385.

Examining the effect that note-taking can have on course performance, researchers were able to find by observing several undergraduate students that there is a strong relationship between the number of points recorded in notes and achievement in the course. This was relevant as the graphic organizers that are utilized in my study are intended to assist in the note-taking process.

Kiewra, K. A. (2012). Using Graphic Organizers to Improve Teaching and Learning. IDEA Paper# 51. IDEA Center, Inc.

This paper was particularly helpful in outlining the different types of graphic organizers as well as detailing the rationale behind each particular organizer. Introducing hierarchies, sequences, matrices, and illustrations, the author was able to give a thorough overview of the

strengths and potential weaknesses of each specific form. This paper was useful in the development of the graphic organizer notes used for my study.

Robinson, D., & Kiewra, K. A. (1995). Visual argument: Graphic organizers are superior to outlines in improving learning from text. *Journal of Educational Psychology*, 87, 455-467.

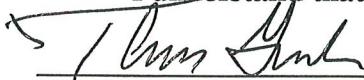
This study sought to investigate the types of information that graphic organizers help students learn. The researchers were ultimately able to observe that students who were allowed to study the graphic organizers for enough time were able to learn more hierarchical and coordinate relations. Additionally, the students who utilized these graphic organizers were able to apply and integrate that knowledge in an essay format more successfully than those who did not have the graphic organizers. This study is of particular relevance due to the fact that it seeks to simulate a more realistic classroom setting with a unique method of testing learning and comprehension.

V. Provide a statement of progress to date and list the research methods coursework completed.

Up to this point, I have completed the Honors requirement (Research Pro-Seminar). I began my research this semester (Spring Semester of 2017) and the project URS funded for both Spring and Fall Semester of 2017. Also during this semester, I have developed one set of graphic organizer notes for a chapter in Foundations of Biology and have distributed this graphic organizer to the students.

Department Chair Approval

- This student's performance in his/her major field is acceptable.
- He/she has completed the requisite research methods coursework for the research to be pursued.
- I understand that he/she plans to graduate with Honors.



Department Chair (signature)

Research Advisor Approval

I have read and support this proposal: 

Primary Advisor (signature)

I have read and support this proposal: 

Secondary Advisor (signature)

If human subjects or if live vertebrate animals are involved, evidence of approval from the Institutional Review Board or an Animal Use Committee is needed through the campus scholarly research offices (Ext. 6361).

January 27, 2017

Joshua Ahn

Tel. 630-750-9292

Email: josh.ahn7@gmail.com

RE: APPLICATION FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS
IRB Protocol #:16-149 **Application Type:** Original **Dept.:** Teaching, Learning & Curriculum
Review Category: Exempt **Action Taken:** Approved **Advisor:** Anneris Coria-Navia
Title: The effect of graphic organizers on note-taking in Foundations of Biology.

Your IRB application for approval of research involving human subjects entitled: *"The effect of graphic organizers on note-taking in Foundations of Biology"* IRB protocol # 16-149 has been evaluated and determined Exempt from IRB review under regulation 46.101 (b) (2). You may now proceed with your research.

Please note that any future changes (see IRB Handbook pages 11-12) made to the study design and/or informed consent form require prior approval from the IRB before such changes can be implemented. In case you need to make changes please use the attached report form.

While there appears to be no more than minimum risks with your study, should an incidence occur that results in a research-related adverse reaction and/or physical injury, (see IRB Handbook pages 12) this must be reported immediately in writing to the IRB. Any research-related physical injury must also be reported immediately to the University Physician, Dr. Katherine, by calling (269) 473-2222.

We ask that you reference the protocol number in any future correspondence regarding this study for easy retrieval of information.

Best wishes in your research.

Sincerely,



Mordekai Ongo
Research Integrity and Compliance Officer