
***A GUIDE TO GRADUATE STUDIES
POLICIES, PROCEDURES, & FORMAT***

AY 2019-2020

**California State University, Chico
Office of Graduate Studies**

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PREFACE

Welcome to California State University, Chico. I am pleased you have selected our campus for your graduate studies. In order to make your time here as uncomplicated as possible, this guide has been developed to provide you with important information that will facilitate your progress to the master's degree. It includes an overview of rules, regulations, and policies, helpful information and hints about how to quickly progress through your graduate program, and information necessary for the preparation and submission of the final copy of your thesis or terminal project.

Although information about the format of the thesis/project is specific and detailed, the information concerning policies and regulations is extracted from other sources and may not be complete. It is the responsibility of every graduate student to be familiar with both University regulations and policies as stated in the *University Catalog* as well as with requirements established by each department.

You should periodically consult with your Graduate Coordinator to ensure timely completion of your degree. If you have further questions about Office of Graduate Studies requirements or procedures for completion of the master's degree, please check with the Office of Graduate Studies. It is the goal of our office to assist graduate students with the completion of all necessary paperwork. The more informed you are of policies and procedures, the more likely your graduate education will progress smoothly. Best wishes for a fulfilling and successful graduate experience.

Dr. Sharon Barrios, Interim Dean of Graduate Studies

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CHAPTER I

FROM ADMISSION TO GRADUATION

Being accepted into a master's program is the first step in the journey through a graduate degree program. Upon entering Office of Graduate Studies, one is faced with a series of questions about timelines, deadlines, Office of Graduate Studies procedures, departmental requirements, and university policies. Questions soon surface: How are graduate advisory committees established? How are thesis/project topics chosen? How is a graduate program approved? What are the requirements for a thesis or project? Are there qualified formatters?

This manual has been developed in response to graduate student questions and needs. While it is not possible to address all potential situations, we have attempted to answer the most commonly asked questions. The following pages will help guide the master's student from the point of developing a program to the final submission of the project or thesis.

Acceptance to a Program

Each graduate student receives an acceptance letter which states the level at which the department recommends admission. Individual departments may also include a letter that stipulates any specific conditions of the admission. A graduate student's status falls into one of four categories:

1. Conditionally classified. A conditionally classified student has been admitted to the desired master's degree program, but has not been formally approved for master's degree study and is taking steps to meet specific requirements outlined by the university and the department to qualify for "classified" status.

2. Classified. A classified master's degree student has been formally approved by the department and the Office of Graduate Studies to pursue master's degree study.

3. Candidate. A student is advanced to candidate status (candidacy) only after demonstrating a significant ability and aptitude for the discipline.

General prerequisites for admission to conditionally classified and classified status and for advancement to candidacy are listed in the *University Catalog*. Specific departmental requirements are in each department's master's program listing.

Advancement within the levels occurs once the necessary university and departmental requirements have been met. A change in classification from one level to another is initiated by the student with a request to the departmental graduate coordinator.

Note for International Students

In order to complete their graduate degree, all international graduate students must follow all of the rules and instructions in this guide. However, in order to maintain proper immigration status, international students also have additional (or stricter) restrictions and responsibilities. For this reason, it is very important that international students maintain close contact with the International Student Advisors in Student Services Center 449.

Beginning the Program

Upon entering the program, become familiar with university and departmental policies and regulations. Are the policies formal or informal? Are the deadlines firm or flexible? Are there guidelines for establishing the graduate advisory committee? Read all departmental brochures and handouts and be sure to spend some time with your departmental graduate coordinator as soon as possible. Above all, read the *University Catalog*. While the university faculty and staff are available for information and assistance, it is ultimately the student's responsibility to meet all academic and administrative deadlines and requirements set by the department and the Office of Graduate Studies.

Become familiar with the faculty in your department and inspire them to become familiar with you. Establish regular communication with your departmental graduate coordinator. Get to know other students. Their first-hand experiences with instructors and courses may help you avoid some of the pitfalls common to graduate programs.

The Master's Degree Program Plan

During the first year, graduate students should submit a completed Program Plan form to the Office of Graduate Studies for approval. This form establishes both the members of your graduate advisory committee and the courses comprising the graduate program. The Program Plan is essentially a contract between the graduate student and his or her graduate advisory committee.

Prepare the Program Plan by developing a schedule of courses and meeting with your departmental graduate coordinator and the graduate advisory committee chair to have the program approved. Be sure to check the *University Catalog* to see that:

1. All major requirements are met.
2. The program meets the university requirements stated in the Graduate Education section of the *University Catalog*.
3. All prerequisites for the courses will be or have been met.

The Graduate Advisory Committee

Forming a graduate advisory committee is one of the most important decisions to be made in a master's program. Until a committee is selected, the graduate program coordinator should be consulted for information and advice. The graduate coordinator assists in establishing a basic course of study and helping identify academic specialties among the program's faculty. The chair of the graduate advisory committee should be selected as early as possible after consultation with the graduate program coordinator.

The committee chair, with assistance from the graduate advisory committee, directs the graduate student's course of study and oversees the thesis, project, or comprehensive examination. The committee chair will assist in meeting the university style and format requirements for master's theses and projects. Check with your program's graduate coordinator to determine the required number of committee members (some programs require a chair and one member; others require a chair and two members).

Members of the graduate advisory committee, particularly the chair, should have a strong background in the appropriate academic area, be able to communicate and work well with other faculty in the program, and have the time to participate on or chair the committee.

The committee chair must be a tenured or tenure-track faculty member who is from the program. This includes faculty members participating in the early retirement program (if they agree to “volunteer” their time during their off-campus semester).

The second member must have the same qualifications as the committee chair. In some departments, the second member may be:

1. A tenured or tenure-track faculty member associated with a program other than the one granting the degree or,
2. A tenured or tenure-track faculty member who is fully retired from the program but willing to “volunteer” his or her time to serve on the committee.

The graduate coordinator of the program must approve a second committee member who falls into category one or two above.

The third member customarily meets the second member qualifications. An exception may be allowed for a person to serve as the third member in cases where the person does not meet the specific criteria indicated above, but is determined to be otherwise qualified for committee membership due to significant professional achievement in an area related to the subject of the thesis or project. This includes professionals working in the community. In this case, approval is required by the committee chair, graduate coordinator and graduate dean.

Graduate advisory committee membership is prohibited for people with conflicts of interest (e.g., those who are related to the graduate student by blood, marriage, personal relationship, or living arrangement).

Students who select the thesis or project as their culminating activity are urged to complete it during the semester they are enrolled in the designated course (customarily taken during the last semester of the master's program). In cases where the thesis or project is not completed during enrollment in these units, students are allowed a maximum of *three* additional semesters to complete the thesis or project. If the thesis or project is not completed by this deadline (and the program time limit has not run out), members of the committee can choose to withdraw. In the case of a faculty member withdrawing, it is the responsibility of the student to reconstitute the committee.

Exceptions to the policy on Graduate Advisory Committees may be requested by the graduate program coordinator and must be approved by the Dean of Graduate Studies.

Regulations Governing Master's Students

The following lists some of the more important regulations that master's students need to know to progress smoothly through their degree programs; the *University Catalog* should be consulted for additional graduate regulations and policies.

It is ultimately the graduate student's responsibility to be aware of all academic requirements and administrative deadlines as outlined in the *University Catalog*. A well-planned course of study and a clear understanding of the requirements and procedures explained in

the following sections will help avoid last semester problems and graduation delays. The following section is taken from the university catalog for your convenience. Your program may have additional requirements that you should also familiarize yourself with immediately.

While the “Academic Policies and Regulations” section of the *University Catalog* contains information concerning general university policies, both the Office of Graduate Studies and individual departments have their own specific policies and rules that apply to master’s degree candidates. Graduate students should thoroughly review the Graduate Education section and their individual program description in the Academic Programs section to become familiar with all of these policies, procedures, and regulations.

Catalog Year

Master’s degree students are governed by the requirements that are in effect at the time of their admission to conditionally classified status in the program. If normal progress is made toward the degree and continuous enrollment is maintained, a graduate student may elect to meet the degree requirements in effect either at the time of admission to conditionally classified status, or in the semester of graduation with the master’s degree.

Continuous Enrollment

Students pursuing a master’s degree must enroll each semester until the degree is awarded. Both enrollment as a regular student and adjunct enrollment satisfy this continuous enrollment requirement. (Special Session, Extension, and Open University enrollments do not.) Adjunct enrollment consists of registration in GRST 899 through the Center for Regional and Continuing Education, for which an administrative fee is charged. Registration in GRST 899 must

be completed by the end of the fourth week of classes each semester (the university census date). Late fees are charged for non-compliance with this policy. No credit is earned for adjunct enrollment, but it allows you to maintain your status in the master's degree program and to make minimal use of selected campus resources, including the library, laboratories, computer facilities, faculty advisors, and the thesis editor. Adjunct enrollment serves both students who have finished their coursework but have not yet met all degree requirements (e.g., terminal project, incomplete grade, etc.), and those who choose not to enroll in regular classes for a semester. However, it is not to be used to postpone the start of graduate study, and you may not enroll in GRST 899 during the initial semester of admission to the master's degree program. Official transcripts will be required of students who have attended another school while on adjunct enrollment at CSU, Chico.

Master's degree students who do not maintain continuous enrollment may be required to reapply to the program that they have interrupted when they wish to return. They may be subject to any new admission requirements and, if readmitted, may be held to any new degree requirements. In addition, they will be required to petition to resume the program and complete late registration in GRST 899 for all semesters that they were out of compliance with the continuous enrollment policy. When students are required to reapply to return, the application fee will be waived upon completion of the GRST 899 late registrations. This policy applies to all master's degree students, including those who have completed all of the courses required for their programs.

Student Health Center privileges at the Student Health Center are available for an additional fee to master's students enrolled in GRST 899.

Graduate Assistants

Students **may not** hold a graduate assistant or teaching associate position while enrolled under adjunct status.

Maintaining Good Academic Standing

As a student admitted to a master's degree program, you must maintain a minimum 3.0 grade point average in each of the following three categories: all coursework taken at any accredited institution subsequent to admission to the master's program; all coursework taken at CSU, Chico subsequent to admission to the program; and, all courses taken in fulfillment of your approved program. Failure to maintain a 3.0 average in any category will result in academic probation in the master's program. Failure to remedy the deficiency within one semester with appropriate courses approved by the program coordinator will result in disqualification from the master's program. Students disqualified from a master's degree program will not be allowed to enroll in any regular session of the university for at least one year, and must reapply and be admitted to a program in order to return to regular enrollment.

If your major department finds that you do not satisfy established criteria in the discipline, you will be terminated in that discipline upon the Office of Graduate Studies' receipt of a letter from the graduate coordinator requesting such termination.

Full-time Status

Except as noted below, full-time graduate students are those who are admitted to a master's degree program and carry at least 8 semester units. For students with appointments as graduate assistants, teaching associates, or part-time faculty, half-time (20 hours/week)

employment may be regarded as the equivalent of 4 semester units of graduate coursework in determining full-time status. Appointments for fewer than 20 hours/week are pro-rated in determining full-time status.

Note: For purposes of financial aid eligibility, students may not be allowed to count employment toward their full-time status; please consult a financial aid counselor.

Graduate Courses

While a graduate student may enroll in courses at any level, only courses in the 400, 500, or 600 series may be counted toward a master's degree program. Courses numbered 400-599 are acceptable as credit toward a master's degree unless otherwise noted in the course description. Graduate students enrolled in 400/500-level courses will be held to more rigorous requirements than undergraduates and must earn a grade of C- or better to count them toward their program. Courses numbered 600-699 are open only to master's degree students and at least sixty percent of the total units required for a master's degree program must be in stand-alone 600-level courses (those not cross-listed with 400/500-level courses).

Any course to be counted toward a master's degree program must be acceptable for graduate credit by the discipline offering the course (i.e., a 400/500/600-level course that is not acceptable for its department's master's degree cannot be counted toward a master's degree in another discipline).

Maximum Course Load

Master's degree students may not register for more than 16 units of work in any semester without the approval of the Office of Graduate Studies. The typical master's degree

requires two years for completion, and it is strongly recommended that master's degree students register for no more than 12 units each semester.

Repeating Courses with Forgiveness

A master's student may repeat one course with forgiveness if specified requirements are met. To repeat a post baccalaureate course to raise one's grade point average, a petition for forgiveness must be filed in the Office of Graduate Studies early in the semester that the course is repeated. The petition, which outlines the requirements of the graduate repeat policy, is available from the Office of Graduate Studies.

Program Time Limit

Master's candidates must complete all requirements for a master's degree no later than five or seven years from the end of the semester of enrollment in the oldest course on the approved program. Consult the academic program chapter for your discipline in the *University Catalog* to determine which time limit is applicable to your program.

In special circumstances, an extension of the program time limit may be granted to a maximum of no more than two additional years. The extension may require taking additional coursework and dropping expired courses from the approved program, or validating expired coursework (see "Validation of Expired Coursework"). The approval for the extension and the duration of the extension are determined by the petitioner's graduate advisory committee, the departmental graduate coordinator, and the Office of Graduate Studies, in that order.

Validation of Expired Coursework

In conjunction with an approved extension of the time limit for completing a master's degree, expired courses must be validated by registration, examination, or other appropriate means. Expired courses are those taken five years or more prior to the date of graduating with the master's degree, **or** seven years or more prior to the date of graduating for those programs under a seven-year limit. A request for an extension and permission to validate credit must be approved by the graduate advisory committee, the departmental graduate coordinator, and the Office of Graduate Studies (in the order stated) before you begin validation.

Validation by registration requires you to enroll in an expired course as an auditor and complete all assigned work. The instructor of the course will notify the Office of Graduate Studies of your satisfactory completion of the course requirements. Validation by examination requires the successful completion of a written examination or report covering the essential materials of the course. The instructor will file in the Office of Graduate Studies the final report or examination together with a written statement that it satisfactorily demonstrates current knowledge of course content. The report or examination will be kept on record in the Office of Graduate Studies until you receive the master's degree.

Transfer and Open University Credit

A maximum of 9 semester units of transfer and/or CSU, Chico Open University coursework is acceptable toward meeting master's degree requirements, provided that the courses have not been counted toward any previous degree. If the school granting the credit for transfer is regionally accredited and would accept the work for graduate credit toward its degree programs, it

may be considered for inclusion in a CSU, Chico master's program. Transfer or Open University credit must be approved by the program graduate coordinator and/or graduate advisory committee chair for content, and by the Office of Graduate Studies at the time the Master's Degree Program Plan is developed.

Note: Neither University of California extension coursework nor correspondence coursework of any kind may be applied toward a master's degree.

Graduate Literacy Requirement

California State University policy requires that all students graduating with the master's degree demonstrate their writing competence. Each department has developed a method of assuring that its students have adequate writing skills. Refer to the "Graduate Literacy Requirement" section of individual master's degree programs in the *University Catalog*.

The Culminating Activity

Consult your graduate coordinator and/or the *University Catalog* for more information on your specific departmental requirements.

Master's Thesis and Project

(699T/699P Units)

Master's Study (699) is separated into a thesis and supporting research (offered as 699T for 1.0 to 6.0 units) or a project (offered as 699P for 1.0 to 6.0 units). Enrollments in 699 courses are supervised by the chair of the student's graduate advisory committee and may not be taken through Extension, Special Session, or Open University.

The completion of a thesis or other terminal project and the supporting research for the topic will receive 1-6 units of Master's Study credit, and enrollment in 699 is required. Normally, enrollment in 699 is limited to classified students and candidates in a master's degree program, although restrictions vary among departments. The units awarded for a thesis or project is determined by the academic department offering the degree. However, in no case may a student enroll in, or receive credit for, more units of 699 than are required for the student's individual program. All 699 enrollments are assigned a grade of RP until all program requirements are completed. A grade of CR is assigned upon successful completion of all requirements for the master's degree.

An RP assigned to a 699 course must be replaced with a CR within the time period allowed for the completion of the master's degree (i.e., as specified by your department, five or seven years from the end of the semester of enrollment in the oldest course on the approved master's degree program). Failure to complete the work within the specified time period will result in a grade of NC.

Applying for Graduation

Candidates must apply for graduation and complete their culminating activity by the published deadlines for the term in which they plan to graduate. All applicable deadlines can be found in the Academic Calendar in both the Class Schedule and the *University Catalog*.

Application materials and instructions are available from the Office of Graduate Studies.

Graduation candidates who finish their programs as adjunct students may be required to complete an application for matriculation purposes to update the information in their graduate

record. Candidates should be sure that transcripts of all post-secondary schools attended are on file at the time they are cleared for the master's degree. If coursework has been completed elsewhere during the course of your master's degree program at CSU, Chico, official transcripts of this work must be sent directly to the Office of Graduate Studies. These transcripts are required before final clearance can be given for the degree.

Students who have applied for graduation in a previous semester but did not complete requirements must refile for graduation by the applicable deadline and pay the refiling fee. Questions concerning graduation requirements and their fulfillment may be directed to the departmental graduate coordinator or the Office of Graduate Studies.

The Oral Examination/Defense

Students completing a thesis or project are required to complete an oral defense/examination related to their work. Although the protocol varies between departments, the oral examination committee is usually composed of the members of the graduate advisory committee and may include the department graduate coordinator and additional faculty who have a research and/or teaching specialization closely related to the thesis/project topic. Some departments use non-university specialists in the content area as members when appropriate.

The deadline for the oral examination is always the same as that for the submission of the thesis/project. However, orals should be scheduled well in advance of this deadline to allow for last minute content changes that might be required by the committee.

Scheduling the oral examination is initiated by the candidate. The committee chair should first be contacted to verify that the thesis/project has progressed to the point where it may be defended. With most departments, the entire work should be completed. The candidate and/or chair will determine a time and date for the examination agreeable to all members of the graduate advisory committee and will announce this date to the department, college, and the Office of Graduate Studies at least a week beforehand. It is important that the Office of Graduate Studies be notified of the scheduled defense in advance so that a Final Progress Sheet can be prepared.

Participation in the Master's Commencement Ceremony

A commencement ceremony for master's graduates is held once a year at the end of the spring semester. You are eligible to participate in the ceremony if you graduated at the end of the previous summer session or fall semester, or if you will graduate at the completion of the spring semester.

Graduation with Distinction

To graduate with distinction, students must achieve a 3.9 grade point average in all approved program coursework and be recommended by the student's graduate advisory committee. Upon recommendation of the appropriate graduate coordinator, an academic dean may award graduation with distinction to a student in his or her college who has a grade point average below 3.9. Students graduating with distinction receive a special diploma; the notation "with distinction" is posted with the degree on the transcript.

CHAPTER II

POLICIES RELATED TO THE THESIS OR PROJECT

Academic Honesty

The university is committed to upholding the highest standards of academic honesty. Professors and graduate coordinators must actively discuss with their students the importance of adhering to accepted standards. Graduate students are expected to have knowledge of current practices and policies related to academic honesty and the disciplinary conventions for conducting research and appropriately citing sources. Graduate students should have a working knowledge and fluency of the style guide specific to their discipline(s). Questions or concerns about these matters should be discussed with the relevant program coordinator or the thesis editor and advisor.

An important component of graduate education is the development of original research, innovative problem solving, and creative expression. Each student must demonstrate and provide evidence of independent thought. The university will employ various methods of auditing graduate student submissions to ensure they conform to university standards for academic honesty. These will include reviews by professors, thesis/ project committee members, and the thesis editor/advisor, as well as technology-assisted audits of submitted works using Turnitin.

Misconduct

Allegations of misconduct in research, coursework, the culminating activity, or any other instructionally related activity will be referred to the relevant program coordinator and the Dean of Graduate Studies. In consultation with the appropriate faculty member(s), the graduate coordinator will determine the merits of the allegation and whether to refer the allegation to the Office of Student Judicial Affairs for possible disciplinary action. Evidence of plagiarism will be referred to the Office of Student Judicial Affairs, which will act in direct consultation with the student's program coordinator (and thesis or project committee when appropriate). The Office of Student Judicial Affairs will follow university disciplinary policy.

The most likely disciplinary outcome of plagiarism in any completed culminating activity (e.g., thesis, project, comprehensive examination) will be expulsion from the university. Per campus policy, expulsion results in permanent termination of student status without the possibility of readmission. Permanent notation of this action is recorded on the transcript and the student is barred from the CSU, Chico campus. Special conditions deemed appropriate by the Coordinator for Student Judicial Affairs may be added.¹

¹ Student Judicial Affairs. (1996). *Executive memorandum 96-38: Code of student rights and responsibilities*. Retrieved August 23 from <http://www.csuchico.edu/sjd/discipline/studentRights.html>

Plagiarism Defined

The university, similar to the Council of Writing Program Administrators, distinguishes between plagiarism and the misuse of sources as follows:

In an instructional setting, plagiarism occurs when a writer deliberately uses someone else's language, ideas, or other original (not common-knowledge) material without acknowledging its source. This definition applies to texts published in print or online, to manuscripts, and to the work of other student writers.²

Plagiarism includes claiming credit for the artistic or creative work of someone else, such as a map, graph, musical composition, photo, electronic image, painting, drawing, sculpture, website, blog, design, or computer code. Obtaining unauthorized assistance from another person in the writing of a comprehensive examination is also plagiarism. Students must take caution not to carelessly or inadequately cite ideas and words borrowed from another source. You must make every effort to acknowledge sources fully and appropriately in accordance with the contexts and genres of your discipline and your discipline's style guide. A student who attempts (even if clumsily) to identify and credit his or her source, but who misuses a specific citation format or incorrectly uses quotation marks or other forms of identifying material taken from other sources, has not plagiarized. Rather the student has failed to cite and document sources appropriately, which will result in the thesis or project not being cleared by the Office of Graduate studies and returned to the student and the student's committee notified.

²Council of Writing Program Administrators (WPA). (2018). *Defining and avoiding plagiarism: The WPA statement on best practices*. Retrieved November 2018 from <http://wpacouncil.org/positions/WPAplagiarism.pdf>

Copyright Restrictions

The U.S. copyright law provides federal copyright protection for both published and unpublished works. Therefore, authors who may wish to include quotations, illustrations, charts, graphs, musical arrangements and so forth in their thesis/project should make every effort to be sure that reproduction of the copyrighted material does not exceed the doctrine of “fair use,” which considers both the purpose and character of the use of copyrighted material. Creative Commons is an emerging area, and issues dealing with Creative Commons works should be addressed in concert with the Office of Graduate Studies. Unpublished works, as well as works published without valid copyright notice, are eligible for protection. The absence of a c-world (©) does not necessarily mean that a work is in the public domain. Tabular arrangements and compilations are specifically covered under copyright law. Permission to reprint or adapt charts, tables, graphs, tabular arrangements, musical arrangements, and so forth must be sought from the copyright holder.

Fair Use

If a work is protected by copyright, permission must be acquired prior to incorporation of that work into a new document. Extracts and quotations may be used to a limited extent for purposes of illustration and criticism. The language of the copyright law is vague as to what constitutes fair use, so when in doubt, seek permission and consult with the thesis editor.

Securing Permission

Efforts to obtain permission to use material from other sources should begin well in advance of a final draft. Candidates are expected to acquire written permission to use the material, and evidence of such permission must be provided with the final copy of the thesis/project. Written permission may either be by a letter or by a fax and must be accompanied by the signature of the individual granting permission. An e-mail response granting permission is considered similar to acquiring verbal permission over the phone. Neither is considered adequate proof that permission has been secured; therefore, they must be backed up by some means of written permission. A statement of permission must appear below the caption of a figure or at the bottom of a table. The owner of the copyright may request that specific words or phrases be used to indicate that permission was granted. All copyrighted tables and figures must be followed by a complete reference citation (e.g., not the abbreviated format such as author/year) and should state, “Reprinted with permission.”

Requests for permission should be directed to the copyright holder or the copyright permissions editor of the publication. **When requesting permission to reproduce copyrighted material, be sure to specify that: *the request is for a one-time, non-profit, educational use, and will be reproduced on the World Wide Web.***

The university is committed to upholding the highest standards of academic honesty. It is incumbent upon each student to become familiar with current standards and policies.

Culminating activities that do not have appropriate copyright releases for borrowed material will not be approved by the Dean of the Office of Graduate Studies.

Limit on Thesis/Project Submissions

Theses and projects may be submitted no more than three times (the original submission, and two resubmissions) for content approval. If none of the submissions pass as acceptable, the student cannot complete the degree with a thesis or project as the culminating activity.

Co-authored Theses/Projects

No co-authored or dual theses/projects are allowed.

Theses/Projects Written in Languages

Other than English

Only master's theses and projects submitted by graduate students in the ***Teaching International Languages*** master's degree program may be written in a language other than English when the area of specialization is Language Studies (Pattern B). This applies specifically and exclusively to graduate students in the Foreign Language Emphasis whose Master's Study 699 units are through Foreign Languages and Literatures. Students submitting theses and projects in a language other than English are required to include an abstract of regular length in the foreign language being studied as well as an extended précis in English of up to 1,500 words.

Human Subjects in Research

The use of human subjects in research at CSU, Chico is governed by Executive Memorandum 93-04 and by the policies of the University Human Subjects in Research Committee, which follow the Code of Federal Regulations for the protection of human subjects. If human subjects are part of your research, these regulations and policies must be complied with and proper procedures followed. **Failure to comply with these regulations jeopardizes not only your own standing, but that of the University as well.**

NOTE: All master's candidates must include 1) a copy of the clearance letter from the Human Subjects in Research Committee approving their research, and 2) the Post Data Collection form within the appendix of their thesis or project.

For more information and guidelines please reference the use of Human Subjects in Research. All required forms are accessible at the previous link. Should you have additional questions or need assistance in completing the forms, please contact Sharon Cain at [530-898-3145](tel:530-898-3145) or irb@csuchico.edu.

Animals in Research

In accordance with university policy, and pursuant to Federal Regulations governing the use of animals in research, such studies are reviewed by the University Animal Care and Use Committee. The Office of Graduate Studies requires that students planning research involving animals contact the chair of the Animal Care and Use Committee before initiating their work.

Non-print Media Project Policy

Non-print media projects are acceptable as a component of the culminating activity of a Master's program. Such projects may be pursued only where the student has previously demonstrated competence in the medium chosen and the master's proposal has been reviewed and approval by the University's Non-print Media Review Committee. Non-print projects shall be pursued within the format of graduate-level 699P Master's Project coursework. It is University policy that no co-authored projects are allowed as a culminating activity for the master's degree. (For more information on non-print media projects, see Chapter VI).

CHAPTER III

INTRODUCTION TO THE THESIS/PROJECT

A master's thesis or project is ordinarily the first serious, scholarly, and formal attempt by graduate students to demonstrate their ability to investigate, develop, and synthesize materials pertaining to a topic in their field of interest. Supervision and review by the graduate advisory committee ensures content accuracy while adherence to production guidelines insures physical and technical quality. The complete work thus provides visible and permanent evidence of scholarly achievement. The difference between a thesis and a project is defined in more detail in the following chapters but a thesis usually describes the process and results of using a recognized research methodology to answer a significant question, while the project is typically a creative work or interpretation.

Selecting a Topic for Investigation

The graduate student and her/his committee will need to agree on the research topic for the thesis or project. To garner ideas, thoroughly read the literature published in professional journals in the field and talk to faculty members in the department.

The thesis/project topic should be significant in that it will add to the body of knowledge in the field and potentially fill in important gaps in that knowledge. The problem should be clearly defined and feasible; time, resources, literature related to the

topic will help considerably in clarifying the problem and delineating a method of approach.

One reason for the publication of studies in professional journals is so that they can be repeated by other researchers to test the studies' validity. Thus, total originality is not required, but care should be taken so as not to simply duplicate existing research; in such a case, plagiarism may be involved.

Organizing the Research Proposal

The research proposal is a conceptual statement of a problem that warrants significant study. The graduate student should work with the graduate advisory committee in developing a research proposal and receive approval from the committee before research begins.

Meriam Library Privileges

The following privileges are granted to graduate students:

1. The loan period for graduate students is five weeks (35 days).
2. As a currently enrolled graduate student with a valid ID, you have borrowing privileges at any other California State University library. Mutual library privileges are subject to the regulations of the lending library, and Chico ID cards are honored at the discretion of the lending library.
3. You may reserve one of the lockers that are available on the second floor of the library by applying at the Circulation Desk and paying a refundable deposit and a service fee.

CHAPTER IV

THE CONTENT OF A THESIS

Introduction

The California State University Education Code (Title V, Section 40510, p. 473) defines a thesis as

. . . the written product of a systematic study of a significant problem. It identifies the problem, states the major assumptions, explains the significance of the undertaking, sets forth the sources for and methods of gathering information, analyzes the data, and offers a conclusion or recommendation. The finished project [product] evidences originality, critical and independent thinking, appropriate organization and format, and thorough documentation.

While the Code delineates the technical differences between a thesis and a project, at times there is a fine line between the two. A thesis is distinguished by certain elements such as an introduction to the study, a review of the literature, a methodology section, results, summary, and recommendations for further research, while a project may not have these components. There is also a difference between the elements found in a quantitative thesis versus those found in a non-quantitative (qualitative) thesis, thus some sections of this description may not apply, and the format should only be used as a guide and not an unyielding outline.

Organizing the research material in an outline based on this format—with five chapters in mind— will help to clarify thoughts and present information in a logical sequence. The following is offered to elucidate what is to be included in the various sections.

Abstract

An abstract must be submitted as part of every thesis. The abstract should contain all the essential information about the project and provide the reader with an overview of the study. It should be written in complete sentences and include statements of the problem, procedure or methods, results and conclusions. The abstract should include accomplishments, the most pertinent facts and implications of the study, and a brief explanation of the work, and should not exceed 250 words (approximately 1½ pages in length). Mathematical formulae, citations, diagrams, footnotes, illustrative materials, quotations, and acronyms may not be used in the abstract.

Chapter I: Introduction to the Study

It is the primary function of the Introduction to introduce and give an overview of the study. The following components should be included in the Introduction.

Background

The beginning of the chapter should serve as a carefully organized lead-in to the problem under investigation. This section should include an overview of the historical evolution, the current status, the projected future dimensions of the problem, or all three.

Statement of the Problem

Present the focal point(s) of the research. Introduce the “what” of the present investigation (i.e., clearly state what the study will examine or investigate). State the specific major question(s) and/or hypothesis(es) to be studied or tested. Make a precise statement of all minor questions to be explored.

Purpose of the Study

Justify the study. Why is the present investigation significant? Explain how it supports other studies, differs from previous studies, extends present knowledge and/or examines new issues.

Theoretical Bases and Organization

How does the present research correspond with other studies? What are the underlying theoretical bases upon which the study is constructed? One or more hypotheses should create the solid foundation upon which the conceptual framework is built.

Limitations of the Study

Discuss both content and methodological limitations of the investigation. How will the research work within or around these confines?

Definition of Terms

Define any special terms used in the study and establish abbreviations that will be used throughout the text.

Chapter II: Survey and Review of the Literature

There are several ways in which this chapter may be structured: chronologically, categorically, or through related theoretical viewpoints. Emphasis should be placed on the reasons underlying the particular areas, topics, and periods selected for review. The chapter should:

- ☐ Provide evidence supporting the historical, theoretical, and research background for the study.
- ☐ Define how the investigation differs from other studies in the field.
- ☐ Show how the study relates to other research studies in similar areas.

- Theoretical foundations, expert opinion, and actual research findings should be included.
Primary sources should be used whenever possible.

Chapter III: Methodology

This chapter describes the research design or approach in depth. This should be a detailed and clearly written description which permits a precise replication of the study. Several parts of this chapter apply mainly to a quantitative thesis, but may be appropriate to a non-quantitative thesis as well.

Design of the Investigation

Explain how the study is designed to investigate each question or hypothesis. If appropriate, identify all variables and how they are manipulated.

Population and/or Sample

Describe the principal characteristics of the population selected. If a random sample is used, describe the general population from which the sample was selected and the sampling procedure used.

Treatment

Describe the exact sequence followed to collect and tabulate the data. Describe the instrument(s) used to collect the data and establish the validity of the instrument(s) via studies by other researchers.

Data Analysis Procedures

Describe and explain data analysis procedures and/or statistical treatments used. Include descriptions of tests, formulae, computer programs, and procedures.

Chapter IV: Results and Discussion

This section reports on and discusses the findings of the study.

Presentation of the Findings

The results of the investigation are presented in narrative form and may be supplemented with graphics. Whenever appropriate, use tables and figures to present the data.

Discussion of the Findings

The discussion of the results should be well argued in relation to each question or hypothesis. Inferences, projections, and probable explanations of the results may also be included. Discuss the implications of patterns and trends, and include any secondary findings.

Chapter V: Summary, Conclusions, and Recommendations

This concluding section should summarize the entire research effort. A sufficiently comprehensive overview should enable the intended audience to understand the entire study. At this point, it is appropriate to reacquaint the reader with the conceptual framework, the design of the investigation, the methodology, and the results of the study. This section should include the significance of the study and its conclusions, the limitations and weaknesses of the study, implications for future research, and recommendations.

References

Cite references according to the department style guide, and be sure to include every source cited in the study, including material that has been adapted for use in tables and figures.

Appendices

Material too detailed for inclusion in the body of the text, or material that cannot be effectively presented due to its length or size may be included in the appendices. Tables and graphs that have been introduced in the main body of the thesis are required to be included in the text immediately following the first reference. They should not be placed in the appendices.

Appendices might include such things as questionnaires, raw data, maps, photos, artwork, letters of permission to reproduce material, and personal correspondence.

CHAPTER V

THE CONTENT OF A PROJECT

Introduction

In many departments, graduate students have the option of producing a project instead of the traditional research thesis. A project is defined by the California State University Education Code as:

... a significant undertaking appropriate to the fine and applied arts or to professional fields. It evidences originality and independent thinking, appropriate form and organization, and a rationale. It is described and summarized in a written abstract that includes the project's significance, objectives, methodology, and a conclusion or recommendation. (Title V, Section 40510, p. 473)

Whereas a thesis is an empirical scholarly research study, a project is distinctly more creative in nature. Often, projects will be based on a compilation of comparative analysis of the works done by other researchers. Although such material provides the study with substance, culminating projects must evidence originality, critical thinking, and reflect the scholarly or artistic capability of the candidate. While requirements for various creative projects will vary, there will be certain elements common to each project.

Types of Projects

The type of project is limited only by the creativity, capability, and budget of the graduate student. The graduate advisory committee will be most concerned with the

manner in which the material is researched, organized, developed, and presented. The content and format guidelines are much more flexible for a project than for a thesis. Often, as in cases where the project is a manual or handbook, the project itself is placed in the appendix, while sections in the main body of the text are tailored to introduce, justify, and validate the study or creative effort.

Organization of the Project

An abstract must be submitted as part of every project. The abstract should contain all the essential information about the project and provide the reader with an overview of the study. It should be written in complete sentences and include statements of the problem, procedure or methods, results and conclusions. The abstract should include accomplishments, the most pertinent facts and implications of the study, and a brief explanation of the work, and should not exceed 250 words (approximately 1½ pages in length). Mathematical formulae, citations, diagrams, footnotes, illustrative materials, quotations, and acronyms may *not* be used in the abstract.

Because of the uniqueness of projects, the introductory sections in the main body will vary in number. The following presents some of these sections and their respective elements commonly found in master's projects. This outline is only a recommendation and should be adapted as necessary. As a general rule, however, projects will contain at least some descriptive sections selected from the following.

Abstract

An abstract must be submitted as part of every thesis. The abstract should contain all the essential information about the project and provide the reader with an overview of the study. It

should be written in complete sentences and include statements of the problem, procedure or methods, results and conclusions. The abstract should include accomplishments, the most pertinent facts and implications of the study, and a brief explanation of the work, and should not exceed 250 words (approximately 1½ pages in length). Mathematical formulae, citations, diagrams, footnotes, illustrative materials, quotations, and acronyms may not be used in the abstract.

Chapter I: Introduction to the Project

The primary function of this initial section is to provide a comprehensive overview of the project.

Purpose of the Project

A statement of the purpose of the project explains why the project was attempted. Include personal interest as well as other identified needs that the project will help satisfy. Why is the project significant?

Scope (Description) of the Project

Define what the project is in terms of content and format. Include specific information regarding the subject matter, the intended audience, how the project is to be used, and the results or effects expected.

Significance of the Project

Explain the significance of the project in the field of study. What new dimensions or concepts have been presented? Emphasize the importance of the project in its use of techniques

and specify the intended effects. If the project is designed to be informational, persuasive, or instructional, specify the effects in terms of behavioral objectives.

Limitations of the Project

If applicable, present and discuss the content limitations with regard to resources, time, and so forth.

Definition of Terms

Define any special terms and establish standard abbreviations that will be used throughout the text.

Chapter II: Survey and Review of Related Literature

This section constitutes the major research effort of the project. It provides the source material for the content and puts the present project in context of existing information in the field. Review and cite related studies and discuss their strengths and weaknesses pertaining to the purpose of the project. Discuss the theories or techniques examined and their respective implications for the present study. Summarize the review with a synthesis of the literature identifying the various approaches and themes. This section ultimately justifies the need for the project.

Please visit the website for the thesis editor's workshop on the Literature Survey and Review.

Chapter III: Methodology

This chapter describes in depth how every aspect of the project was conducted, compiled, or created. It should be significantly detailed and should describe the format and technique used in presenting the material. Techniques, questionnaires, interviews, study sites, and material used to accomplish the study should be described here.

Chapter IV: Results

There may or may not be a results section, depending on the type of project. If there are findings to report, they should be synthesized for inclusion in this section. Material too detailed to be included in the body of the text should be presented in the appendices.

Chapter V: Summary, Conclusions, and Recommendations

Summary

Present an overview of the previous sections and how the final project addresses issues which have been raised. Reacquaint the reader with the conceptual framework and the design of the study. This section summarizes the entire project effort.

Conclusions

Conclusions presented should validate both the need for the study and explain how the present study responded to that need.

Recommendations

Recommendations should include comments regarding content, technique, and the process of creating a master's project of this type.

References

Cite references according to the department style guide, and be sure to include every source cited in the study, including material that has been adapted for use in tables and figures.

Appendices

As a rule, the project itself is placed in Appendix A. This will allow more freedom in the format of the work. In addition, material too detailed for inclusion in the body of the text may be placed in the appendices.

CHAPTER VI

THE NON-PRINT MEDIA PROJECT

Introduction

With the approval of both the Non-print Media Review Committee (NPMRC) and the candidate's advisory committee, graduate students have the option of producing a non-print mediated product instead of the traditional research thesis or project. A written component is also required.

Non-print Media Project Policy

Non-print projects may be pursued only when the student has previously demonstrated technical competence in the medium chosen. For purposes of documentation, students may choose to use the Instructional Media Center, other campus offices, or outside technical services. However, all candidates wishing to pursue non-print mediated projects will be required to obtain project approval from the Non-print Media Review Committee (NPMRC) *prior to commencing the project. Non-print mediated projects that have not been approved by the NPMRC will not be accepted as part of the culminating activity.* Figure 1 outlines the review and approval process for non-print media projects.

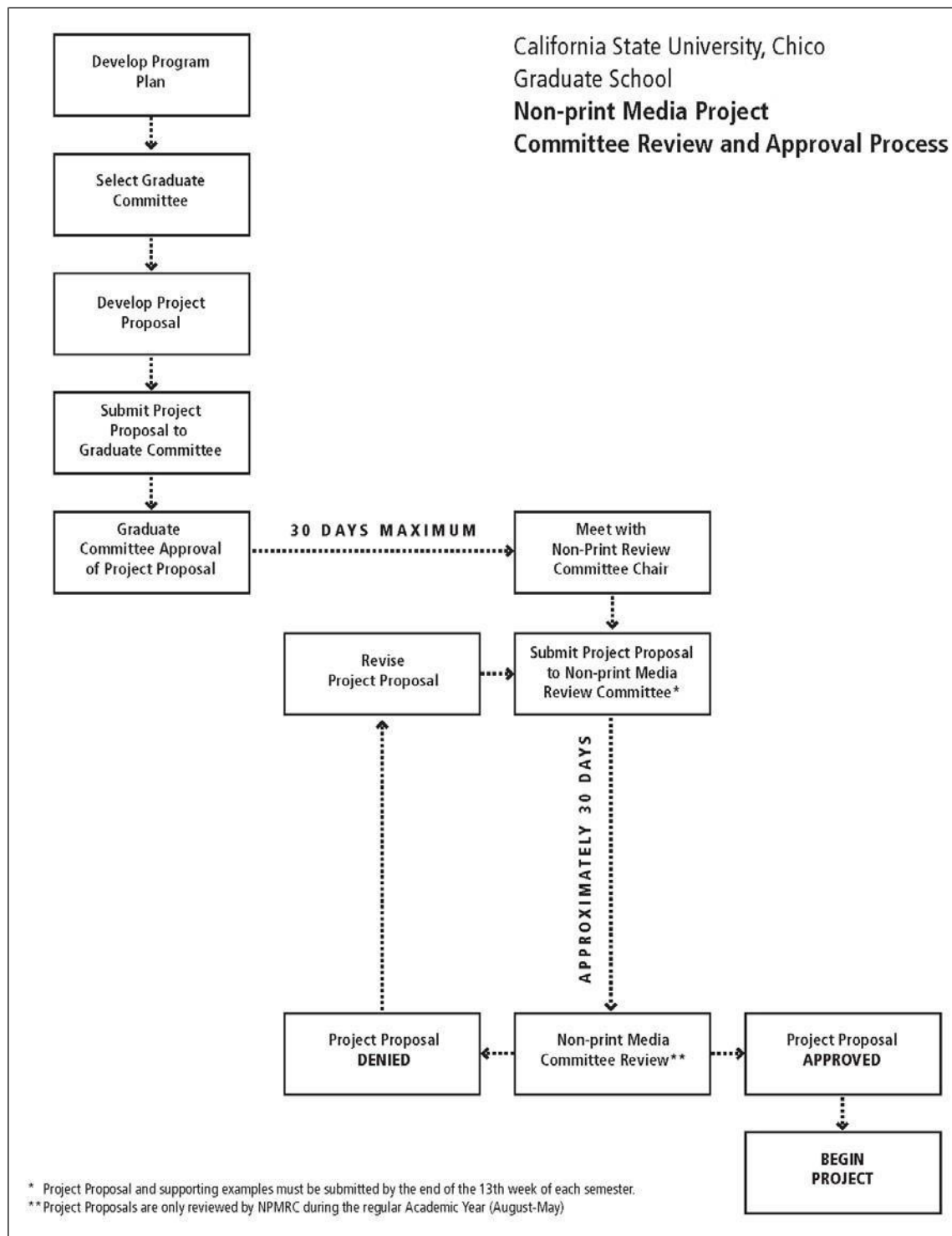


Figure 1. Non-print media project committee review and approval process.

Non-print Media Project Description

Non-print media projects are acceptable as a component of the culminating activity of a Master's program. Such projects may be pursued **only** where the student has previously demonstrated competence in the medium chosen. Non-print projects shall be pursued within the format of graduate-level 699P Master's Project coursework. **It is University policy that no co-authored projects are allowed as a culminating activity for the master's degree.**

The Non-print Media Project Proposal

A project proposal must be approved by the student's Graduate Advisory Committee and submitted to the Non-print Media Review Committee within thirty days of the approval. The proposal should include the following:

1. A statement of the purpose of the proposed project, the need for the project, and the student's personal interest.
2. A statement of the content and format of the project, including specific information regarding the subject matter, the intended audience, how and where the project is to be used, and the anticipated results or effects.
3. A statement of the intended method of production. A detailed written plan should be developed which outlines the major steps to be performed and procedures for the production. This would include such things as required talent resources (dancers, singers, etc.), time required for the various aspects of the project, and an estimate of technical support necessary for production, including personnel, equipment, and facilities. A production script would be appropriate here.

4. A statement substantiating the need for such a study/project. An extensive review of existing materials and literature should demonstrate that the project does not duplicate the efforts of others. This section should convince the Non-print Media Review Committee of the merit of the project.

Project Approval Process by the Non-print Media Review Committee

Within thirty days of approval of the project proposal by the student's graduate advisory committee, the student must meet with the NPMRC chair. If the chair determines that the student possesses the qualifications to advance with the proposed project, the student will be given a *Request for Non-print Media Proposal Review* application to complete and submit to the NPMRC for their approval. This completed form, the written proposal, and required examples must be submitted to the Office of Graduate Studies for NPMRC review. The student, the student's graduate advisory committee, and the program's graduate coordinator will be notified of the Non-print Media Review Committee's recommendation. Figure 2 outlines the non-print media project submission process.

Non-print media projects must be significant, evidence originality and independent thinking, and follow appropriate form and organization. They are comprised of the following:

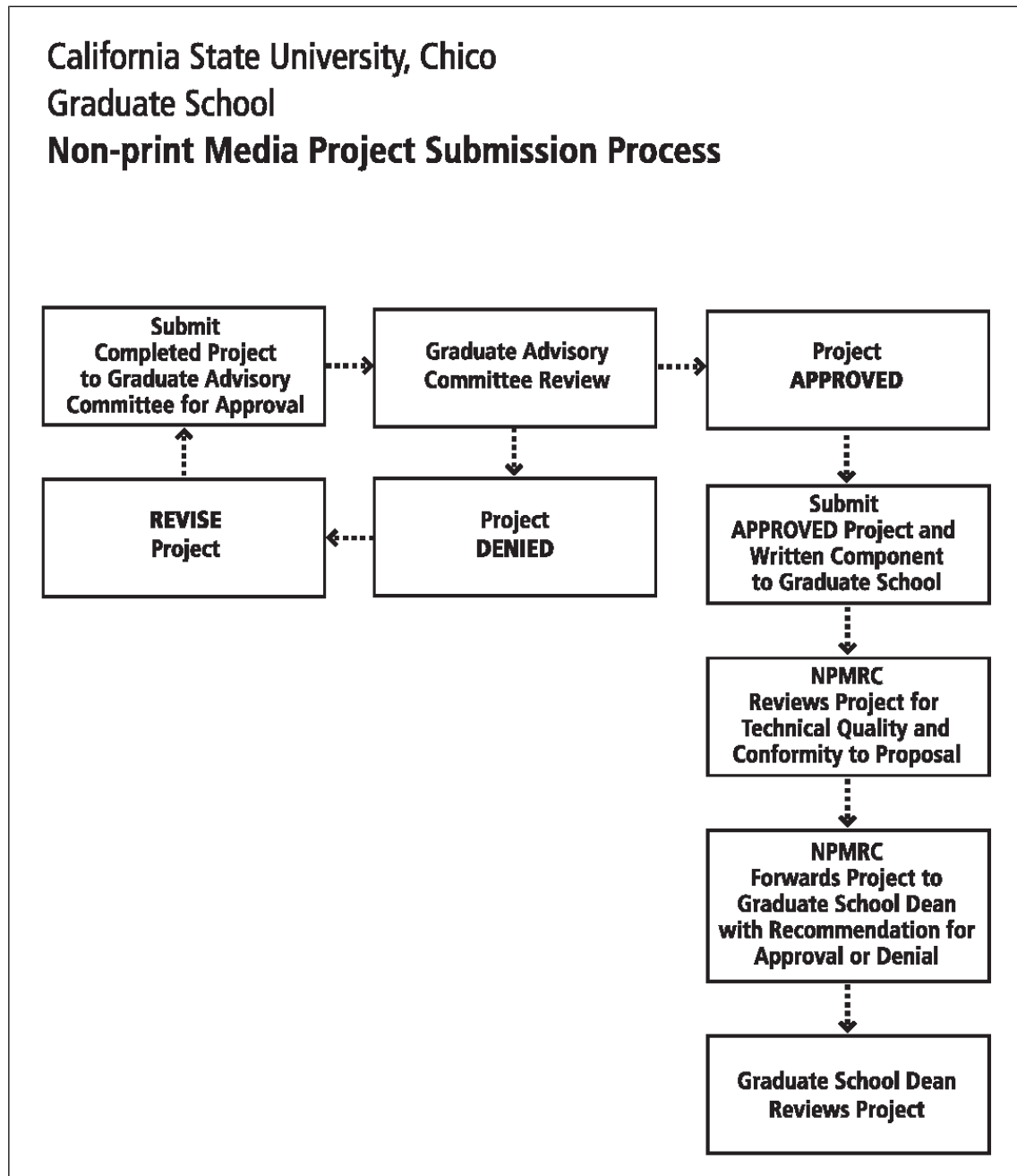


Figure 2. The non-print media project submission process.

1. The Written Component. The written component shall be more than the presentation of a mere outline, plan, depiction, description, or demonstration. The text should describe the project

and summarize the significance and objectives, provide a review of related literature, explain the methodology or treatment, and present conclusions or recommendations.

2. The Non-print Component. The non-print component must conform to the project proposal approved by the Non-print Media Review Committee. It must demonstrate the candidate's proficiency in the proposed media.

The Written Component of the Non-print Media Project

An abstract must be submitted as part of every written component of a non-print media project. The abstract should contain all the essential information about the project and provide the reader with an overview of the study. It should be written in complete sentences and include statements of the problem, procedure or methods, results and conclusions. The abstract should include accomplishments, the most pertinent facts and implications of the study, and a brief explanation of the work, and should not exceed 250 words (approximately 1½ pages in length). Mathematical formulae, citations, diagrams, footnotes, illustrative materials, quotations, and acronyms may *not* be used in the abstract.

All non-print media projects must be accompanied by a written component. It must be more than the presentation of a mere outline, plan, description, or demonstration. The text should describe the project, summarize its significance, objectives, and methodology, and present a conclusion and/or recommendation. This written component should include such things as scripted

choreography, text documentation of script writing, production notes, and/or other appropriate documentation. This component will be bound and shelved in the university library.

While the non-print media presentation demonstrates the creativity and quality of the technical and artistic aspects of the project, the written component should be a significant contribution to others in the field who wish to learn from or expand upon this accomplishment. The following outline is a guide to the written component.

Following is a suggestion of how to structure the written portion:

Chapter I: Introduction

The primary function of this initial section is to provide a number of introductory statements regarding the proposed non-media project.

Problem Statement

Briefly indicate what prompted an interest in the project. Include any historical background, current technology, and/or future dimensions in the field of study. The introduction should provide a setting and focus for the project.

Scope of the Project

Explain the project in terms of content and format. Specify the audience to which it is directed and the context in which it is to be presented.

Significance of the Project

Present the purpose of the program and the significance of the project. What new dimensions or techniques are being applied to the media or the subject which make the work

unique? Emphasize the importance of the project itself in relation to techniques, support of information, or instructional needs.

Intended Effects

List the expected users of the program and discuss the intended effects of the presentation on its audience. If the project is designed to be informational, persuasive, or instructional, specify the anticipated effects in terms of behavioral objectives.

Limitations of the Project

Discuss any limitations in relation to the content and technical aspects, including resources, time, and abilities.

Chapter II: Survey and Review of the Literature

This portion constitutes the major research effort of the project. It provides the source material for the content and defines how the project differs from other media productions in content, format, or techniques. A description of how the work fits in relation to existing media with a similar purpose will provide a rationale for the approach and techniques chosen for the project. Related media productions should be cited and evaluated. Discuss the techniques used and their applicability to the present study.

The review should be summarized with a synthesis of the literature and products. Identify the various approaches and themes as a basis for justifying the treatment selected.

Chapter III: Treatment

This section provides an in-depth description of how each aspect of the project was conducted. The explanation must be sufficiently detailed to permit the writing of a production script, and should be organized in the same manner as the completed production.

If the content of the project is the focus, most graduate advisory committees will be concerned with evaluating the manner in which the research, organization, and development of the subject has been done (i.e., what novel ways have been developed for presenting the context?). This section should contain all the information to be included in the content with a narrative description of the way it is to be mediated. It is not necessarily presented in script form, but it should describe the format and technique of presentation. If the originality and creativity of the project rests in the manner and quality in which the content is presented, the major emphasis will be on the production quality of the medium chosen. In such cases, the treatment of the content will be the major effect of the study.

Explain how the project will be executed. Specify the techniques and methods which will be used to achieve the anticipated goals of the project. How and/or why will these tools be effective?

Chapter IV: The Production Script

This is the blueprint from which the media project is produced. It is detailed, comprehensive, and describes the dialogue, set requirements, props, equipment, etc. The script

should follow the standard technical format common to productions using similar media. Post-production work necessary to complete the project should be included.

Chapter V: Summary, Conclusions, and Recommendations

This final section should summarize the entire project. It should be written with the intention of evaluating the entire process of production from concept to final product. The summary should present an overview of the project, reacquainting the reader with the purpose, design, and results of the study. Both negative and positive conclusions found as a result of the study should be discussed. Describe the areas in which the study could have been improved and how problems encountered along the way could have been solved or avoided.

Recommendations should include comments regarding content, technique, and the production process as a whole. This section will provide the reader with valuable information for future media productions.

References

Cite references according to the departmental style guide, and be sure to include every source cited in the study, including material that has been adapted for use in tables and figures.

Appendices

As a general rule, the project itself is placed in Appendix A. This will allow more freedom in the format of the work. Material too detailed for inclusion in the body of the text may also be placed in the appendices.

CHAPTER VII

FORMATTING

A thesis/project consists of four major parts: pre-text pages, text, documentation, and appendices. Some theses and projects may not require use of all four parts, but when used the sequence below should always be followed:

- Title Page
- Approval Page
- Publication Rights (optional)
- Dedication (optional)
- Preface/Acknowledgments (optional)
- Table of Contents
- List of Tables (if used)
- List of Figures (if used)
- List of Symbols or Nomenclature (if used)
- Abstract

Please visit our website under the Formatting heading for sample template of the pre-text pages, and a detailed visual explanation of how to format your thesis. Note: Use this template as an aid. You are entirely responsible for meeting the formatting requirements outlined here and on the website. <https://www.csuchico.edu/graduatestudies/current-students/thesis-project/formatting.shtml>

Final Formatting Options

The final format of all theses and projects may follow two options:

Option 1:

Disciplines may follow the existing University format as specified in the *Guide to Graduate Studies*. Thesis editor will provide preliminary edits and advice while approving the final format of document submitted by graduate students in their respective disciplines, and then meet with the Dean for final approval and his signature. Each discipline choosing this option will continue to select their department style guide that students use to format their in-text citations, all tables, captions for figures and tables, and the reference list at the close of each chapter.

Option 2:

Disciplines may choose to select a format consistent with professional publications in their area for the body of text (e.g., formatting the chapters and reference section”. However, specific University format requirements must still apply to the pre-text pages, as well as other format requirements that must be met per the *Office of Graduate Studies* requirements.

Chico Digital Repository

<http://www.csuchico.edu/lref/dbaz.html>

This should be the first place you visit before you start to write your thesis. The Chico Digital Repository (CDR) has replaced the bindery and microfilmer for final theses and projects. The CDR is a digital repository for scholarly work created by the faculty, staff, and students of CSU, Chico. Whereas the culminating activity used to be bound and shelved in the Library, now all culminating activities are on the CDR.

Every thesis and project that has been approved by the Office of Graduate Studies since fall 2009 is available here.

The CDR will present working examples—excellent models— of how to structure your thesis per the University format guidelines. The CDR is also an excellent resource to help you find other committee members who have the same interests as you and might be willing to serve on your committee. You can also see what kind of scholarship your peers have produced, and what kind of writing you will be expected to produce.

Warning: Do not attempt to follow the exact format of previously completed theses and projects on the CDR: guidelines are always changing. Further, not all theses and projects have the same structure. The University format should remain consistent and uniform for all disciplines.

Departmental Style Guides

Each candidate selects the appropriate departmental style guide and must follow the specifications in that guide. Each department selects its own style guide, which in turn determines the format for the:

1. Referencing system throughout the thesis/project.
2. List of references at the end of the work.
3. Formatting and captioning of all tables.
4. Format of captions for all figures.

Please speak with your Graduate Coordinator to find out style guide your department uses:

<http://www.csuchico.edu/graduatestudies/about-us/programs-coordinators.shtml>

Anyone wishing to follow a manual other than that approved by the department must provide the thesis editor with a written memo signed by all committee members approving the change, and a copy of the alternative style manual.

Links for Style Guides: APA, MLA, Chicago, Turabian, CSI, and ECE

- <http://www.apastyle.org/>
- http://www.chicagomanualofstyle.org/CMS_FAQ/new/new_questions01.html
- http://www.press.uchicago.edu/books/turabian/turabian_citationguide.html
- <http://www.mla.org>
- <http://www.lib.washington.edu/help/guides/42CBE.pdf>
- <http://www.nwmissouri.edu/library/citing/Chicago.htm>
- <http://writing.wisc.edu/Handbook/DocCBE.html>
- <http://csci.ecst.csuchico.edu/programs/ms-csci/style>
- <http://www.geosociety.org/pubs/geoguid5.htm>

University Format

Please keep in mind the two options listed above. Remember: However, specific University requirements will still apply to the pre-text pages. The Graduate School will only provide formatting guidance on the required format sections of a thesis/project for students in disciplines choosing this option. Faculty will guide and approve the format of theses/projects following discipline-specific format.

Length

Although the Office of Graduate Studies does not have a page limit or page maximum, we do suggest that the graduate student strive for a thesis or project that ranges between 50 and 70 pages.

Page Size

The standard for a document's page size is 8.5 X 11 inches. If compelling reasons exist to use a larger paper size, please contact the Thesis Editor and Advisor for approval.

Appearance and Typeface

- Basic manuscript text must be a non-italic type font and at a size of 12-point or larger. Whatever typeface and size you choose for the basic text, use it consistently throughout your entire manuscript. Fonts may vary per thesis editor approval for graphs and figures. For footnotes, figures, captions, tables, charts, and graphs, a font size of 8-point or larger is to be used.
- You may include color in your thesis, but your basic manuscript text must be black.
- For quotations, words in a foreign language, occasional emphasis, book titles, captions, and footnotes, you may use italics. A font different from that used for your basic manuscript may be used for appendices, charts, drawings, graphs, and tables.
- Entire manuscript, including figure captions, must be set in same font size and style—except where indicated above.
- Theses/Projects must be double-spaced and on one side of the page.

Pagination

- Page numbers must be positioned either in the upper right corner or the bottom center. They must be 1” inch from the edge or bottom. The placement of the page numbers in your document must be consistent throughout.
- Your manuscript is composed of pre-text pages (Title, Approval, Dedication, Publication Rights, Preface/Acknowledgements, Table of Contents, List of Tables, List of Figures, List of Symbols or Nomenclature, Abstract) and the main body of text and references. Page numbers must be positioned at the bottom center for the beginning of each chapter in the text, and place in the upper right corner for all the pages that follow.
- Do not number the Title page, Approval page, and all half-title pages (which precede reference sections, endnotes, bibliographies and appendices).
- Pre-text pages are numbered using lower case Roman numerals beginning with the number “i” and continue in sequence to the end of the pre-text pages (i, ii, iii, iv, v, etc.)
- The main body of your text and your references use Arabic numeral page numbers. Start numbering page 1 on the first page of the first chapter.

Margins

- All margins must be at least 1” from the edge of paper.
- Page numbers must be $\frac{3}{4}$ ” from the edge.

Spacing

- Double Space
- Use entire page without infringing upon margins.

- Whenever text is available, all pages must be filled to the bottom 1” margin: do not leave pages partially filled with sections of white space.

Paragraph and Block Quotations

- All paragraphs are indented 6/8” from left margin.
- Block quotations (direct quotations exceeding four lines) indented 3/8” from left margin and single-spaced.
 - Introduce a block quote with a colon.
 - Do not use quotation marks around block quotations; this will mistakenly make the material look like a direct quotation.
- If the quoted material begins mid-sentence, indicate this with an ellipsis (. . .). For example: “. . . the entire nature of man will soon change”)

Tables, Charts, and Graphs

- Number in Arabic numerals; all references will be by this number (see Table 5).
- Introduce by their number prior to insertion in text.
- If space is limited, separate sheets or fold-out pages may be used in the table.
- Table order determined by sequential numbering.
- Place each table close to first reference.
- If space is inadequate, continue filling the page with text and start the table at top of next page or by itself; if space remains, fill the balance of the page with text.

- ☐ Triple space (leave two blank lines) above and below each table to offset from rest of text.
- ☐ Title appears at top; all source material and/or notes placed at bottom.
- ☐ If space is limited, reduce font to 10 point.
- ☐ Leave eight to ten lines between two consecutive tables when they appear on same page sans intervening text.

Tables Reproduced

- ☐ Full reference section for tables reproduced with permission or adapted from another source.
- Reference section must fall below table and be presented exactly as it appears in the list of references at work's end.
- ☐ Do not use abbreviated forms for source citations.
- ☐ Copyrighted material must have letters of permission per final approval submission to Office of Graduate Studies and International Programs.
- Specific wording or “credit lines” must be used if requested by copyright holder.

Figures, Tables, Charts, and Graphs

- ☐ Figures, color figures (pictures, graphs, charts) illustrations, photographs, maps, diagrams, and similar presentations must adhere to professional quality.
- ☐ Label at the bottom with caption not exceeding width of figure.

- Place in text; place at top of following page, on separate sheets individually, if space is insufficient.
- If space remains after first reference or below figure, fill balance of page to the 1” bottom margin.
- Triple space above and below figures when inserting material in text.
- Color figures final copies must be printed from a laser printer or with permanent ink.
- Reduce large material too large to be presented in the conventional manner.

Paragraph indentions and Block Quotations

- All paragraphs are indented 3/4” from left margin.
- Block quotations (direct quotations exceeding four lines) indented 1/2” from left margin and single-spaced.
- Introduce a block quote with a colon.
- Do not use quotation marks around block quotations; this will mistakenly make the material look like a direct quotation.
- If the quoted material begins mid-sentence, indicate this with an ellipsis (. . .). For example: “. . . the entire nature of man will soon change”).

Epigraphs

- When used as chapter heads do not enclose in quotation marks.
- Block on the right half or two-thirds of the page.
- Author/s and title of quotation are presented flush right and below the epigraph.

Listings

- All listings are indented 3/8" from left-hand margin for first lines of text.
- Carry over lines must return to original margin.
- Numbers, dashes, bullets, etc. may precede listings.

Titles

- Each chapter begins on new page.
- Place chapter number 1 from top page; chapter title follows three lines (spaces) below this.
- Capitalize chapter titles and center over body of text.
- Triple space between the chapter title and text or centered heading (see Appendix D).
- If title exceeds the 3" limit, double-space and center all additional lines in an inverted pyramid.

Headings

- Headings are the key to writing with precision and presenting material clearly.
- Headings are organized and presented by levels (meaning a top-down progression based on their level of importance).
- Headings vary and should be chosen with clarity in mind: strive to be clear, precise, and logical.
- Three most common headings: Centered Heading; Flush-Left Heading; and the Paragraph Heading.

- Each chapter must begin with the same level of heading.
- All headings except the paragraph heading are set on a line separate from the text; placement and punctuation differentiate the levels being indicated (see Appendix D).
- Do not use abbreviations and acronyms.

Centered Heading

- The first and most general one.
- Must be centered over the text; two lines of text must follow on the same page for this heading and all others.
- Do not underline.
- Center within margins.
- Capitalize only the first letter of each major word.
- Triple space before all centered headings; double space between heading and text.
- Length of title on any line must not exceed 3”.
- If title is lengthy, divide it into the appropriate number of lines and single space the lines in the inverted pyramid style.

Flush-Left Heading

- Second heading also called free-standing sidehead.
- Underline and set flush with left margin; capitalize only the first letter of each major word.
- Double space before and after all flush-headings.

- If title exceeds the 3” limit, divide it into the appropriate number of lines.
- All carry-over lines must be single-spaced and indented ¼” from left-hand margin.

Paragraph Heading

- Third level of heading also called paragraph sidehead.
- Underline and indent at 6/8”; end with period.

Reference Section

- Should be preceded by a half-title page that is counted not numbered.
- Typed in capital letters and centered on half-title page.
- Title of this section (“Bibliography” or “Reference Cited”) is determined by the style guide (MLA, APA, etc.) of the department.

Appendices

- Pagination is the same as chapters: page number for the first page at the bottom of the page, and all subsequent pages in the upper right corner.
- Each appendix is preceded by a half-title page bearing only its label (e.g., APPENDIX A, APPENDIX B).
- Half-title page is counted but not numbered: use when referring to the appendix in the table of contents.

Thesis Editor and Advisor Services

The Thesis Editor will check the document to make sure it meets specific University format set by the *Office of Graduate Studies* and for publication on the *Chico Digital Repository (CDR)*. Every thesis and project that has been approved by the Office of Graduate Studies since fall 2009 is available here. Again, if you are entertaining writing a thesis or project, we urge you to visit the CDR as soon as possible. Also, please contact the Thesis Editor and Advisor, Dr. Carson Medley, as soon as possible, for guidance: cmedley@csuchico.edu or 530.898.5392. <http://csuchico-dspace.calstate.edu/handle/10211.4/13>

What the Thesis Editor and Advisor Will Do for You:

1. Provide a preliminary edit two weeks prior to the deadline for culminating activity.

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- The draft MUST reflect your best effort to meet university and departmental format requirements.
 - Drafts may be submitted for more than one preliminary review per deadline.
 - Documents submitted to the Thesis Editor will be returned either via email with Track Changes.
2. Enforce the final format of all theses and projects per one of the two options:
 - a. Option 1: Disciplines may follow the existing University format as specified in the *Guide to Graduate Studies*. Thesis editor will provide preliminary edits and advice while approving the final format of document submitted by graduate students in their respective disciplines, and then meet with the Dean for final approval and his signature. Each discipline choosing this option will continue to select their department style guide that students use to format their in-text citations, all tables, captions for figures and tables, and the reference list at the close of each chapter.
 - b. Option 2: Disciplines may choose to select a format consistent with professional publications in their area for the body of text (e.g., formatting the chapters and reference section”. However, specific University format requirements must still apply to the pre-text pages, as well as other format requirements that must be met per the *Office of Graduate Studies* requirements.
 3. Hold office hours and meet with students and/or faculty to advise about the thesis/project writing process, University format, organization, copyright matters, deadlines, forms, policies, and submission procedures. Try and contact Carson Medley to set up an appointment or email him: 530.898.5392 or cmedley@csuchico.edu

4. Present a series of thesis/project writing and academic writing/research workshops throughout the year and, upon request from faculty, present these workshops to various classes.
5. Formatters will work with the thesis editor on special formatting issues or unusual material.
6. Ensure that all check-sheets signed by all members of the candidate's graduate advisory committee, and turned in with the student's final document, are compliant with the following Graduate School requirements:
 - a. Copyright releases for all borrowed material have been acquired.
 - b. Human Subjects in Research clearance procedures have been followed.
 - c. No plagiarism issues exist in the document via a Turnitin report or other comparable program.
 - d. Ensured that the Non-Print Media Review Committee has reviewed and approved the submission of a non-print media project to accompany the final written master's project.
 - e. Option 1 requirements have been met.
 - f. Option 2 requirement have been met.
7. Approve the final format of each document submitted by graduate students and ensure that all University specific formatting rules have been adhered to.

What the Thesis Editor Cannot Do For You:

1. Provide guidance on questions that are meant for the student's graduate advisory committee such as content issues, discipline specific questions, or matters regarding departmental style guides.
2. Approve the content of the thesis as this is the responsibility of the student's committee.

3. Approve in-text content or editing guidance regarding specific departmental style guides.
4. Mechanical edits.
5. Allow students to make any content changes after the final thesis/project has been officially submitted to the Graduate School.
6. Check student's work that has been professionally formatted to make sure there are no pre-text or textual errors: the formatters work independently from the university, and it is ultimately the student's responsibility to check the formatter's work for University format or Departmental style/professional publications format.
7. Provide guidance on any computer related formatting issues (leader dots, spacing, margins, etc.). It is the student's responsibility to understand how their computer functions.
8. Offer advice or guidance on how the student's printer works or why they cannot format their PDF.
9. Schedule the Oral Defense for students.
10. Request the Final Progress sheet from the Graduate Evaluator for the Oral Defense.

Working with a Formatter

Many candidates prefer to leave the specifics of the technical format requirements to a professional formatter. Contact the Thesis Editor and Advisor for a list of formatters. However, it is ultimately the student's responsibility to determine if the chosen formatter has the necessary qualifications for the work involved. Formatters' fees vary, so rates need to be discussed and agreed upon prior to making any final arrangements.

Note: the formatter works independently from Chico State and has no connection. You must sign a document provided by the formatter that is a binding agreement that you

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A clear understanding of responsibilities of the formatter and the student will avoid problems, time delays, and excessive costs. The Office of Graduate Studies recommends the use of contracts to delineate responsibilities and cost of the final product. The following are common guidelines followed by many formatters and students.

Student Responsibilities for Working with Formatter

- Structure the document as closely as possible to the university format.
- Clearly and consistently indicate all sections and headings throughout the work.
- Follow the format dictated by the departmental style guide for all tables and figures.
- Follow the departmental style guide for content and format for all references.
- Deliver the material on time and keep the formatter informed of any schedule changes.
- Once a formatter is selected, book the approximate block of time and stick to your delivery date of the approved thesis or project.
- Use the designated departmental referencing system.
- List the references completely and in proper sequence at the end of the work.
- Use proper spelling, punctuation, and capitalization.
- Show formula, equations, and symbols legibly, with all sub and superscripts clearly indicated.
- Make sure you review the thesis or project closely before submitting to the Office of Graduate Studies. Once you have signed the agreement form with the formatter stating that you have reviewed the formatted work and approve, we will not allow any changes to be made.

Thesis or Project Formatter Responsibilities

- Assure the final thesis/project adheres to the university format and the required departmental style guide.
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Question Student Should Ask Formatters

- Do you guarantee that your work will meet both the university and the departmental style guide requirements?
- What computer programs and which platform do you use?
- If provided, will the final formatted copy of the thesis or project provided for my use be in a Word document (not a PDF) so that it can be modified for future publications?

- Have you done work for other students in my particular discipline?
- Do you have the most recent edition of my departmental style guide and the most recent edition of *A Guide to Graduate Studies*?
- How long will it take to complete the formatting of my document?
- When must my document be to you to guarantee submission by the semester deadline?
- What are your rates and how are they calculated?
- Can you provide references from previous master's candidates?
- Do you use a written contract?

Questions Formatters Might Ask Students

- Approximately how many pages is the thesis/project?
- Is this a final copy, approved by all members of the graduate advisory committee?
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- Have you followed the required department style guide?
- Do you have special formatting requirements such as tables, figures, charts, the use of a foreign language, or math?
- When will the material be submitted for final formatting?
- Will all the material be submitted at once?
- Do your expectations of the formatter include editing or checking grammar or spelling? If so, is your committee aware of this?

CHAPTER VIII

FINAL SUBMISSION OF THE THESIS/PROJECT

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 - Phone Number
 - Semester of Graduation
 - Thesis or Project/Non-Print Media
 - Title of Thesis or Project

Please adhere to the following:

- Call or email Thesis Editor in advance to schedule an appointment.
- The deadline for preliminary edits is **two weeks** before the final submission deadline.
- The draft **MUST** reflect your best effort to meet university and departmental format requirements.
- Drafts may be submitted for more than one preliminary review per deadline.
- Documents submitted to the Thesis Editor will be returned either via email with Track Changes.

Final Submission of Thesis/Project

The final clearance of a master's thesis/project by the Office of Graduate Studies requires that specific university and departmental format criteria be met. To meet

the submission deadline date, all theses/projects must follow the specific guidelines established in this guide.

Additionally, the written component must comply with the department style guide requirements for the reference system used in the text, the list of references at the end of the work, the format for all tables, and the format for the captions beneath figures (see Appendix A for department style guide requirements). Upon submission, the final document **must have the signatures of all members of the graduate advisory committee** (proxy signatures are not acceptable) and, if required, the signature of the department's graduate coordinator.

Due to the number of students graduating each semester, the Office of Graduate Studies will only allow for *one final edit* of each thesis/project. While preliminary edits are offered throughout the early part of each semester, documents received for final approval which are not in compliance with all aspects of both the University format and the departmental style guide requirements will not be accepted. Candidates for graduation will not be cleared under these circumstances and will be required to reapply for graduation for a subsequent semester.

Student's Final Submission of Thesis/Project

- Committee chair submits to the Office of Graduate Studies the Final Progress Sheet (PDF), Chair's Verification Sheet(PDF) and two Approval Pages signed by all committee members, as well as the Graduate Coordinator if required by the program, immediately after the defense. If revisions requested, the committee chair must turn in the Approval Pages immediately after the revised thesis/project has been reviewed and approved by all committee members.
- Submit PDF of Master's Candidate's Agreement Form and Thesis/Project Submission Form (PDF) to: submission@csuchico.edu

- Submit PDF of Thesis/Project (save as T/P, Year, Last Name, First Name)

to submission@csuchico.edu

Final Clearance by Office of Graduate Studies

- Thesis/Project received for final approval will not be accepted if any of these documents are missing: Approval Pages, Chair's Verification Sheet, Master's Candidate's Agreement Form, Final Progress Sheet, and Thesis/Project Submission Form.
- All theses/projects must follow the specific guidelines established by the Office of Graduate Studies per Guide to Graduate Studies and Procedures.
- The Office of Graduate Studies will allow one final edit of each Thesis/Project if the revisions are cosmetic and not content related
- Thesis/Project not in compliance with all aspects of both the University format and departmental style guide requirements will be rejected. Note: Candidates for graduation will not be cleared if not in compliance and will be required to reapply for graduation for a subsequent semester.
- The Office of Graduate Studies will not allow for any extensions to the submission deadline. Rare exceptions deemed an emergency will be reviewed by the Dean. These deadlines are absolute. Semester deadlines for the final submission of theses/projects to the Office of Graduate Studies are established two years in advance. All deadlines are published on the Office of Graduate Studies website.

REQUIRED DEPARTMENTAL
STYLE GUIDES

Master's Program	Degree	Departmental Style Guide ^a	Graduate Coordinator Signature Required ^b
Anthropology	M.A.	A current journal article from <i>American Antiquity</i> or <i>American Anthropological Association</i>	No
Art	M.A. or MFA	Kate Turabian. <i>A Manual for Writers of Term Papers, Theses, and Dissertations</i> (latest edition) (See the graduate coordinator for special formatting of master's thesis or project)	Yes
Biological Sciences/ Botany	M.S.	<i>Council of Science Editors (CSE Style Manual, latest edition)</i> or A current peer-reviewed journal in Biological Sciences	No
Business Administration	MBA	Consult with the graduate coordinator for current department style guide	Yes
Communication Science and Disorders	M.A.	<i>Publication Manual of the American Psychological Association</i> (latest edition)	Yes

Master's Program	Degree	Departmental Style Guide ^a	Graduate Coordinator Signature Required ^b
Communication Studies	M.A.	<i>Publication Manual of the American Psychological Association</i> (latest edition) or <i>MLA Handbook for Writers of Research Papers</i> (latest edition)	Yes
Education	M.A.	<i>Publication Manual of the American Psychological Association</i> (latest edition)	Yes
English	M.A.	<i>MLA Handbook for Writers of Research Papers</i> (latest edition)	No

Master's Program	Degree	Departmental Style Guide^a	Graduate Coordinator Signature Required^b
Environmental Science	M.S.	<i>American Geophysical Union (AGU)</i> http://www.agu.org/pubs/authors/manuscript_to_ols/journals/pdf/AGU_author_guide.pdf	No
Geosciences	M.S.	<i>Geological Society of America (GSA)</i> See Graduate Coordinator for a copy of the department style guide	No
History	M.A.	Kate Turabian. <i>A Manual for Writers of Term Papers, Theses, and Dissertations</i> (latest edition)	No
Interdisciplinary Studies	M.A. or M.S.	<i>Publication Manual of the American Psychological Association</i> (latest edition)	Yes

Master's Program	Degree	Departmental Style Guide^a	Graduate Coordinator Signature Required^b
Kinesiology	M.A.	<i>Publication Manual of the American Psychological Association</i> (latest edition) or <i>A current peer reviewed journal approved by committee chair</i>	Yes
Mathematics Education	M.S.	<i>Publication Manual of the American Psychological Association</i> (latest edition)	Yes
Nursing	M.S.	<i>Publication Manual of the American Psychological Association</i> (latest edition)	Yes
Nutritional Science	M.S.	<i>Publication Manual of the American Psychological Association</i> (latest edition)	Yes
Political Science	M.A.	Kate Turabian. <i>A Manual for Writers of Term Papers, Theses, and Dissertations</i> (latest edition)	Yes
Psychology	M.A. or M.S.	<i>Publication Manual of the American Psychological Association</i> (latest edition)	No
Public Administration	MPA	Kate Turabian. <i>A Manual for Writers of Term Papers, Theses, and Dissertations</i> (latest edition)	Yes

Master's Program	Degree	Departmental Style Guide^a	Graduate Coordinator Signature Required^b
Social Science	M.A.	Kate Turabian. <i>A Manual for Writers of Term Papers, Theses, and Dissertations</i> (latest edition) or <i>Publication Manual of the American Psychological Association</i> (latest edition)	Yes
Social Work	MSW	<i>Publication Manual of the American Psychological Association</i> (latest edition)	Yes
Teaching International Languages	M.A.	<i>Publication Manual of the American Psychological Association</i> (latest edition)	Yes

^a To be used for the format of 1) all in-text citations, 2) the list of references, 3) the format of tables, 4) the format for all figure captions.

^b The graduate coordinator must approve of the content of the thesis or project, and will sign off on the final copy of the thesis/project approval page.

IMPROVING LANGUAGE AND SOCIAL SKILLS IN AUTISM
SPECTRUM DISORDER USING COMPUTER BASED
TRAINING: A CASE STUDY

A Thesis
Presented
to the Faculty of
California State University, Chico

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Teaching International Languages

by
© Maria A. Beecroft
Fall 2013

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SPECTRUM DISORDER USING COMPUTER BASED
TRAINING: A CASE STUDY

A Thesis

by

Maria A. Beecroft

Fall 2013

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DEDICATION

I would like to dedicate this thesis to my sons,

Eric and Sean

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to Dr. Hilda Hernández for her continuous support during the Teaching International Languages Master's Program and while serving as committee chair for this thesis. Professor Hernández's passion and excitement for teaching and research will always stay with me. She planted the seed for this thesis and it grew. Without her supervision and constant help, this thesis would not have been possible.

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Many thanks to thesis editor and advisor, Carson Medley. His guidance and suggestions were very helpful to me during the research and writing process of proposal and thesis. Special thanks to Dr. Magda Müller for ongoing support, inspiration, and humor over the last three years. To my ingenious participant: I learned so much from you! Thank you for your hard work, tenacity, and patience.

I would like to thank all my family members, especially my sisters, for believing in me and saying that I could do it. Finally, my special thanks go to my husband Charlie for his patience, understanding, and unending support. Without his encouragement, I would not have been able to pursue this degree.

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ABSTRACT

IMPROVING LANGUAGE AND SOCIAL SKILLS IN AUTISM SPECTRUM DISORDER USING COMPUTER BASED TRAINING: A CASE STUDY

by

© Maria A. Beecroft 2013

Master of Arts in Teaching International Languages

California State University, Chico

Fall 2013

There has been increasing incidence and awareness of autism spectrum disorders in recent years. Improved outcomes due to early intervention and continued assistance throughout the school years have created the need for ongoing support for adults on the autism spectrum. Recent advances in computer technology and understanding of the human brain offer the possibility that specific computer based training may provide a cost effective means to deliver this necessary support. The affinity of individuals with autism towards all things computer combined with the limited side effects and availability anywhere, anytime, are a winning combination.

This case study examined to what extent, if any, training software produces improvements in the language and social skills of a bilingual, young adult who has autism. Primary focus was on working memory, sequencing, and facial recognition. This study involved pre and post testing, using real-world tasks, to measure the effects of

using the Posit Science computer based training programs designed to improve language and social skills. Results suggest that computer based training was beneficial for the participant in these areas.

Previous research conducted in this field has been encouraging, but limited in scope or generalized from individuals with related neurological conditions. More research is needed in this area and it is recommended that software designed specifically for individuals with autism be developed and used. Larger populations and longer time commitments are also necessary to determine if programs like this could be beneficial for other individuals on the autism spectrum.

CHAPTER I

INTRODUCTION

Background

This research is a case study of a thirty-year old bilingual male, who has autism and his response to a computer based training program. The participant's mother is a German native living in the United States and fluent in both English and German. His father, a native English speaker, spoke both English and German with the participant. The participant responded to and spoke both languages without difficulty for the first three years of his life. Based on regular pediatric visits and reports from his parents, the participant's development and language skills were completely typical for his age. Parents reported significant changes in development occurred shortly after turning three years old.

The participant began his education in a parent-participation pre-school that required a parent accompany him anytime he was there. In kindergarten, the participant attended a special school primarily for Down syndrome students and others with severe disabilities. In first and second grade, the participant was in a self-contained special education classroom at a Department of Defense school in Japan with four other students, a teacher, and an aide. The participant's school day was reduced to 2 ½ hours. During this time, the pediatric neurologist first used the label "PDD" (Pervasive Developmental Disorder) to describe the participant's condition. The school psychologist suggested at

an IEP meeting that the participant would never be able to read or write and his training should focus on survival skills. He suggested that time spent on attempting academics would be a waste. Years later, when the participant attended high school in Japan, this same school psychologist was forced to admit that he was mistaken about the participant's abilities.

Beginning third grade at a Department of Defense school in Germany, the participant was mainstreamed in a regular classroom with a one-on-one aide and attended some classes in the resource room. He received intermittent speech therapy and occupational therapy. This pattern continued until his high school graduation from a Department of Defense high school in Japan. By this time, the PDD diagnosis had been altered to high functioning autism disorder. In 2001, he attended a community college where he had support from the disability office in the form of note takers, occasional tutors, and extra time on tests in a quiet location. He taped all lectures. The participant completed his AS degree in computer electronics in 2005 with a GPA of 3.98.

The participant still lived with his parents and had several short periods of employment. During this time period, he took additional classes at the junior college to finish Cisco and Microsoft certifications. He also received his driver's license in 2007, though he still drives with a parent in the car for navigational and general driving support. Due to the economic environment and limited job opportunities, the participant decided he wanted to complete a Bachelor's degree in computer science at California State University, Chico. In order to qualify for the junior transfer program to CSU Chico, the participant had to take additional courses at the two-year college. His parents and college counselor advised that he take the less rigorous computer information system major,

because the computer science major required calculus and physics and the participant's high school math preparation barely went past Algebra 1. Upon completion of a survey of calculus course and statistics course, the instructor convinced the participant he should try full-blown calculus for the higher major. Subsequently, the participant aced three semesters of calculus and two semesters of physics. He is currently a senior at CSU Chico, majoring in computer science, and expected to graduate in December, 2013.

Despite the participant's academic successes, autism still severely limits social interaction. He shares an apartment with his parents in Chico. They provide a great deal of support at home with organization and time management. His struggle with facial recognition and other social skills remains problematic. Among other areas, he has difficulty with interpreting non-verbal communication, auditory processing, and task sequencing. Even though the participant has surpassed expectations, his parents still seek ways to help him lead a more normal life.

When the participant first started working on driving and taking difficult classes at the junior college, his father heard about Posit Science's success in a number of cognitive functions using computer based training programs. The participant used a visual enhancement program that reportedly helped his field of vision for driving and reactions. He also took a brain fitness course and reported that it helped him with listening and understanding in college classes, though there was no scientific study involved at the time.

The participant agreed to participate in this case study, hoping to benefit from the new Posit Science programs focusing on language and social skills. Though the

participant is legally independent, his parents are fully supportive of his involvement with this project. He completed the program during summer break.

Statement of the Problem

This study seeks to determine the effectiveness of Posit Science computer based training in improving language and social skills for a bilingual participant with autism. Previously, the programs have been mostly researched with other disorders related to aging, stroke, traumatic brain injury, and similar neurological events. Results have been positive for people with these disorders and reportedly have improved their quality of life. The participant previously reported visual and cognitive improvements using a different set of programs from Posit Science, though there was no scientific examination of the data at the time.

This study was designed to investigate whether the new programs can produce improvements in language and social skills for a subject with autism and possibly other individuals with similar conditions. This type of computer based training has only been recently developed, and there seems to be scarce research using it with individuals with autism. The focus of most research has been on other neurological conditions. If the program yields significant improvements in language and social skills for the participant, it could increase the likelihood of successful employment and a more independent life.

Purpose of the Study

The purpose of this study is to answer the following questions:

1. To what extent, if any, does training software produce improvements in the language skills of a bilingual, young adult who has autism?
2. To what extent, if any, does training software produce improvements in the social skills of a bilingual, young adult who has autism?

Distinctive features of autism, such as hand flapping or insistence on sameness, can also occur in typical children. However, the main feature of autism is uncommon social interaction. Severity of this impairment may vary among individuals, but is so unusual that it cannot be considered to be typical behavior (Benaron, 2009, p. 4). Language difficulties, such as sequencing, expressive and non-verbal communication, are major problems for people on the autism spectrum. This study's main goal is to investigate whether online computer training can improve language and social skills in a bilingual participant who has autism. Another purpose is to raise awareness in parents, educators, and caregivers of this method of training for individuals with autism.

Definition of Terms

Asperger's syndrome

Asperger's syndrome is a subtype of autism. With Asperger's syndrome, people display autistic characteristics, but no delay in language and intellectual development (Frith & Happé, 2005, p. 787).

Autism spectrum disorders

Autism spectrum disorders (ASDs) are described as “a group of developmental disabilities characterized by impairments in social interaction and communication and by restricted, repetitive, and stereotyped patterns of behavior” (Centers for Disease Control and Prevention, 2012, p. 1). While many characteristics of autism are the same, there are also many differences in individuals. This is “referred to as a spectrum disorder – that is, one in which symptoms can occur in many forms and with varying degrees of intensity” (Paula Kluth, 2003, p. 533). Autism spectrum disorder includes “autistic disorder, Asperger disorder, and pervasive developmental disorder not otherwise specified” (Centers for Disease Control and Prevention, 2013, p. 1)

Executive functioning

Executive function is a term used for thinking processes, such as designing a plan and steadily following it to reach a goal. Working memory is part of executive functioning.

High functioning autism

The term High Functioning Autism (HFA) has been used mainly in the U.S. as a label for diagnosis and to receive services (Attwood, T., 1998, p.150); however, it usually describes a person who is more capable and places in the advanced region of the autism spectrum continuum.

Working memory

Working Memory (WM) is the ability to remember steps in a sequence and follow them.

Limitations of the Study

As with any research, there are limitations to this study. In order to get an in-depth view of the problem, a qualitative method case study design was used for this research. However, because this study focused on only one individual and a limited number of studies were consulted, not all perspectives may be included. Another limitation might be that the researcher worked one-on-one with the participant, and, therefore, some investigator bias might be associated with the study. The online training involved considerable time. In order to administer the programs consistently, the participant and his parents agreed it would be best to participate during summer break from college. Because of time constraints, not all programs were finished. This may be reflected in incomplete data. The participant had previous experience with Posit Science, and, therefore, the same company was selected for this study. The software programs used, however, are designed for a broader range of individuals and not specific to the autism spectrum. The impact of the program's application on other individuals with autism cannot be determined.

CHAPTER II

LITERATURE REVIEW

Introduction

This study investigated what, if any, improvement can be achieved using computer based training in a bilingual, young adult who has autism. Two areas were examined: social skills (focusing on facial recognition) and language skills (auditory processing, non-verbal communication and working memory/sequencing).

Individuals with autism have many needs in the area of language and socialization. Some are addressed while in school through training and/or clinical interventions in the form of medication. When individuals reach adulthood, many of the services they receive cease (Sullivan, 2007): “After aging out of school, adult sons and daughters with autism typically either sit at home (and need a caretaker) with no programs, or participate in those which poorly serve their unique needs” (p. 6). Concerned parents look for other alternatives or approaches to improve their young adults’ skills and lives. There are interventions using different techniques and measures. The method evaluated in this study differs from previous work as computer based training programs are fairly new, and few studies have been done using this method (Mineo, Ziegler, Gill, and Salkin, 2009, p. 179; Faja, Aylward, Bernier, and Dawson 2008, p. 5). However, findings that new tools like this could help people on the autism spectrum are encouraging (Moore, McGrath, and Thorpe, p. 218).

The purpose of this study was to determine if and to what extent computer based software can improve language and social skills in individuals with autism. The scholars I have consulted are organized first by “background information”. This section includes facts about the nature of autism spectrum disorder (ASD), Asperger’s Syndrome - a variation of autism on the autism spectrum -, Attention Deficit Hyperactivity Disorder (ADD), and Pervasive Developmental Disorder (PDD). The next section, “bilingualism and autism”, addresses issues and views about people with ASD learning multiple languages. After this, research on computerized training is discussed. In the last section, “target areas”, the objectives of this study, such as facial recognition, sequencing, language, communication, and social skills are discussed.

Background Information

Although autism spectrum disorder had been observed earlier, it was not until 1943 that two natives of Austria, Leo Kanner (1894-1981) and Hans Asperger (1906-1980), described children with unusual social interaction. Kanner was in the United States and Asperger in Vienna, Austria, when they described the same symptoms in their patients and used the term autism (Lyons and Fitzgerald, 2007, p. 2022). “Autos” is the Greek word for “self” (Benaron, 2009, p. 3). While Kanner’s work focused on a more severe form of autism, Asperger’s cases dealt with more able children. Asperger was not credited with his accomplishments until after his death in 1980. Lorna Wing, a British psychologist and mother of a child with autism, coined the term Asperger’s Syndrome and used it in a paper published in 1981 (Attwood, 1998, p. 15; Benaron, 2009, p. 8).

The nature of autism can be explained in many different ways. An example that people perhaps can relate to is the comparison of the person with autism to that of a foreigner who does not understand the language or the culture of the country he is encountering only that “autistic people are ‘foreigners’ in any society” (Sinclair, 1993, p. 2). Colman, A. M. (2012) described autism in the Dictionary of Psychology as

A pervasive developmental disorder characterized by gross and sustained impairments of social interaction and communication; restricted and stereotyped patterns of behavior, interests, and activities; and abnormalities manifested before age 3 in social development, language acquisition, or play. Symptoms may include emotional non-responsiveness, lack of reciprocity in social interaction, failure to develop peer relations, delay or failure of speech development, stereotyped and idiosyncratic language usage or non-verbal behavior (including gaze aversion), insistence on sameness, and ritualized mannerisms. The disorder was first described in 1943 by the Austrian-born US child psychiatrist Leo Kanner (1894-1981).

In Moore, McGrath, and Thorpe (2000) autism is described as a ‘triad of impairments’ in social interaction, communication, and thinking/behavior areas. A person with autism has problems relating to other people and is often unable to empathize with them. He or she finds it difficult to understand verbal and non-verbal communication and is rigid in thinking, language and behavior. Many scientists currently believe that this is caused by a deficiency in theory of mind, understanding or interpreting the thoughts and actions of others (Jordan, 1991a; Wing, 1996, as cited in Moore et al., 2000, p. 218).

Other terms are used for classification and diagnostic assessment, such as autism spectrum disorder or pervasive developmental disorders. According to the National Institute on Deafness and other Communication Disorders (NIDCD, 2010), autism falls under the group of conditions called “autism spectrum disorders” which can

vary in severity and age of onset. Autism may also be called pervasive developmental disorder (PDD) which is a broader category marked by delays in areas such as communication and social interaction (p. 1).

Young adults on the autism spectrum disorder (ASD) have many needs which are not often addressed in research and literature, because the focus is mainly on children on the spectrum and their needs (Eaves & Ho, 2008, p. 739). This population experiences a shortage of interventions which are proven to be effective in improving social skills (Kandalaft, Didehbani, Krawczyk, Allen, and Chapman, 2012, p. 34). Yet, these individuals and/or their caregivers need to work on solving their problems and improve their lives. Rabipour and Raz (2012) reported that especially parents are drawn to computerized training over the internet to avoid “side-effect-laden medication and other less conventional options” (p. 159).

The incidence of the broad autism spectrum was estimated to be 1 in 88 in 2008, (Centers for Disease Control and Prevention, 2008, p. 1) and 1 in 50 in 2011-12 (CDC, 2013, p. 2) based on parent reports. Liu, Conn, Sarkar, and Stone (2008) state that “there is an increasing consensus that intensive behavioral and educational intervention programs can significantly improve long term outcomes for individuals and their families” (p. 662). Autism is a life-long condition (NIDCD, 2010, p. 1), and parents constantly look for ways to better the lives of their children with autism and to promote their independence. Even though resources and guidance are limited, parents contribute significantly to their children’s success (Attwood, 1998, p. 11).

Through parental perseverance, trial and error, intuition, self-motivation, constant repetition and reinforcement of concepts that come naturally to typical children,

and daily, often even hourly planning, small steps on a long road are achieved. This is in agreement with Rutter's (2006) assessment that "Despite the urgent need and societal import of intensive treatment (as cited in Liu et al., 2008, p. 662), appropriate intervention resources for children with ASD and their families are often difficult to access and highly expensive" (Tarkan, 2002, as cited in Liu et al., 2008, p. 662). Often it is left to the parents to take the full initiative and explore other alternatives. Options are available, such as the software packages of the advancing computer technology, which address specific deficits in autism, such as social communication and other areas (Liu et al., 2008, p. 663).

One of the biggest problems individuals with ASD face in real life communication is that social situations tend to bewilder them and interpreting gestures or emotions are difficult for them (Hobson et al., 1989; Prior & Ozonoff, 1998; Volkmar et al., 1989, as cited in Bernard-Opitz et al., 2001). One of the positive aspects of computer training programs is that, unlike real life situations, the environment is controlled, proceeding in stages that become incrementally more complex as the program progresses without overwhelming the participant.

Several studies, such as Mineo, Ziegler, Gill, and Salking (2009) state a need for more research about learning if successful findings from computer programs can be transferred to real life contexts (p. 185). In the meantime, there are other benefits for this kind of learning. An example is Bernard-Opitz, Sriram, and Nakhoda-Sapuan's (2001) observation that, "Although real-life practice remains the most important part of social problem solving, computer based simulations might be a non-threatening starting point

for individuals with autism, contributing to the facilitation of better social and communicative competence” (p. 384).

Bilingualism and Autism

Given the constraints of living with autism, it is difficult for many parents to decide if they should raise their child bilingually. Little information is available on this topic. Children with autism may not have the opportunity to learn a second language, because their parents receive discouraging advice from professionals towards bilingualism (Kay-Raining Bird, Lamond, and Holden, 2011, p. 52). This is especially problematic for children who need to be bilingual so that they can fully participate in their family’s community and social life. Research revealed that while there are difficulties, children with autism can become bilingual, especially if raised in a bilingual family setting (p. 63). Among the many benefits of bilingualism reported are enhancements of metalinguistic skills such as those found with typically developing children. As far as the authors knew, only one case study of a Korean and English speaking child with autism had been conducted (Seung et al., 2006, as cited in Kay-Raining Bird et al., 2011, p. 53).

Little is known about how children with autism acquire language (Seung, 2006). Research on bilingual language developments in children with ASD is very limited (Hambly & Fombonne, 2011, p. 1342). The authors studied whether there were additional delays if children on the spectrum learned another language and found that this is not the case (p. 1342). Furthermore, they advised that “caregivers should not be discouraged from maintaining bilingual environments or introducing a second language

where necessary for the child or family, although little is currently known about the pace of learning or bilingual achievements for children with ASDs” (p. 1349).

Another view of this issue is presented in the research of Toppelberg, Snow, and Tager-Flusberg (1999). These authors questioned whether children with severe developmental disorders, such as autism, should learn different languages and maintain heritage languages as is recommended for typically developing children (p. 1197). The authors pointed out that children with ASD have a much more difficult time acquiring the first language and that they require a “high quality of language input. Together with their unique social and communicative difficulties, acquiring L2 for these children is exceptionally arduous” (p. 1198).

However, there might be benefits for a bilingual individual with ASD, because of the positive effects multiple languages can have on the brain. As Crinion et al. (2006) point out, using different languages stimulates the brain in different ways (p. 1540). Research also revealed that second language development changes the brain’s structure (Bot, 2006, p. 129) and makes it more efficient (Kluger, 2013, p. 42). There is also clinical evidence that languages are not housed in the same part of the brain. Paddock (2009) cites the findings from a case study of a bilingual with brain damage to one side of his brain and concludes that the evidence suggests “that a person’s first and second language are represented in different parts of the brain”. In this research, Raphiq Ibrahim (2009) studied a 41 year old bilingual man whose L 1 was Arabic and L 2 was Hebrew, who suffered brain damage. In his conclusion, Ibrahim reported that the individual’s first language had suffered much less damage than his second language.

Issues of bilingualism and heritage language maintenance were discussed in Yu (2013). The author found that minority language parents do not feel comfortable speaking to their children with ASD in their native language. They fear that this would be an additional burden on their children and worsen their lives (p. 10). Families seeking advice from professionals in the educational and health sectors are often told to only speak English with their children, which is in disagreement with what experts in the field of bilingualism and heritage languages recommend (p. 11). Parents often felt they had no other option than to speak English with their children on the autism spectrum, because they needed the language for special education and related services and to do well in general (p. 20). This caused many mothers intense stress. Yu (2013) concluded, “Language use between parents and children is a complex matter that is unique to each family. Parents need to be supported to make language use decisions that are self-enhancing and congruent with their families’ needs” (p. 10).

Computerized Training

Computer aided learning could potentially have a great impact on students with autism (Moore et al., 2000). The authors stated that many people on the autism spectrum like working with computers and that this could be a vehicle to promote their learning, enrich and empower their lives (p. 218). In this study caregivers were addressed as having the goal and challenge of equipping the person with autism to lead a ‘happy and satisfying life’ (Carlton, 1993, as cited in Moore et al., 2000, p. 218). To achieve this goal, education is of great importance. Individuals on the autism spectrum

need to be taught and guided in special ways and computers could have an important role in providing this (Trevvarthen et al., 1998, as cited in Moore et al., 2000, p. 218).

Many individuals on the spectrum seem to have special interests, such as computers, games, and programs. Relatively few studies have been conducted on the impact of technology enhanced computer programs, but research has revealed that most participants were highly engaged (Mineo, Ziegler, Gill and Salkin, 2009, p. 172). This affinity for computers could be beneficial for learning in general, such as helping students with ASD address difficulties in the curriculum (Moore et al., 2000, p. 218). Social skills and language skills might also be enhanced using computer assisted technology (Bertram et al., 2013, p. 301). It is important to encourage a special interest, such as computers, because “some interests can eventually become a source of income and employment” (Attwood, 1998, p. 97).

Klingberg et al. (2004) studied the effects of computerized training on working memory in children with ADHD. They described working memory as “the ability to retain information during a delay and then to make a response based on that internal representation” (p. 177). According to Hill (2004), working memory is part of executive functioning, which is responsible for such brain processes as planning and persistently following a goal (as cited in Baltruschat et al., 2011). This is an area the participant of this study also has difficulty with, especially in sequencing tasks, which is part of working memory and executive functioning. Klingberg et al.’s study (2004) revealed that “the treatment group that participated in the high-intensity training of working memory improved significantly more than the comparison group”. The study

concluded that training can improve working memory and suggested that it could be useful in other individuals with executive functioning deficits (p. 185).

Faja, Aylward, Bernier, and Dawson (2008) studied the effects of computerized face-specific training on adolescents and young adults with autism and noted that directing their attention to faces may lead to better processing ability (p. 4). To their knowledge, there was no previous research indicating that training programs actually helped with facial recognition of unfamiliar faces in individuals with ASD (p. 5). Their present study suggested that face expertise training is feasible and can influence facial recognition (p.17). Moreover,

computerized training may be criticized for lack of ecological validity, but the artificial nature of the training may be exactly the factor that enhances face processing ability with unfamiliar faces for individuals who have not developed face expertise naturally. (p. 19)

Barnes et al. (2009) studied 47 participants with mild cognitive impairment in a computer based cognitive training program from Posit Science Corporation, the company that developed the programs the participant used. While their research did not find any significant difference between groups, they reported that similar computer based programs are feasible in individuals with mild cognitive impairment and that further research is warranted (p. 1).

Another study that used programs from Posit Science was done by Rosen, Sugiura, Kramer, Whifield-Gabrieli, and Gabrieli (2001). This study focused on memory and brain function in participants with mild cognitive impairment using the cognitive training program from Posit Science to enhance the speed and accuracy of auditory

verbal processing. The research found brain changes which suggest that cognitive training is beneficial (p. 1).

There is limited availability of specific programs designed for individuals with ASD and their needs. Research by Moore et al. (2000) stated that apparently mostly generic software is used, but the best option would be to use computer aided learning systems that target areas unique to autism (p. 219). Autism specific software packages would address the problems individuals with ASD encounter directly and provide better support for this population (Higgins & Boone, 1996, as cited in Moore et al., 2000, p. 218). This is also one of the reasons that Posit Science was used in this study. Posit Science had programs that addressed participant's needs, even though they were not specifically designed for autism spectrum individuals.

The general consensus from the above studies indicates that computer based training could be one of the better tools for individuals on the autism spectrum. The combination of an affinity for computers and ability to use software to break down tasks to provide the necessary repetition were also cited.

Target Areas

Individuals with ASD have difficulty with non-verbal communication, such as extracting information from other people's faces as clues for meaning. David et al. (2008) conducted a study using Simon Baron-Cohen's "Reading-the-mind-in-the-eyes test" (p. 597). Subjects were to match the correct emotion with pictures of the area around the eyes to describe the expression of thought and feeling they saw. Data revealed that the high functioning autism (HFA)/Asperger syndrome (AS) group scored

significantly lower than the control group in interpreting facial expressions and their meanings. These processes are also defined as “mentalizing” or “theory of mind” (Baron-Cohen, 1997, as cited in David et al., 2008) or “mindblindness” (Baron-Cohen, 1996, p. 1). This is a deficit in autism that can lead to awkward, inappropriate, offensive or even dangerous situations, because individuals on the spectrum often fail to recognize non-verbal cues embedded in communication or to channel them correctly. One such incident led to the death of a non-verbal man with ASD who had hypersensitivities to noise and crowds (Sullivan, 2007, p. 5).

Another area of difficulty for individuals with ASD is identifying people by their faces and keeping the faces apart. It is not uncommon for them to remember people by what they wear or what their games or other possession are instead of by their faces. This inability to recognize people can cause problems in all phases of daily life. Temple Grandin (1995), autism spokesperson, university professor, and autistic person, stated that unless she has seen people many times or they have distinct features, she will not recognize or remember them. To further illustrate this disability, Grandin writes about a woman with ASD in her book who identifies cancer cells in a laboratory, but must see people as many as 15 times to remember their faces. The reason she can spot irregular cells immediately is that they literally “jump out at her” (p. 74).

This is not to say that individuals with ASD cannot recognize differences in other things, especially when it comes to cartoon characters. Grelotti et al. (2005) tested an individual with autism who had an extreme interest in Digimon (digital monster), a cartoon that originated in Japan. He was able to identify the different animated Digimon characters faster than familiar faces or objects. This study revealed that the individual’s

brain regions responsible for face and emotional processing responded more strongly to Digimon characters than to familiar faces or objects. Instead of becoming an expert in faces like most of us are from very early on in life, this person developed an expertise of Digimon (p. 380).

As adults, typically developing individuals are able to categorize and remember faces holistically rather than by different features (Faja et al., 2008, p. 2). The authors reported on studies suggesting that individuals on the autism spectrum may not use the same strategies as typically developing individuals when processing faces (p. 1). The study also cited the example of the participant with the unusual interest in Digimon (Grelotti et al., 2005, as cited in Faja et al., 2008, p. 5), noting that individuals with ASD have the ability for facial recognition, but do not use it. One of the reasons might be that ASD individuals are not motivated to pay attention to faces (p. 17). The authors stated that their research was the first to empirically support investigating “specialized face perception mechanisms” (p. 18). Their study explored the effects of face expertise training in adults with high functioning autism spectrum disorders. They found that individuals with ASD can improve their facial recognition skills and become face experts through training (p. 1).

In another investigation, Faja et al. (2012) focused on matching pairs of faces (social) and non-social objects, and reported the same findings as in their study of 2008. With training, individuals with ASD can become face experts with training (p. 289). The comments of some of the participants were of particular importance and interest, because they showed a different aspect of facial recognition not mentioned before. In this study, participants used static pictures instead of dynamic stimuli. Participants favored the

pictures, because they did not have to deal with movement or other distractions, such as having a live person in front of them who talks and displays emotions which are perplexing. While it was felt that this is a good first step for individuals with autism to learn how to read faces, the study called for further research under more complex and natural circumstances (p. 291).

Very little literature exists on improving another difficult area, working memory, for individuals with autism (Baltruschat et al., 2012, p. 550). Working memory is “the ability to retain information during a delay and then to make a response based on that internal representation” (Klingberg et al., 2005, p. 177). Working memory can range from simple tasks to sophisticated stages of solving problems (Williams, Goldstein, Carpenter, and Minshew, 2005, p. 747). Specific examples of working memory in everyday life are activities with multiple steps, such as grocery shopping, looking for lost items or staying on track in a conversation (Baltruschat et al., 2012, p. 550). The study used a German computerized working memory test, “Arbeitsgedächtnis Testbatterie” (AGTB), at the beginning and end of the study (p. 555), and reported that the AGTB posttest showed that performance had improved. However, no real-life applications were made to see if working memory could be improved in participants with ASD in their day-to-day activities (p. 559).

Further support for the idea that working memory (WM) can be improved with training is provided by Klingberg et al. (2005). In their study of children with ADHD, a related disorder, they found the following:

Although the training effect remained relatively stable for several months, we expect that it will eventually be necessary with a shorter period of retraining to maintain the effect. However, if WM and executive functions improve by practice,

as this study indicates, then we would expect some degree of practice effect also from everyday activities with very high WM loads, such as mathematics and other demanding academic activities. It is theoretically possible that improvement of WM and executive functioning by an intensive training program would enable the children to perform better and hence to participate more in such WM demanding activities. This would lead to more WM practice in everyday life, and the children would enter a positive feedback loop that would reduce the need for retraining with a training program. (p. 184)

While there is general agreement that working memory is a problem for people with ASD, researchers put forth a wide variety of ideas as to its nature and causes. Williams et al. (2005) studied high functioning children, adolescents, and adults with autism (p. 747). They found that the problems were likely not their verbal and spatial working memory, but problem solving. While this may apply to this specific situation, the working memory issues they describe are in spatial problem solving as opposed to working memory related to lists of tasks or event sequencing. The authors suggested that verbal working memory may be fine in individuals with ASD, while spatial working memory is not (p. 753). This seems to contrast the ideas presented by Grandin (1995), who sees in pictures and demonstrates excellent visual spatial problem solving in her intricate designs. It could lead one to question whether there are distinct visual versus verbal strengths or weaknesses within individuals on the autism spectrum. This might explain the variances between different research groups in this area.

Further evidence of contradictions about working memory in individuals with autism can be found in Nakahachi et al. (2006). The authors of this study pointed to distractions caused by external factors in the testing area as interfering with performance on working memory tasks. They suggested testing in a distraction free environment to achieve a clearer picture of performance (p. 317).

A separate study by Ozonoff and Jensen (1999) examined difficulties with working memory in individuals with autism, ADHD and Tourette's syndrome. They indicated that these have long been looked at as similar, due to executive function problems. After closer examination, they discovered that while all of the groups had difficulty in the area of working memory, the nature of the difficulties were unique to each disorder. The authors felt that these unique characteristics in working memory held potential for the diagnostic process in separating individuals in these groups and possibly increasing treatment effects (p. 175).

Impairments in social skills are one of the core characteristics of autism. This is often a main reason why individuals with ASD have difficulty relating to classmates, neighbors, and people in general. This leads to failure to make friends and separation from society. Bernard-Opitz et al. (2001) investigated whether social skills in children on the autism spectrum could be improved using software packages. Eight normal and eight autistic children were tested using distinct social problems. While the group with autism was far less successful in finding solutions, results showed that young children with ASD can be taught to navigate the social world using computer interfaces (p. 377). This study also stated that the children on the spectrum "enjoyed the programs", while their typically developing peers "showed signs of boredom in the later sessions of the study" (p. 383). This agrees with the fact that the participant in this study also enjoys these computer programs. He is always motivated to start the training with the software. Even though the tasks are repetitive and monotonous at times, he has to be reminded when it is time to stop. When he interacts with the program, his full attention is fixed on the screen, and he

seems to forget everything around him. This intense engagement with the material is an important criterion for a positive outcome of the learning experience.

Other studies, such as Hopkins et al. (2011), have explored the use of computer based intervention (e. g., avatar assistants) to improve the social skills of individuals with ASD. The importance of improving social skills was highlighted by the American Psychiatric Association (1994): “children with Autism Spectrum Disorders (ASD) are particularly affected by this impairment as evidenced by their difficulties in reciprocal social interaction skills” (as cited in Hopkins et al., 2011, p. 1543). The authors maintained that even though faces have the same parts, such as nose, eyes, and mouth, most people can distinguish between them and are able to identify individuals by certain differences. Individuals with ASD, however, process faces by concentrating on the distance between the features rather than by the impression of the whole face (p. 1544). The interactive avatar assisted “FaceSay” computer program gives participants a chance to practice eye gaze and facial recognition (p. 1543). The features of working with computers, such as the environment being controlled and structured, can help individuals with ASD (p. 1544).

The participant’s parents reported that teaching social skills through rehearsing social rules has been an almost daily practice. It entails planning every detail of a given situation and discussing the outcome afterwards. The problem with this is that “no set of rules can be drawn up to cover every contingency” (Tantam, 1993, as cited in Moore et al., 2000, p. 219). Even though he prepares for numerous situations, the participant inevitably encounters unexpected and unrehearsed scenarios. According to the parents, teaching social rules has helped the participant tremendously, even enabling

him to make some correct decisions on his own. The participant and his parents hope that the computer software programs used for this study will further assist him in this area.

Conclusion

Autism is much more common now, and there is no cure at this time. Public awareness has increased. Unlike the past, autism is now seen as an affliction that could affect any family (Benaron, 2009, p. xi). Doctors, schools, caregivers and parents work diligently one day at a time to give individuals with ASD a chance for a better life.

Additionally, they have dire needs in communication and social skills. Although more is now known about this lifelong disorder than just a few years ago, research is needed to better understand and help individuals on the spectrum.

According to the literature reviewed, there has been some success using computerized training programs with autistic and neurological disorders. However, many disagree as to the areas where training is appropriate and most effective. The general consensus is that computerized training programs can improve the lives of people with autism. There have been positive results using Posit Science software for language and social skills training in a variety of neurological conditions, but no specific research has been done on individuals with ASD.

Social skills are problematic for individuals on the autism spectrum due to difficulties in facial recognition, understanding social norms, and interpreting gestures and other social cues. Individuals with autism frequently have difficulty recognizing people that they interact with on a regular basis, but can readily differentiate between

numerous cartoon characters in ways that the rest of us either would or could not do.

Individuals with autism often behave inappropriately in situations, because they lack the ability to read emotions in people's faces. This often leads to social isolation in school specifically and the community in general.

Language difficulties, including sequencing, working memory, expressive and non-verbal communication, are a major problem for people on the autism spectrum.

Researchers offer varied opinions as to the cause of problems with sequencing and working memory, but the end result often leads to frustration for the person with ASD and the individuals they encounter. Tasks that would be routine for most of us at an early age, may still elude adults with ASD, even though they may have a high degree of intelligence. This often necessitates specialized support for education and potential employment. The failure to express feelings and inability to perceive non-verbal communications can create difficult situations for people on the autism spectrum. Combined with hypersensitivity and crowd anxiety, these communication difficulties have sometimes escalated to the point of altercations, arrest, and on occasion even resulted in death.

Children are usually the main focus of autism related programs, such as early intervention in education and treatments in the medical field. Therefore, much of the literature is also concerned with younger age groups and their problems. With emerging knowledge about autism, interventions are helping children with autism grow up and lead more productive lives. However, much more needs to be done, especially for young adults with autism who lack support from the education system and other public resources. With the advancing technology, computer training programs are being

designed to help individuals with disabilities improve conditions through planned activities. These measures are cost effective and non-invasive. They can be self-administered at home or at other locations, and do not have the side effects and other negatives associated with medications. Combined with minimal community support, these resources can go a long way toward creating meaningful adult lives for people on the autism spectrum.

CHAPTER III

METHODOLOGY

This study assessed whether language and social skills in autism could be improved using computer based training. A qualitative method case study design was implemented. According to Gall (2010), a case study “is conducted to shed light on a particular phenomenon – that is, a set of processes, events, individuals, programs, or any other events or circumstances of interest to researchers” (p. 339). This is the appropriate method for this study, because unlike other methods, a case study can focus on a particular individual in his natural setting and yield rich data. In a case study, the participant and researcher are part of the investigation providing emic (insider) and etic (outsider) views and offer insights into the complexities of the case. This study involves triangulation, using multiple measures to collect and evaluate data from Posit Science, the participant and his parents, and the researcher in an effort to show a more complete view.

Participant

The subject of this case study is a 30 year old bilingual male with high functioning autism. He is a senior at CSU Chico, majoring in computer science. He was raised in a bilingual household with a German mother and a U.S. native English speaking father. The study involves his progress participating in “People Skills Training” and some auditory/language focus activities from Posit Science. He utilized another program from this company several years ago which proved beneficial.

The purpose of this study is to take an in-depth look at improving language and social skills in autism using People Skills Training and Auditory/Language Focus Activities from Posit Science. The questions to be answered are:

1. To what extent, if any, does training software produce improvements in the social skills of a bilingual, young adult who has autism?
2. To what extent, if any, does training software produce improvements in the language skills of a bilingual, young adult who has autism?

Instruments

Posit Science Online Training Program

This study utilized seven online training programs from Posit Science. Three programs taught language skills: Memory Grid, To-Do List Training, and Syllable Stacks. The remaining four programs addressed social skills: Face to Face, In the Know, Recognition, and Face Facts. The different programs are described as follows (Posit Science, 2003):

Language Skills Training

The Memory Grid Training Program required the participant click on cards, listen to the sounds they produce, and match the syllables in order to clear a grid. These syllables represented the most commonly used English sound combinations in different examples of speech, such as male or female voices, different accents, different timing, etc. Eventually the sounds became more similar, making the tasks more difficult. As the participant improved, he was given more cards to match.

The To-Do List Training Program involved listening to a set of instructions, remembering them, and following them in order. As the program progressed, the list of

instructions grew longer and more complex, the items that had to be gathered were more similar and more instructions had to be remembered.

The Syllable Stacks Program required listening to a series of sounds, and then clicking on the words to reproduce the sounds in the exact order. The number of syllables increased and it was harder to discern between the syllables. There were distracters not matching any sounds and the speed transitioned from slow to faster than normal speech. With improvement, more sounds in the series were given.

Social Skills Training

In the Face to Face Program, the participant watched as a face with an expression flashed briefly on the screen. He then saw a set of faces and had to pick the right match. For instance, if the person in the first picture looked happy, he had to find the happy face in the second set. The exercise changed as follows: more emotions were added; the intensity of the expressions decreased; and the number of faces to choose from increased from 3 to 6. As the participant advanced, the faces flashed for fewer milliseconds on the screen.

The In the Know Program involved listening to a conversation, and then answering questions based on the details heard. As the program progressed, the speech processing level changed, and the sentences became more complex. The pauses between sentences decreased. As the participant improved, he was given longer conversations with more difficult and elusive details (e.g., he had to distinguish between rumors, denials and facts to arrive at the correct answer).

In the Recognition Program, the participant watched a face appear briefly on the screen. Only the oval of a face, from forehead to chin without any hair, was shown;

no other parts were featured. The participant had to remember features of the face and was asked to identify who he saw from a selection of faces in the next screen. Then the angle of the faces changed, the number of faces to choose from increased from 3 to 6, and the faces became gender-matched instead of having male and female faces mixed together. All these changes increased the level of difficulty. As the participant advanced, the faces flashed for fewer milliseconds on the screen.

In the Face Facts Program, the participant looked at faces and read facts such as names, occupations, places where they live, their preferences, their families and pets. In the testing, he had to recall which facts go with which face. In later levels, the names and facts became more similar, and the gender changed (first men only, then women only, then both genders) making it harder to keep them apart. As the participant improved, he had to remember more and more faces, names, and facts.

The Posit Science People Skills and Memory programs have built-in baseline assessments and record incremental progress throughout the process which have been reported as part of the data collection.

Researcher's Measurement Activities

The researcher designed two measurement activities to mirror the Posit Science training programs in language and social skills to collect data and allow for triangulation. The first part is comprised of eight everyday tasks to test the participant's sequencing abilities. The resulting data was used in assessing language skills. For the second part, the researcher designed a PowerPoint of twenty pictures of people familiar to the participant to teach and test social skills in the form of facial recognition. The scores were used as social skills data. Baseline and post-tests were administered before and after

implementing the Posit Science language and social skills training, so the researcher could calculate overall growth by comparing the scores on the pre and post-tests.

Language Skills Measurement Activities

The following eight tasks were designed by the researcher to collect data before and after implementing the Posit Science Memory Training as baseline and progress language assessment (receptive, spoken, and written):

1. Get your cell phone first and then your coat
2. Find the milk, salt and pepper, and the cutting board and set them on the table
3. Find the key to the mail box, get the mail, set it in the office, and return the key where it belongs
4. Tell me, in order, what you have done in (a specified time period)
5. What homework/chores will you do first, second, and third?
6. Write a plan of four things you will do today
7. Tell me three things you need to do to set the table and do them
8. Call a sibling, talk to him for 5 minutes, and tell me three things he talked about

Social Skills Measurement Activities

To determine baseline and progress in the social skills assessment portion of the study, the researcher used the following measurements before and after implementing the Posit Science People Skills Training program:

1. 20 pictures of family members, church members, teachers, and others the participant should be familiar with were collected and randomly arranged in a power point format.

2. The training consisted of showing the pictures to the participant for 10 seconds while researcher named the individual.
3. Testing was done 30 minutes later by randomly showing each of the 20 photos and giving participant 10 seconds to name each individual. The number and identity of correctly identified pictures were recorded.
4. Three days later, each of the 20 photos were randomly shown again and participant was given 10 seconds to name each. The number and identity of correctly identified pictures were recorded.
5. Six days later, each of the 20 photos were shown again at random and participant was given 10 seconds to name each. The number and identity of correctly identified pictures were recorded.

In addition, researcher kept a journal of the daily training, observations, reflections, and input from the participant, his parents, and herself. This served as anecdotal data for triangulation purposes and provided a more holistic view of the situation. Results from the pre and post multiple measures were compared and analyzed to identify any changes that resulted from the training.

CHAPTER IV

FINDINGS AND RESULTS

The purpose of this study was to investigate whether online computer training could improve language and social skills in a bilingual, young adult who has autism. The instruments used were the Memory Training and the People Skills Training programs from Posit Science. These programs were selected, because they were the best fit for the participant's language and social skill goals. In addition, the researcher designed two measurement activities to collect data for assessing language and social skills before and after implementing the Posit Science programs. The following is an analysis of the data collected from Posit Science and the researcher.

Posit Science Training

The participant started the Posit Science online language and social skills training on June 17, 2013 and finished August 27, 2013. He participated approximately 30 minutes per day for 57 days. During this time period, he completed 658 subtests averaging 2.76 minutes per test, with the shortest test taking 49 seconds and the longest 22.68 minutes. Total actual training activity was 30.32 hours from the time the participant clicked "start" to the completion of each subtest. This does not reflect the time spent reading instructions, seeing results, selecting the next level of activity, etc. The participant continued to make progress throughout the period of the study. The

number of levels completed reflects the time limitations of the study and not difficulty completing additional levels.

Language Data

The participant's percentile ranking for the language activities improved from a baseline at the 44.6th percentile to the 84th percentile during the time period. Because this portion of the training involved varying degrees of difficulty across the 92 subtests or levels, there is no clear linear view of progress. The Posit Science software is designed to allow users to move to the next level after improving over their baseline score on a particular activity. When users complete a level by showing improvement over their baseline attempt, they are permitted to move to the next higher level of difficulty. In the early stages of the program, the participant repeated activities attempting to achieve perfect scores on each subtest (level), rather than moving to the next level. When the researcher realized this, participant was encouraged to move to the next level when eligible, instead of seeking perfection at each level. An overview of the results can be seen in Table 1 below.

Table 1

Results from Posit Science Language Skills Training

Activity	Levels Completed	Average Improvement over Baseline	Trials/Stars Earned	Average Stars/Trial
To-Do List	38/38	1.02 levels	122/371	3.04
Memory Grid	29/40	1.01 syllables	111/297	2.68
Syllable Stacks	25/40	.54 syllables	24/47	1.96
Overall	92/118	N/A	257/715	2.78

Posit Science, 2013

The trials' category represents the number of individual activities the participant attempted. This number is skewed higher by the participant's attempts for perfection in the early stages. Posit Science breaks each activity mentioned in Table 1 above into several stages. These stages are then divided into a variety of levels with increasing difficulty both horizontally and vertically. For example, in the To-do List Training, the complexity of instruction increases horizontally, while similarity to distracters increases vertically. In Syllable Stacks, the difficulty of the syllable category increases horizontally, while the voice changes vertically. The participant can choose whether to move vertically or horizontally after completing a level, but must complete all levels before moving to the next stage.

The Average Improvement over Baseline column in Table 1 above reflects the mean improvement over the baseline for each of the levels attempted. Between 0 – 5 stars were awarded for each trial, based on the speed and/or accuracy of task completion. These stars provide the participant with a general measure of success and are intended to provide some motivation. As mentioned previously, a number of the 257 trials to complete the 92 levels involved the participant voluntarily repeating levels to increase his score. It takes a minimum of 184 trials to complete 92 levels as each level requires a minimum of a baseline and mastery score.

Social Skills Data

The participant's percentile ranking for the social "People Skills" activities improved from a baseline at the 37.5th percentile to the 66th percentile. As mentioned above in the language training, this portion of the training involved varying degrees of difficulty throughout the 72 subtests or levels. There is no clear linear view of progress.

The participant's tendency to repeat activities in the earlier stages of the training to achieve a perfect score was addressed in the previous section. An overview of the results can be seen in Table 2 below.

Table 2

Results from Posit Science Social Skills Training

Activity	Levels Completed	Average Improvement over Baseline	Trials/Stars Earned	Average Stars/Trial
Recognition	17/24	197.9 ms	130/346	2.66
In the Know	18/18	1.28 levels	102/325	3.19
Face to Face	17/24	250.7ms	111/207	1.86
Face Facts	6/6	.5 people	24/27	1.13
Overall	58/72	N/A	367/905	2.47

Posit Science, 2013

In Recognition and Face-to-Face activities, the scores are listed in milliseconds (ms), reflecting the amount of time an object is flashed on the screen from a low of 32 ms to over one second. The participant was able to reach this minimum time several times in the early stages. Difficulty increased horizontally and vertically as it did in the language skills section. For example, in the Face-to-Face activity the time the face was seen was reduced horizontally, and the number of emotions to match increased vertically.

The social skills portion of the program seemed more difficult for the participant. This may be reflected by differences in the percentile ranking, stars per trial ratio, and the greater difference between the minimum possible trials 116 and the 367 trials actually completed. This ratio of more than three times the minimum number of trials to advance is much greater than the ratio in the language skills area (minimum 184

trials : 257 actual trials = 1.4) This would support research that reports difficulty in social skills on the autism spectrum (David et al., 2008; Grandon, 1995; Grelotti et al., 2005; Faja et al., 2008).

The participant stated that the language skills training was easier than the social skills training. He said that it is harder to distinguish between the faces than to understand the words. The To-do List was very challenging in the beginning, but became easier with practice. At first he only remembered the first two items and had to guess what the third one was. After a while, he figured out a strategy, which the researcher also observed, of repeating the instructions. For instance, if the voice said, “Get the screw, then the bag, and then the shovel”, the participant immediately said aloud, “Screw, bag, shovel” and clicked on the pictures of the items in order to accomplish the task. He reported that this seemed to help him. In the Memory Grid Training, the participant had to match sounds and tell them apart from really close sounding choices. He reported he got better by listening closely, but it was hard to improve, because he often had a high baseline which was difficult to match or surpass. The participant also found the emotions, especially fear and surprise, of the Face to Face Training, difficult to match. He reported that he used eyebrows and color of hair and skin to identify the faces. In the Know involved remembering details of a conversation. The participant reported that it was very difficult to distinguish between rumors and true bits of conversation, but as he progressed, he was able to ignore the distracters better.

The parents reported that the participant independently made time for the online training on most days. He was focused on the training and always motivated to improve his skills. On a few occasions, he was frustrated, e. g., at some stages of the

social skills programs, but often he could be heard cheering when he was able to pass a level and access a new one.

At the end of the online training, the researcher asked the participant what he was able to gain from this experience. He answered that identifying faces was easier after the training. He had learned strategies, such as picking up additional cues, either from the eyes or the hair, in order to recognize people. He was also able to process sounds better. In addition, he thought he improved his ability to listen to details and recall them better, even though sequencing is still difficult. Without the training, his skills would have stayed the same.

Researcher's Testing

Language Data

The participant was able to complete the eight language tasks in both pre and post-testing. The subject's parents were surprised the participant was able to be successful in all eight activities. They felt that he would not have completed these tasks in a normal day-to-day situation. The parents stated that because the participant knew it was a test, he paid closer attention to the instructions and was able to complete the tasks. Based on this information, it may have been a better design to have the parents administer the pre and post-tests without the participant's knowledge. Their anecdotal reports indicated that the participant has shown improvement in similar tasks in daily life during and since the completion of the training. For example, he seems to be able to carry out tasks that involve several steps, such as collecting items for his backpack for school, on

his own more reliably now. It was also noticed that after the training emails to his instructors contained more sequenced, detailed, and focused wording.

The following is a description of the testing, the eight baseline and post-test language tasks, and the results:

Before each task, the participant was informed of the upcoming test and the researcher read the question to him. While the participant performed the task, the researcher observed and took notes in a journal. There were no other people present besides the participant and the researcher, and except for the testing, nothing else was going on.

For Task 1, the researcher instructed the participant to get his cell phone first and then his coat. He had no problem accomplishing this in about thirty seconds. Similarly, the participant was successful following the instructions for Task 2 to get the milk, salt and pepper, and the cutting board and set them on the table within fifty-two seconds. The participant found the key to the mailbox in the kitchen of his home, went outside and across the street, opened the correct mailbox, retrieved the mail, closed and locked up the mailbox, crossed the street, entered his home and set the mail on top of a desk in the office; then he hung the mailbox key back up in the kitchen. The participant took about two minutes to accomplish this task. Because there was no notable difference in performance in pre and post-tests for Tasks 1 through 3, they are not noted separately.

For the fourth task, the researcher asked the participant what he had done this morning. In the pre-test, his answer was, "Got up, ate, brushed teeth, got clothes on, shaved, went to work-out club, did several different machines, came back to house, did stuff on computer, went to do testing." He said this in about one minute. For the post-test

of this question, he listed the following: “Saw the teacher during office hours, got ready for security class, ate afterwards, worked out, saw Kevin [a student], home, worked on laptop.” This also took about one minute. For question 5, “what homework/chores will you do first, second, and third?”, the participant answered in about one minute in the pretest: “First, mowing lawn; second, helping dad with sprinklers; third, cooking spaghetti” (he forgot he mowed the lawn the day before). In the post-test, the subject took time to think and answered in about two minutes: “Work on security thing, find different websites and operating systems, work on capstone program more and after that...probably work on databases, work on quiz for biology.”

The participant had to “write a plan of four things you will do today” for Measurement 6. He wrote: mowing lawn, reading library book, drawing art, playing my computer. This took about two minutes. In the post-test he wrote: visit teacher in biology during office hours; work on my project for capstone in Rails; go to my security class; go to hack this site. He wrote this down in two minutes. The instructions for Task 7 were “tell me three things you need to set the table and do them”. In the pretest the participant said, “Get plates, forks and knives and glasses, glasses in front, plate below glass, forks and knife left and right.” He forgot about the researcher’s instructions ‘and do them’. The researcher repeated the instructions. After that, the participant set out three plates, glasses, and utensils (finished in approximately five minutes). In the post-test, the participant said, “Placemats, plates, glasses.” He gathered these items and set the table in about two minutes.

For the final Task 8, the participant called his brother for five minutes and told the researcher three things he talked about. In the pretest, his answer was, “Kai fine,

trimming bushes this morning, Melissa deal with him and Kai is hard.” There were long pauses in which he said several times, “That’s as much as I can remember.” This took about five minutes. The researcher took the following notes as she listened to what the brother said in the pretest on a second telephone: He was talking about work and that different people from the company were coming to town today to compare their ideas. When he drove home, he went to the \$5-Store and bought swimming trunks and sandals for his trip to Las Vegas. In a radio contest, he won tickets for tomorrow’s concert “Of Monsters and Men”. He ate beef Pho Vietnamese noodle soup. Kai is bigger now and will be probably one of the biggest dogs the participant has ever seen. He has to pack for Las Vegas tonight, because they are going to the concert tomorrow. Kai can do tricks like lay down, paw, roll-over. They are gathering trash and recycling today for tomorrow’s pickup. Melissa is not in class, but that’s good, because to take care of him and Kai is a full-time job. He trimmed the bushes yesterday.

After the training, the researcher conducted the post-test in the same way and the participant answered, “Kai is not feeling well, has new diet for six months (corrected himself and said correctly six weeks), will see if it works and see what happens. If he is fine, they will keep him on that diet otherwise find a new diet. Doctor didn’t see anything wrong in the tests. I asked about the cake, has some left and will eat it today. Filled up fridge with meat and groceries today, had eaten everything down” (about 3 minutes). The researcher’s post-test in notes about the conversation were: Brother talked about Kai being sick, but doing better, had blood in stool on Thursday. X-ray, blood and stool sampling was done, he takes probiotics, medications in pill form and powder, and is on a diet of rice and chicken. Call back from doctor, all tests negative, keep dog on

special bran diet for six weeks. He could be allergic to something. Is energetic and it's hard to tell something is wrong if it wasn't for the blood in the stool. About work: convinced boss to buy instead of renting to save money. He was very happy idea was accepted. Today he and Melissa went to Bed, Bath & Beyond to return knives and pots. They exchanged china and got 42 pieces for \$200. Participant asked if any cake was left. Brother said yes, it's in the fridge and they will eat it tonight. He and Melissa went to Costco, Aldi and Giant Eagle today for five hours to buy food (meat and veggies), were totally out of everything, had eaten up all the leftovers and had nothing in the fridge.

According to the parents, sequencing has always been a challenge for the participant, and he usually needs several prompts to complete these activities in real life situations. Reportedly it is not unusual that tasks will not be completed, even though there is ample practice doing similar tasks on a daily basis. Because of his distinct sequencing difficulties, the researcher selected a type of training program that would target these problems. As the results showed, the participant was particularly successful in Tasks one through seven, being able to complete all of them in a short time and very satisfactorily. Task 8 was also completed in the sense that the participant was able to recall three things his brother talked about. However, when investigating what was actually said during the telephone conversation, several aspects came to light.

In the pre-test, the participant recalled, almost echoed, only the information of the very last segment of the conversation about Kai, Melissa and trimming the bushes. He used very few words, "Kai fine, trimming bushes this morning, Melissa deal with him and Kai is hard." It was noticeably frustrating for him to produce this much, as demonstrated by the fact that he took several breaks and insisted that was all he

remembered, then added another piece of information. The participant's recall of the conversation was very limited in detail, and he did not state details correctly (trimming bushes this morning instead of yesterday). He did not mention the tickets his brother won, even though this was a highlight of his day and of the next day's activities. The parents reported that sequencing events, stories or conversations has been particularly difficult for their son, and that he used to be unable to tell them what happened, e.g., in school. The information he provided could not be put together to make sense. This has improved over the years, but is still problematic.

In the post-test, the participant provided more information and details than in the pretest, and he used a more narrative, interesting style. The focus was still narrow, but improved, and he seemed much more comfortable with the task. There were no pauses and no noticeable frustration as in the baseline testing. Furthermore, not only did he pay attention to time factors, he also caught his own mistake (six weeks instead of six months). Additionally, he started recalling many details contained in the beginning of the conversation, left much of the middle part out, and focused again on two items at the end of the call. The parents stated that if the participant is interested in the subject (Kai) and the nature of the information (the welfare of the dog), he is likely to be more engaged and supply more information.

Social Skills Data

The parents provided the researcher with 20 pictures of family members, church members, teachers, and others the participant should be familiar with. The researcher created two different PowerPoints with the same pictures in random order. The pictures were timed to be seen for 10 seconds each before going to the next slide.

For the pre and post-tests, the participant was first trained by showing the presentation, while the names of the individuals in the pictures were read to him by the researcher during the 10 seconds. Thirty minutes later the participant was tested (Trial 1) by viewing the PowerPoint and identified the individuals he knew. This testing process (without reading the names to him first) was repeated three days (Trial 2) and six days (Trial 3) later, and the results are found in Table 3 below.

Table 3

Results from Researcher's Social Skills Testing

Trial	1	2	3	Mean
Pre-Test Photos Identified	4	3	4	3.7
Post-Test Photos Identified	6	5	8	6.3
Improvement	2	2	4	2.6

All testing was based on twenty pictures. The first baseline testing was done June 10, 2013, and the participant correctly identified four pictures. On June 13, 2013, the second baseline testing revealed that three were named correctly, one less than three days before. During the last pre-test on June 16, 2013, four were identified, matching the number of the first day of baseline testing. After the computer training, the post-testing was conducted and compared to the results of the baseline testing to determine if there was any change in recognition. The first post-testing was conducted August 29, 2013, and showed that six faces were recognized, an improvement of two additional faces. On the second post-test which took place on September 1, 2013, the participant recognized five faces, an increase of two. On the last post-test on September 4, 2013, the participant

was able to recognize eight persons as opposed to four, doubling the results of the baseline test.

The parents were surprised at how few pictures the participant was able to identify. They expected he would miss some, but not so many of the people he had regular contact with. However, the participant's post-tests showed improvement when compared to the baseline tests. Both pre and post-tests showed a decrease in trial 2 before the increase in trial 3. The parents described this as one of their son's unique patterns. In many other examples of his past learning, the participant often displayed either no immediate gains from instruction or a set-back before a definite improvement could be registered. This trend was repeated in this testing.

Other results of the researcher's testing were that the participant was able to recognize the face of a family friend that passed away seven years ago. In contrast, he was unable to identify an instructor from two semesters ago. However, he was able to name one person on the third trial of baseline and then reliably in all three post-tests. Similarly, he was able to identify another person on his first and third trial in the post-testing. However, in the last trial of the post-tests, the participant was able to name two additional persons besides the six previously identified images. He was not able to identify these two pictures in any of the baseline and post-tests before. This outcome was very unpredictable and unexpected. The participant did not comment or show any signs of surprise or joy about recognizing two additional people. When the researcher asked him specifically, he answered that, "Recognizing people is very hard, maybe something clicked." The researcher also observed that the participant came up with strange names that had no connection to any of the people he knows during the facial recognition

testing. The parents noted that he has done this many times before, usually when he is guessing and has no idea of what to say.

Discussion

It was noticeable that the Posit Science Social Skills results somewhat mirrored the researcher's social skills testing in that facial recognition can be a difficult area for people on the autism spectrum (Attwood, 1998, p. 55; Bogdashina, 2005, p. 62; Benaron, 2009, p. 135). Researchers claimed that gaze abnormalities prevent children with autism from becoming "face experts". They use different areas of the brain than other children for facial recognition. However, it is possible for individuals with ASD to recognize people who are important to them by processing their faces in the fusiform gyrus. This is the area of the brain typically used. Unfamiliar faces can be learned through intervention programs, which form alternative pathways in the brain circuitry (Benaron, 2009, p. 135). Despite significant difficulties in this area, the participant improved. Results from the language skills training of Post Science and the researcher's testing revealed that this area is less difficult for the participant. The participant showed improvement in both the program's and researcher's data. As research has shown, people who are multilingual use different parts of the brain for each language (Ojemann, 1991, p. 2282). This raises the question as to whether it is possible that being bilingual gave the participant better language skills in two brain areas.

Due to time constraints, not all of the Posit Science activities in the language and social skills area could be attempted. The results are incomplete and do not reflect what might have emerged had it been possible to finish all the levels and stages in both programs. Gains could be related to how often the program was used (Silver & Oakes,

2001, p. 299). The software used is designed to address a wide variety of neurological issues from simple aging to Alzheimer's, traumatic brain injury, stroke, and more. The researcher's language testing may have been flawed to some extent and not reflected the actual disability of the participant. The results imply, as hoped, that computer based training could be useful for other individuals with similar conditions as the participant. However, generalization of these findings to a wider population is most likely not feasible, because they are based on only one case study with a very specific focus. It was not the purpose of this study to assess generalization to real life settings.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This research study hoped to identify possible benefits in language and social skills using computer based training programs for a bilingual individual with autism. Social skills and language issues with sequencing, and working memory are extremely problematic for individuals on the autism spectrum and negatively impact their quality of life and employment opportunities.

Grasping social cues and displaying social awareness is difficult for individuals with ASD. Facial recognition, interpreting gestures, understanding social norms, and gaining information from social cues are challenging for them. This can lead to awkward situations, inappropriate behavior, inability to form friendships, and integration problems in school and society.

Another area of difficulty for individuals with ASD is language, such as sequencing, working memory, expressive and non-verbal communication. Impairment in this area often leads to frustration for individuals with autism and the people they encounter. For most of us, these language functions develop naturally in early childhood, but individuals with ASD need to be taught.

This case study examined to what extent, if any, training software produces improvements in the language and social skills of a bilingual, young adult who has

autism. Based on progress in the Posit Science activities, the researcher's testing, and anecdotal data from the participant, his parents, and the researcher, one can conclude that training software produced improvements in both language and social skills in a bilingual participant with autism. The extent of the improvement is difficult to calculate based on the limitations of this study. The data looks promising, but actual improvement would need to be measured by the participant's increased ability to recognize faces, interact appropriately in social situations, and follow verbal instructions in his daily life. While the transfer of gains to real life situations is difficult to quantify, it does not lessen the obvious benefits experienced by the participant. For instance, by focusing on these difficult areas, the programs elicited the participant's attention to the problems. Through training, he was able to develop strategies which can help him respond appropriately. This study agrees with the literature (Moore et al., 2000; Attwood, 1998; Faja et al., 2008; Bernard et al., 2001): computer based training has some promise for individuals on the autism spectrum and could provide a cost effective, non-invasive, non-threatening avenue for improvement in these areas.

Recommendations

This research used a qualitative case study design focusing on one individual with ASD to find answers to the research questions. Due to limited time, not all programs could be finished. While the programs attempt to simulate realistic situations, activities are planned and programs do not involve real people or problems. Further research involving larger groups, greater time commitment, and investigating whether

benefits from computer based training would generalize to non-trained situations in real-life contexts is needed.

This study used generic software primarily designed to help individuals with related neurological problems. To specifically address the needs of individuals with ASD, it would be beneficial to apply customized software. Further research should be conducted to identify ways to create a heightened sense of alertness in individuals with ASD prior to giving instructions or other input. In this study, the use of “this is a test” seemed to trigger careful attention and follow-through by the participant. Duplicating that increased level of attention could be a powerful tool in education and daily living.

Future directions for the participant in this study are to use the other programs from Posit Science. Each of them trains different areas. The participant and his parents are interested to see the effects of finishing all the programs offered. The hope is that the continued use of these programs will be beneficial.

After all support from the educational system has ceased for young adults with ASD, this type of intervention may be very useful. It provides people with autism a way to learn on their own, thus boosting self-confidence (Attwood, 1998, p. 98). Moreover, learning is focused and purpose driven. Another advantage is that computers are special interest items (Attwood, 1998, p. 93) for many people with ASD. This can provide motivation (Moore et al., 2000, p. 218) to participate and facilitate learning. Given the improvement shown in this study, it is possible that other individuals on the autism spectrum with similar problems may also benefit from training. The recommendation is that parents of individuals with ASD evaluate similar programs.

Each person with ASD has different needs, and finding suitable software is important. Often companies offer free trial runs to explore programs and test if they are a good fit. Utilizing computer training for specific areas of difficulty exposes people with ASD to another way of learning. As with most people, a different approach is often a good way to acquire knowledge. The benefits of utilizing online training include a distraction-free, controlled environment and learning at individual pace. Additionally, computer based training allows repetition needed by individuals with ASD to learn difficult concepts. This researcher hopes that this study raises awareness of computer aided training for people with autism as an option for learning.

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