DESIGN AND CONSTRUCTION OF VISUAL DEGREE AUDIT

SOFTWARE: AN APPLICATION OF VISUAL COMMUNICATION,

PROJECT MANAGEMENT, AND GRAPH THEORY

HONORS THESIS

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for Graduation in the Honors College

by

Emily Hom-Nici

San Marcos, Texas
May 2014

DESIGN AND CONSTRUCTION OF VISUAL DEGREE AUDIT

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FAIR USE AND AUTHOR'S PERMISSION STATEMENT

DEDICATION

This thesis is dedicated to my parents and role models, Janice Nici and Jim Hom, who have lovingly pushed me to achieve my best in every aspect of my life. I owe all of my successes to their nurturing and brilliant parenting. To my fiancé, Matt Castillo, who has been my emotional support and my foundation for my entire college career. And to my professors and mentors who have shaped me into the student I am today. Finally, to my friends, who have always been incredibly encouraging with my goals.

ACKNOWLEDGEMENTS

I would like to thank my thesis mentor, Grayson Lawrence, for his remarkable dedication to not only my success and education, but to every student he teaches. Without him, this thesis would lack the enthusiasm, passion, and excellence that he inspires me to put into my work.

I would also like to thank the advising staff for helping me understand the academic advising world, and Dr. Ferrero for my introduction into graph theory. Finally, I would like to thank Dr. Galloway and the Honors College for elevating my college education and always expanding my mind in ways I did not think possible.

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ABSTRACT

DESIGN AND CONSTRUCTION OF VISUAL DEGREE AUDIT

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PROJECT MANAGEMENT, AND GRAPH THEORY

By

Emily Hom-Nici

Texas State University
May 2014

SUPERVISING PROFESSOR: GRAYSON LAWRENCE, MFA

The purpose of this study is to design and construct a comprehensive visual tool,

the Visual Degree Audit (VDA), which addresses and resolves the limitations of the

current degree-planning resources at Texas State University. Choosing the perfect college

course schedule can be a daunting task for new students because of the numerous

resources from which students must pull their information. In addition, the narrow time

scope students are encouraged to plan for, and the lack of interactivity between students,

advisors, and students with the provided information are all barriers to students' being

able to create their optimal college education path to graduation. This study researches

the current advising practices and technologies available and Texas State's current

degree-planning resources and suggests a new solution for the shortcomings. A gap

analysis, in the form of a student survey, was completed in order to identify the current

system's core shortcomings and advantages. The VDA prototype was then developed

using Project Management techniques, Communication Design methods, and graph theory. The final prototype was user-tested using an exploratory group of students who also participated in the preliminary gap analysis survey. These students were asked to perform tasks related to degree planning with the new VDA system and complete a post-evaluation survey. The participant's survey answers and verbal comments during the user-test were then analyzed. Results suggest that the VDA was successful in providing a system that was easier to understand, more helpful, more useful, and provides an overall better experience in assisting students through their higher-education degree planning.

CHAPTER I

INTRODUCTION

The Student's Perspective

Choosing the perfect college course schedule can be a daunting and confusing task for new students. Incoming freshmen, transfer students, and students who are switching majors have a considerable learning curve to overcome before they can truly understand their own degree plan. To remedy this learning curve, universities have created many different ways of providing resources for students to utilize when planning their college career. Resources that students use while constructing their degree path include the university catalog, suggested schedules, specific degree checklists, online programs, advisors' knowledge, and fellow students' advice.

Each of these resources individually addresses specific problems that arise when students are planning their schedules. The catalog lists every detail about each class in the department and all degree requirements; the suggested schedules provide a model course load for a general student, the degree checklists compile the courses needed in each area of a specific major (i.e. introduction classes, history courses, advanced, required electives); online programs can provide up-to-date references to students' personal records such as transcripts, class standing, and current and future course listings; and the advisors/fellow students have personal experience and advice to offer.

While all of these resources are useful in their own way, they are flawed in a few regards: each resource is meant to solve a specific question a student may have during the process; these resources tend to reiterate similar information in multiple but not complete applications, thus requiring students to simultaneously use *all* of these resources while

navigating their college education. Consequently, the process can lead to much confusion, errors, and uncertainty. A new, comprehensive visual tool must be developed to better assist the students in their higher education journey.

Statement of Objective

This thesis has three objectives: The first objective is to develop a new approach to communicating the complexity of degree paths to students, through Communication Design, project planning techniques, and graph theory. The second is to design and test an application, which utilizes Communication Design to present the degree information to the audience. Finally, the third objective is to test and determine if this new application has the potential to be successful in its mission to assist students, especially new students, in understanding their own college career path more easily, more completely, and with a shallower learning curve.

Thesis Organization

To complete these goals, this project focuses on Texas State University's (Texas State) system as a model for a university community. In Chapter 2, a gap analysis and research was completed on the resources and applications currently provided to students in order to identify the current system's core shortcomings and advantages. Chapter three states the problem and resulting hypothesis of the thesis, while chapter four discusses the development of a new system, the Visual Degree Audit (VDA). The new system utilizes Communication Design and project planning methods to create a more visual and task-oriented interface than the current resources. To achieve this, the Critical Path Graph method (CPM) and other project planning techniques were used to graph each major and display the information. This chapter reveals the complete prototype of the application.

Chapter five explains the user testing of an exploratory group of five students. During the

user testing, the participants were asked to perform tasks related to degree planning on

the new VDA system with an unfamiliar major and minor; and they were then surveyed

post-test. The results and evaluation of the comparative surveys of both systems are also

addressed in this chapter. Finally, chapter six discusses conclusions and future research

for the VDA.

Chapter II

PRELIMINARY RESEARCH

Advising Practices

Academic advising is one of the most common resources provided to students by universities to assist them through their higher education journey. Advisors are faculty or staff members whose job is to advise prospective and current students on which courses they need to take and when so they can best achieve their individual academic goals (Patankar, 1998). Beginning in the nineteenth century, advising quickly became the norm; by the 1930s, nearly all higher education institutions had installed formal advising systems (Murry, 1972). Over the years, much research has been performed on best advising practices and developments to improve the effectiveness of the advising process for students. Studies by Crockett (1985), Habley (1981), and Tinto (1987) suggest that academic advising is essential and directly correlated to the retention of undergraduate students at a university. Universities understand that academic advising is essential for the health of their institution and is extremely beneficial for the students receiving the advising.

The student-advisor relationship is generally described as a mentoring relationship in which the advisor guides the student to graduation where the advisee can then commence with fellow individuals with a completed degree in their career (Yarbough, 2002). Because academic advising is known to be primarily effective when it is initiated in the early stages of the student's academic planning, the expectations and requirements of the advisor are vast (Lowe, 2001). Advisors are expected to have completed a degree similar to that of their advisees, be familiar with all catalog

requirements and any changes, be conscious of former students' successes/failures, have

training and/or experience in interviewing, and finally have a strong understanding and

personal commitment to the mentoring process (Yarbrough, 2002). Additionally,

"undergraduate advising requires in depth understanding of what alternate courses can be

used as substitutes, how students can be brought back to the right track if they are off

track, or if special conditions apply" (Anantatmula, 2010, p. 15). With all of these

expectations, the purpose of academic advising has continued to evolve throughout the

years. University of Wisconsin-Oshkosh decided to improve their advising and other

student academic services in 2002 by establishing a new advising center and new campus

advising model where the physical act of selecting courses is thought of in a "broader

context of exploration, self-knowledge, goal setting, decision making, and planning for a

major, career, and lifelong learning" (Freeman, 2008, p. 12).

The relationship and expectations between an advisor and student changes

throughout the student's academic career. In the preliminary stages of a degree path,

students have a tendency to opt for prescriptive academic advising where the advisor's

role is to give advice based on authority, where the advisor makes decisions for the

student based on a list of requirements (Freeman, 2008). Prescriptive advising is what

students often expect from their advising appointments—they want to be told what to do

and when to do it. This can result in a disappointing or unfulfilling advising experience

(Freeman, 2008). However, in a study performed by Fowler (2010), "through the 1st

semester, prescriptive academic advising became developmental advising as advisors

began to take less of an authoritative and more of a collaborative and process-oriented

approach to their work with the students" (p. 7). This process-based approach begins as

the student becomes more familiar with their personal academic goals and objectives (Yarbrough, 2003). As the student becomes more familiar with their own goals, the path to achieve these same goals can become more clear and attainable. While prescriptive advising is preferred by the students initially because of their uncertainty, developmental academic advising, or process-oriented advising, helps "both students and advisors to develop a heightened personal investment in the success of the individual academic program, the supporting academic unit, and the overall university" (Yarbrough, 2002, p. 61).

Other Advising Systems

To create an improved degree path advising application, it is important to consider other platforms that have been utilized and found to be successful. Georgia State University's *PACE* system and Miami University's *DARS* system were the first of the computerized degree audit programs that began in the late 1980s (von Munkwitz-Smith, 2005). While many of the early programs were internally developed, after ten years, information system vendors began to embrace degree audit software, allowing prospective transfer students to see if their credits would transfer to other institutions (p. 45). The functionalities of these early web systems included providing students with open class listings, degree requirements, limited transactions, individual registration, and the chance to update their personal information and to apply for graduation (p. 46). Today, internal proprietary software and academic advising are almost synonymous. "Most universities are using technology in academic advising to allow advisors more time to focus on student development rather than spend time on the paper-based administrative part of advising" (Feghali, 2011, p. 83).

The power of advanced technology can be a source of concern for people who are currently employed because of the fact that a computer system can often do their job more efficiently. For example, the *Academic Counseling Expert* (*ACE*) system developed for the San Jose State University Science degree in Aviation was specifically designed to replace the faculty advisor and to provide all of the necessary advice to aviation students (Patankar, 1998). The *ACE* system included: a list of suggested courses for the semester based on coursework completed, the ability to substitute courses from other colleges, and the ability to examine suggested courses for time conflicts (1998). This rule-based system had a rudimentary text-based interface, as seen in Figure 1, and was concluded to be a reliable tool to save faculty members valuable time instead of the original thought that it could adequately replace the advisors.


```
                          MS-DOS Prompt                              ▼ ▲

Welcome to ACE - The Academic Counseling Expert.
           To begin consultation, press any key.
Please enter your social security number
      (without dashes or spaces) and press return to continue.
 320849971

Your social security number is not in the database. Press any
        key to update your record now.


───────[ RULES ]───────         ───────[ FACTS ]───────
THEN                            vp_soc_sec = 320849971 CNF 100
student = new CNF 100           student = new CNF 100
Finding value for soc_sec
Testing 2
RULE 2 IF
student = new
THEN
soc_sec = vp_soc_sec CNF 100

←                                                                    →
```

Figure 2 *Typical display in the authoring mode*

```
 1Help      2How?      3Why?      4Slow      5Fast      6Quit
 Display how a fact value conclusion was reached
```

Figure 1: ACE system screen (Patankar, 1998, p. 52)

In contrast to the initial plan to replace advisors with these expert systems, the services of the *Course Concierge* at the University of Nevada, Reno were not created to compete with the work of the faculty and professional advisors. Instead, as the director of the program and curriculum of the University of Nevada Paul Neill states (2011), "On the contrary the concierge service should complement what they do" (p.10). The purpose of Reno's Concierge was to keep students on track to graduate in four years (p. 7).

Penn State University's *eLion* system includes some unique and notable features that enhance the student's experience with the application. This expert-based interactive system is designed to "supplement student-advisor relationships and engage students" in actively questioning and taking control of their educational planning (von Munkwitz-Smith, 2005, p. 46). In addition to the advising technology features previously mentioned, *eLion* includes features that emphasize the advisor interaction and student goal actualization. These features include assistance in preparing for advisor meetings, allowing students to identify majors that avoid unwanted courses, and allowing students to create a list of majors based on their interests. The system is also able to provide individualized advice about whether or not to drop a course late (Hunter, 2007, p. 79). Faculty and Advisors can also use the eLion system to view rosters, request audits, submit final grades, provide syllabi, and much more (p. 79).

In a study conducted by Feghali in 2011, a web-based decision support tool was created to solve a similar problem to this study. The *Online Advisor* was developed and tested on students at the American University of Beirut (AUB) with the goal of helping "advisors and students make better use of an already present university information system" (p. 82). AUB included a student information system, AUBsis, with all of the

necessary data to help students and advisors (online transcripts, registered classes,

grades), but it was not "intelligent" and could not deliver personalized information to

students in a way that would be useful for advising or degree planning (p. 82). Similar to

previously described technology-based advising systems, the Online Advisor aimed to

save time and consolidate all information in one interface. Figures 2 and 3 illustrate the

advising system of AUB without the Online Advisor, and conversely, the system the

Online Advisor aims to create.
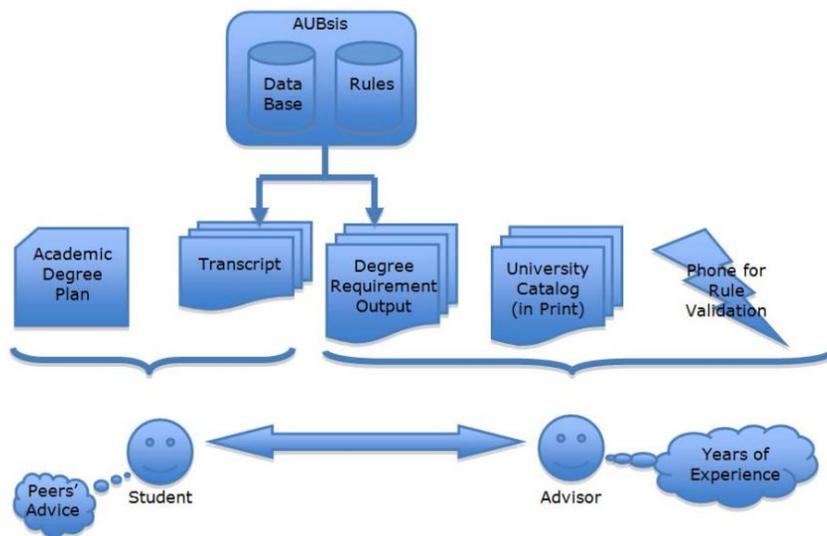
Figure 2: AUB system without the Online Advisor. (Feghali, 2011, p. 86)
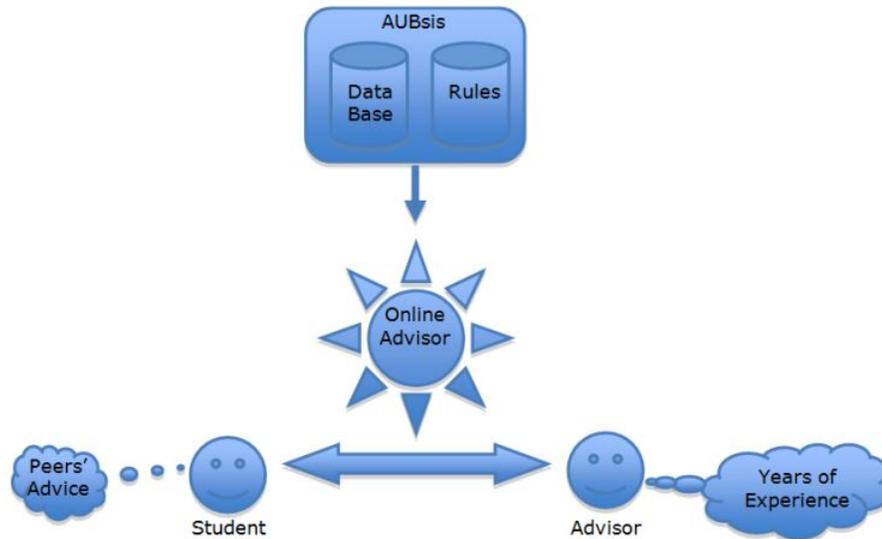
Figure 3: AUB system with the *Online Advisor* (Feghali, 2011, p. 87)

The *Online Advisor* features a Summary page (Figure 4) which aims to provide advisors and students with a quick overview of the current standing of the student at the university. It displays the information in a segmented list form interface with color-coding. The Degree Checklist screen (Figure 5) displays the courses required for the student to graduate in grouped areas including credits required, credits earned, and the corresponding earned grades. Finally, the Degree Plan page (Figure 6) of the *Online Advisor*'s interface "allows the student or the advisor to select the courses that he/she thinks must be taken in a specific semester" (Feghali, 2011, p. 89). Students do this by selecting specific semesters to build using the unmet courses.

BBA Summary | Records By Term | Degree Checklist | Degree Plan | Change Password | Print | Logoff |

		Arabic Placement	
Holder of		English Test	TOEFL / CBT 250
Degree	BBA	English Placement	ENGL 203
Admitted to OSB	Fall 2003-2004	Concentration1	
As	Freshman	Concentration2	
Class	Junior		

Course Legend

| passed | registered | failed | withdrawn | incomplete | repeated |

† if exempted from arabic, one elective from outside the OSB is required.
†† if exempted from ENGL203, students must take ENGL204 and one elective from outside the OSB.
††† if exempted from MATH203, one elective from outside the OSB is required.

Sophomore Term 1		Grade	Sophomore Term 2		Grade
CMPS 209	(3 cr)	73	ACCT 210	(3 cr)	65
ECON 211	(3 cr)	65	ECON 212	(3 cr)	72
ENGL 203²	(3 cr)	77	ENGL 204	(3 cr)	78
MATH 203³	(3 cr)		MKTG 210	(3 cr)	84
MNGT 215	(3 cr)	82	MATH 204	(3 cr)	84

Junior Term 1		Grade	Junior Term 2		Grade
ACCT 215	(3 cr)	75	BUSS 200	(3 cr)	73
CVSP 201, 202, 205, 207⁴	(3 cr)	88	BUSS 211	(2 cr)	69
DCSN 200	(3 cr)	66	BUSS 239	(0 cr)	
FINA 210	(3 cr)	67	Bus. Elective⁵	(3 cr)	79
INFO 200	(3 cr)	86	Humanity⁶	(3 cr)	85
			ENGL 208	(3 cr)	78

| Summer 2 Internship Practicum: BUSS 245 | | | Grade: | | |

Senior Term 1		Grade	Senior Term 2		Grade
Bus. Elective⁷	(3 cr)	87	BUSS 248	(0 cr)	
Bus. Elective⁷	(3 cr)		BUSS 249	(3 cr)	
BUSS 230	(3 cr)	81	Bus. Elective⁷	(3 cr)	

Local intranet

Figure 4: *Online Advisor* Summary Page (Feghali, 2011, p. 87)

BBA Summary | Records By Term | Degree Checklist | Degree Plan | Change Password | Print | Logoff |

		Arabic Placement	
Holder of		English Test	TOEFL / CBT 250
Degree	BBA	English Placement	ENGL 203
Admitted to OSB	Fall 2003-2004	Concentration1	
As	Freshman	Concentration2	
Class	Junior		

Course Legend

| passed | registered | failed | withdrawn | incomplete |

† if exempted from arabic, one elective from outside the OSB is required.
†† if exempted from ENGL203, students must take ENGL204 and one elective from outside the OSB.
††† if exempted from MATH203, one elective from outside the OSB is required.

Course		Title	Cr	Fa 03	Sp 03	Su 03	Fa 04	Sp 04	Su 04	Fa 05	Sp 05	Su 05	Fa 06	Grade
MAJOR REQUIREMENTS														
ACCT210		Financial Accounting	3		65									65
MNGT215		Management of Organizations	3			82								82
MKTG210		The Marketing Function	3				84							84
FINA210		Business Finance	3					67						67
ACCT215		Management Accounting	3						75					75
BUSS200		Business Data Analysis	3						73					73
BUSS211		Business Law	2						69					69
INFO200		Management Information Systems	3						86					86
BUSS240		Strat. Career Planning Workshop	0							P				P
DCSN200		Manag.Decis.Making:Mod.& Techn	3							66				66
BUSS230		Managerial Economics	3								81			81
BUSS245		Internship/Practicum	1											
BUSS248		Developing Bus. Plans Workshop	0											
BUSS249		Strategic Management	0											
MKTG225		Marketing Communications	3											
Required Area Credits	36													
Attempted- Area Credits	36													

Done   Local intranet

Figure 5: *Online Advisor* Degree Checklist Page (Feghali, 2011, p. 88)

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PSYC235A	Sp.Tp: Drugs and the Brain	3						
Required Area Credits	21							
Attempted- Area Credits	21							
Remaining Area Credits	0							
Area Average								73.67

UNIVERSITY GENERAL REQUIREMENTS

ENGL203	Academic English	3	77					77
ENGL204	Adv Academic English	3	78					78
CVSP202	Medieval,Islamic& Renais.civil	3		88				88
CVSP201	Ancient Near East& Class Civil	3			85			85
CVSP204	Contemporary Studies	3				88		88
CVSP203	Enlightenment and Modernity	3						
ARAB201A		3						☐
ARAB201B		3						☐
or ARAB211		3						☐
ARAB215		3						☐
ARAB219		3						☐
Required Area Credits	21							
Attempted- Area Credits	18							
Remaining Area Credits	3							
Area Average								83.20

Select Term Fall ▼ 2006 ▼

Update Degree Plan   New Degree Plan

Done   Local intranet

Figure 6: *Online Advisor* Degree Plan Page (Feghali, 2011, p. 89)

Feghali's study concluded by comparing and evaluating the former advising system to the new Online Advisor system and surveying students' perception on Effectiveness, Efficiency, Value, and Attitude. The study concluded that 79% of users were satisfied with the Online Advisor, 90% of students rated the system effective and efficient, and over 75% rated the Online Advisor as useful and helpful (p. 90).

Another technology based advising tool consists of the *u.direct* and *u.achieve* systems built by CollegeSource Inc.—a technology company that creates solutions for higher education. College Source's products are used by more than 2,000 colleges and universities, worldwide. The *u.achieve* degree audit provides a "visual snapshot of where the student stands today in regard to overall degree completion" (CollegeSource, 2012). As seen in Figure 7, *u.achieve* uses graphs to help the student visualize different aspects of their DA in relation to their entire plan. The rest of the DA breaks down the major into

more specific details, in list form (See Figures 8 and 9). College Source's *u.direct*

academic planner allows the student to create new plans and view previously saved plans.

Additional features include adding comments to plans from the advisors or the students

themselves. This program also provides an interface where students can view the

department's prescribed academic plans and thus build their own individualized plans

(see figures 10 and 11). Advisors can approve terms or entire plans through this program,

and students can also "validate" the plan they have set up.
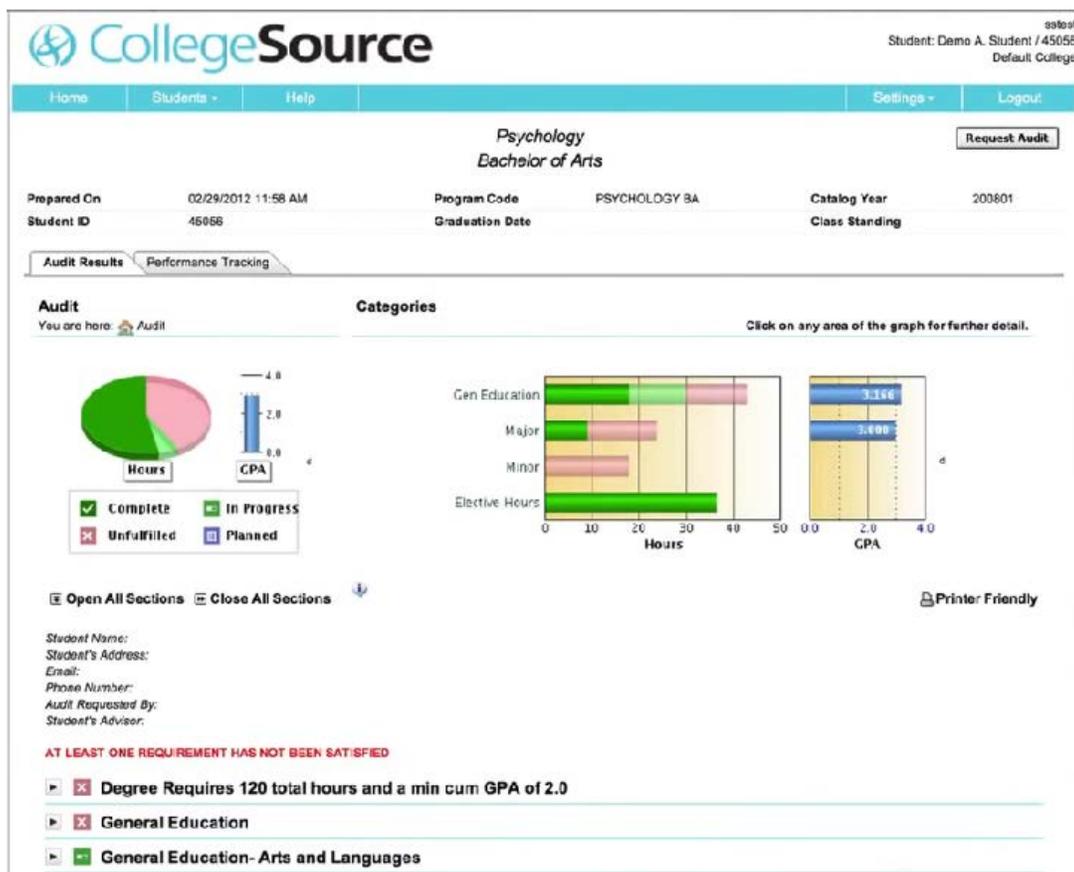
Figure 7: College Source *u.achieve* interface detail (CollegeSource, 2012)

AT LEAST ONE REQUIREMENT HAS NOT BEEN SATISFIED

▼ ☒ Degree Requires 120 total hours and a min cum GPA of 2.0

    Earned: 63 Hours 2.907 GPA
    In Progress 6 Hours
    Needs: 50 Hours 2.000 GPA

      ☑ 1 A minimum 2.0 will include all courses taken for a
        grade, whether or not the course applies towards hours

      ☒ 2 The Senior year must have at least 18 hours taken
        in residency.

        Needs: 18 Hours

▼ ☒ General Education

    Earned: 3 Hours 4.000 GPA
    In Progress 6 Hours
    Needs: 2.000 GPA

      ☒ 1 Specific Required Courses

        3 Hours Added 4.000 GPA

Fa04	ENGN222	3.0	A	Intro to Engineering
				Approved ENGR for MATH
				>>MATCHED AS:MATH222

        Needs: 2 Courses
        SELECT FROM: WRIT177, MATH163, 261, HIST102

      ☑ 2 General Coursework

        0 Hours Added
        In-P --> 6 Hours

| Sp10 | ART 189 | 3.0 | RG | IP | Drawing |
| Sp10 | ENGL231 | 3.0 | RG | RET | British Literature |

▼ ☑ General Education- Arts and Languages

    IP Earned: 6 Hours
    In Progress 3 Hours

| Sp09 | THEA191 | 3.0 | A | | Drama Appreciation |
| Sp10 | ART 189 | 3.0 | RG | IP | Drawing |

| Fa10 | ITAL260 | 3.0 | A | Italian Literature |

▼ ☒ Major in Psychology

    Earned: 9 Hours 2 Sub-Groups 3.000 GPA
    Needs: 6 Sub-Groups

      ☑ 1 General Psychology

        3 Hours Added 1 Set

| Fa08 | PSY 111 | 3.0 | B | Intro to Psychology |

      ☒ 2 Biopsychology

        Needs: 1 Course
        SELECT FROM: PSY 251 Biological Psychology I, 351 Biological Psychology II,
        356 Biological Psychology III

      ☒ 3 Cognitive Psychology

        Needs: 1 Course
        SELECT FROM: PSY 271, 273, 372, 373, 375, 470

      ☑ 4 Developmental Psychology

        3 Hours Added

| Fa08 | PSY 231 | 3.0 | A | Abnormal Psychology |

Figure 8: College Source *u.achieve* interface (CollegeSource, 2012)

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Figure 9: College Source *u.achieve* interface detail (CollegeSource, 2012)

Figure 10: College Source *u.direct* Schedule Builder page (CollegeSource, 2012)

Figure 11: College Source *u.direct* Schedule Builder detail (CollegeSource, 2012)

Texas State University Resources

Texas State University provides students with a variety of resources to communicate the requirements to graduate within each major. One recent program, the *Personalized Academic and Career Exploration* program, PACE, has been implemented. The program's goal is to become a freshman's "partner" in achieving their "goal of obtaining a degree from Texas State University" by working together in developing strategies for academic success and gaining a better sense of self awareness and possible future careers (PACE Center, n.d.). PACE has dedicated advisors whose purposes are to effectively communicate the University's curriculum requirements, policies, and procedures, guide and encourage students as they define and cultivate goals, support students with planning academic paths consistent with their abilities and interests, and monitor student' progress towards meeting their goals (PACE Academic Advising,

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2014). All new students are to attend the PACE center advising rather than the dedicated major's advising centers. The PACE center also includes mentoring services to help improve student retention. Goals for students completing the PACE program include the ability to schedule a meeting with an Academic Advisor, refer to their undergraduate catalog, access, read and understand their degree audits, declare a major/develop an academic plan, access and find other student services (PACE Center, n.d.). When the student has completed their first year at Texas State, they are moved to their major's respective advising center.

One reason why PACE was created was to help incoming students understand the numerous resources the university provides for academic planning. Firstly, one of these resources include every department's own entry for the university's full catalog which contains all available academic possibilities. These combined entries attempt to spell out every rule and describe each class for all degrees. The catalog is published online and in a thick paperback book with each section explaining the degrees in written form. Co/pre-requisites are listed at the end of each class description by class number. The student must either memorize these numbers or reference another section in the catalog to understand which classes these numbers are referring to. It is reasonable to expect this newly referenced class would also have pre-requisites that would need to additionally be explored.

Another resource Texas State advisors provide to students are "checklists" or "Degree Outlines" (the name varies by department) (see Figures 12 and 13). This resource is created separately by each department. While each checklist differs by department, they all attempt to provide a condensed version of the catalog to show

students their different options within certain categories in their degree. These lists tend

to separate the more advanced classes from the foundation courses, grouping the courses

in a way that may makes it easier for the student to comprehend the requirements that

they must fulfill to meet their individual academic goals.

Psychology Department Requirements
Fall 2013

In order to graduate students must complete at least 120 total semester hours, with 36 advanced (3000-4000) semester hours (24 ADVANCED hours must be Psychology), 9 semester hours of Writing Intensive (WI) and achieve at least a Texas State GPA of a 2.00, major GPA of a 2.25, and minor GPA of a 2.00.

Prerequisite Timeline
Courses in Timeline must be taken in different semesters

PSY 1300 and
MATH 1315 ⟹ PSY 3301 ⟹ PSY 3302 ⟹ GROUP 4 and
C or higher   C or higher   C or higher   PSY 4391
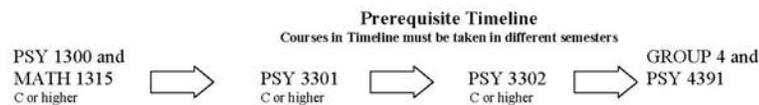
Group 0   Foundations of Psychology—These 4 courses are prerequisites for most 4000 level courses. (12 hours)
_____1300 Introduction to Psychology
_____3300 Lifespan Development
_____3301 Introduction to Statistics * (Requires C or better in PSY 1300 and MATH 1315 or above, not 1316))
_____3302 Experimental & Research Methods * (WI) (Requires C or better in 3301)

Group 1   Individual Differences in Behavior - choose 1 course from:
_____3315 Abnormal Psychology   OR   _____3316 Personality Psychology

Group 2   Biological Bases for Behavior - choose 1 course from:
_____3321 Sensation & Perception   OR   _____4322 Brain & Behavior

Group 3   Social Bases of Behavior - choose 1 course from:
_____3331 Social Psychology   OR   _____ 3333 Industrial Psychology

Group 4   Learned Bases for Behavior - choose 1 course from: (Requires C or better in PSY 3302)
_____3341 Cognitive Processes * (WI) OR   _____4342 Learning & Memory (WI)

Required for all Psychology majors
_____ 4391 History and Theory * (WI) **(Requires C or higher in PSY 3302 and 24 PSY hours)**

3 Psychology Electives. (2 must be ADVANCED electives) Choose from list below or substitute a second course from any or all of Groups 1-4 to fulfill the hour requirements here. PSY 1300 is a prerequisite for all courses except PSY 2311

_____2311 Psychology of Human Sexuality   _____3336 Sports Psychology   _____4390 B Emotion & Human Behavior
_____3312 Adolescent Psychology *   _____3337 Psychology of Prejudice   _____4390 C Interpersonal Relationships
_____3313 Psychology of Adulthood & Aging _____3350 Behavior Modification (WI)   _____4390M Psychology and Opera
_____3314 Psychology of Consciousness (WI) _____3352 Group Processes (WI) *   _____4390N Psychopharmacology
_____3323 Evolution and Behavior *   _____3353 Computer Appl./Social Behavioral * _____4390O/3322 Psychology & Law *
_____3325 Psychology of Persuasion   _____3361 Health Psychology (WI)   _____4390P Human Factor
_____3332 Psychology of Women (WI)   _____4318 Psychological Measurement *   _____4393 International Psychology (WI)
_____3334 Psychology of Human Diversity (WI) _____4350 Reality Therapy/Choice Therapy (WI) _____4395 Individual Study (WI) *
_____3335 Forensic Psychology   _____4352 Intro to Clinical Psychology (WI) * _____4396 Internship *

* These psychology courses have special holds, prerequisites, or require an interview with the instructor.

For additional information and/or assistance please contact:
Psychology Department
UAC, Room 253
Ph: 512-245-2526 / Fax: 512-245-3153
www.psych.txstate.edu

To make an appointment with the Psychology Advisor please contact:
College of Liberal Arts Advising Center
Flowers Hall 322
Ph: 512-245-1852 / Fax: 512-245-7949
www.liberalarts.txstate.edu/advising/   updated 8/30/13

Figure 12: Example Checklist, Psychology

Department of History
Bachelor of Arts Degree – Non-Certification   2012-2014 Catalog
For Advising Purposes Only – Unofficial Degree Requirements
Minimum GPA Requirements: TX State (**2.0**), Major (**2.25**), Minor (**2.0**).

General Education Core Curriculum Components
(46 hours)

COMMUNICATION (9 hours)
☐ (010) ENG 1310
☐ (010) ENG 1320
☐ (011) COMM 1310

MATHEMATICS (3 hours)
☐ (020) **Choose One Course from:** MATH 1315, 1316, 1317, 1319, 1329, 2321, 2417, *or* 2471.

NATURAL SCIENCE (7-8 hours) - Choose any Two Courses from the following to equal at least 7 hrs.: (1 hr. courses are associated labs: i.e. 1110, 1140, 1105)

☐ (030) BIO 1320, 1421; 1330/1130 *and/or* 1331/1131.
☐ (030) CHEM 1310,1430; 1341/1141 *and/or* 1342/1142.
☐ (031) GEOL 1410 *and/or* 1420
☐ (031) PHYS 1310, 1320, 1110; 1315/1115,1325/1125; 1430; *and/or* 2425.
☐ (031) PHYS 1340, 1350, 1140 (Astronomy).
☐ (031) ANTH 2414
☐ GEO 1305, 1105

HUMANITIES & VISUAL & PERFORMING ARTS (9 hours)
☐ (040) **Choose One Course (3 hrs.) from:** ENG 2310, 2320 (British); 2330, 2340 (World); 2359, 2360 (American)
☐ (041) PHIL 1305 *or* 1320
☐ (050) ART, MU, DAN, *or* TH 2313

SOCIAL & BEHAVIORAL SCIENCES (15 hours)
☐ (060) HIST 1310
☐ (060) HIST 1320
☐ (070) POSI 2310
☐ (070) POSI 2320
☐ (080) **Choose One Course from:** ANTH 1312, ECO 2301, ECO 2314, GEO 1310, SOCI 1310, *or* PSY 1300.

TX STATE COMPONENT (3 hours)
☐ (090) US 1100
☐ (090) Two PFW Courses (1 hr. each) :
　　　PFW _____
　　　PFW _____

B.A./College of Liberal Arts Requirements (12-21 hrs.)
*These are in addition to the Core Curriculum courses.

*CHOOSE ONE ADDITIONAL Course (3-4 hrs.) from:
☐ MATH (1315 or higher), Science (any course), PHIL 2330 (Logic), CS 1308, *or* GEO 2410. (Excluding Math 1316, GEO 2410 requires a Math prerequisite of 1315 or higher with a grade of C or better.)

*CHOOSE ONE ADDITIONAL Course (3 hrs.) from:
☐ ENG 2310, 2320, 2330, 2340, 2359 *or* 2360

MODERN LANGUAGE (6-14 hrs.)
(All 4 semesters must be from the same language.)
☐ 1410
☐ 1420 (These prerequisite requirements must be met before taking 2310 and 2320.)
☐ 2310
☐ 2320

MAJOR REQUIREMENTS IN HISTORY - (27 additional credit hours and 2.25 GPA required.)
☐ HIST 2310 or 2311
☐ HIST 2320 or 2312

Students must select at least one course from each of the following groups. No more than a total of 3 courses may be taken in any one group.

☐ **Group A: 3 Adv. Hrs. (*World History*)**
　　_____

☐ **Group B: 3 Adv. Hrs. (European History)**
　　_____

☐ **Group C: 3 Adv. Hrs. (U.S. History)**
　　_____

☐ **Group A, B, and/or C: 9 Adv.Hrs.**
　　_____, _____, _____.

☐ **Senior Seminar** - HIST 4399
(Prerequisite: 24 hours of Hist. and Special Approval.)

MINOR – (Requirements vary with selection.)
(18-24 hours)   (2.0 GPA required)
　__ __　　　　　　　　　 __ __
　__ __　　　　　　　　　 __ __

In order to graduate, students must have a total of 120 Hours (including 36 Advanced Hours).
Before Electives, student will have : Total Hrs._____, Adv. Hrs. _____
Student Needs: _____ Hrs. Any Level + _____ Adv. Elective Hrs. = _____ Total Elective Hours.

Figure 13: Example Checklist, History

The final and most recent addition to the student resources offered by Texas State is the new Degree Audit (Figure 14). Texas State University currently uses the *Banner*® system by Ellucian for much of its day-to-day management tasks. With *Banner*, Ellucian offers a variety of additional "solutions" or add-on programs to assist students and the university. The add-on system that this thesis focuses on is Ellucian Degree Works. According to Ellucian, Degree Works is "a comprehensive academic advising, program planning transfer articulation, and degree audit solution that helps students and advisors negotiate an institution's curriculum requirements with ease" (Ellucian, 2012, p.9). Currently in its 4th generation, Degree Works began in 1988 as a simple degree audit evaluator; it expanded to include web-based student and advisor interaction in 1995 (p. 9). The system provides real-time advice and counsel, interactive what-if degree planning, credit transfer, personalized advising, degree certification, and retention and transfer recruitment capabilities (Ellucian, 2014).

The Degree Works program can be accessed by students and advisors at any time. Students access the system by logging into their Self-Service portal through the university's Cats Web, a portal used to access many personal information services such as registration, student records, financial aid, etc. When the student selects the Degree Audit (DA), the site populates with their personal information including student standing, hour and credit requirements, courses completed, courses in-progress, and courses still required (see Figures 14 and 15). This personal information is sourced from student records handled by Admissions. The main function of the DA is to show the student what classes they have completed and what classes are still required to complete their degree. Completed courses are displayed on the check-list highlighted in pale yellow with green

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checkmarks, along with the course number and course title, the final grade, hours completed, and in what semester the requirement was satisfied. Similarly, in-progress courses are indicated in blue with blue tildes in the check box, while the grade slot indicates "(IP)" and the hours are in parentheses. Finally, open gray checkboxes indicate un-fulfilled courses, and possible courses are included. The student is able to click on any of these possible courses to receive a pop-up with more specific information on the class (Figure 16).

Student View AV724514 as of 04/29/2014 at 22:48

Student		Level	Undergraduate
ID		Degree	Bachelor of Fine Arts
Classification	Junior	College	College of Fine Arts and Comm
Advisor		Major	Communication Design Undergrad
Overall GPA	3.96	Concentration	
Texas State GPA	3.96	Certification	
		Minor	
		Catalog Year	Fall 2012

Legend

✅	Complete	≈	Complete except for classes in-progress	(T)	Transfer Class
☐	Not Complete	≋	Nearly complete - see advisor	@	Any course number

Degree in Bachelor of Fine Arts			Credits Required: 121
		In Progress Hours: 28	Credits Earned: 81

Unmet conditions for this set of requirements:	- A minimum of 121 credits are required. You currently have 109, you still need 12 more credits.

☐	IMPORTANT MESSAGE		
	Remark:	An advisor must review this audit prior to using for degree planning.	
✅	You meet the minimum GPA requirement		
✅	University Seminar	US 1100 UNIVERSITY SEMINAR	A 1 Fall 2011
✅	Foreign Language		
☐	Core Curriculum	Still Needed:	See **Core** section
☐	A Major is required	Still Needed:	See **Major in Communication Design** section

✅ Foreign Language Proficiency	
✅	FOREIGN LANGUAGE PROFICIENCY

Core		GPA: 3.91	Credits Required: 40
		Points Earned: 133	Credits Earned: 41

✅	WRITING (Core Code 010)			
✅	College Writing I	ENG 1310 COLLEGE WRITING I	CR 3	Fall 2011
✅	College Writing II	ENG 1320 COLLEGE WRITING II	A 3	Fall 2011
✅	COMMUNICATION (Core Code 011)			
✅	Fundamentals of Human Communication (CORE 011)	COMM 1310 FUND OF HUMAN COM	A 3	Fall 2011
✅	MATHEMATICS (Core Code 020, 021)			
✅	Mathematics Component	MATH 1315 COLL ALGEBRA	A 3	Spring 2011
		Satisfied by MATH1314 - Lone Star College System		
✅	NATURAL SCIENCE (Core Code 030, 031)			

Figure 14: Texas State's Degree Audit

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✅	HUMANITIES & VISUAL AND PERFORMING ARTS					
✅	Introduction to Fine Arts (Core Code 050)	HON 3396S	AMERICAN SONG	A	3	Fall 2012

Exception By: **Frey, Sarah C on 03/22/2013**   Apply Here : **approved per Honors**

✅	Philosophy (Core Code 041)	PHIL 1320	ETHICS & SOCIETY	A	3	Spring 2013
✅	Literature (Core Code 040)	HON 3396F	ART OF STORYTELLIN	A	3	Spring 2012

Exception By: **Frey, Sarah C on 03/22/2013**   Apply Here : **approved per Honors**

☐	HISTORY (Core Code 060)					
☐	History of the U.S. to 1877	Still Needed:	3 Credits in **HIST** 1310			
✅	History of the U.S. 1877 to Date	HON 3395Y	MUSIC RACE US SOUT	A	3	Fall 2012

Exception By: **Frey, Sarah C on 03/22/2013**   Apply Here : **approved per Honors**

✅	AMERICAN GOVERNMENT (Core Code 070)					
✅	Principles of American Government	POSI 2310	PRIN OF AM GOV	B	3	Spring 2013
✅	Functions of American Government	POSI 2320	FUNCT AMER GOVT	A	3	Fall 2013
✅	SOCIAL & BEHAVIORAL SCIENCE (Core Codes 080)	SOCI 1310	INTRO SOCIOLOGY	A	3	Spring 2012
≈	HEALTH & HUMAN PERFORMANCE (Core Code 090)					
✅	Fitness, Wellness and Dance	PFW 1155A	BEG BADMINTON	A	1	Fall 2012
≈	Fitness, Wellness, Dance & Ensemble	PFW 1154B	CHALLENGE COURSE	IP	(1)	Spring 2014

■ Major in Communication Design	GPA: 4.00	Credits Required: 75
	Points Earned: 156	Credits Earned: 39

Unmet conditions for this set of requirements: 75 credits are required. You currently have 63, you still need 12 more credits.

Your ARTC Foundations GPA is 4; a GPA of 3.0 is required for these classes Your ARTF GPA is 4; a GPA of 2.0 is required for these classes

✅	ARTF FOUNDATIONS - Minimum Grade of C required					
✅	2-D Design - Min. Grade of C	ARTF 1301	2-D DESIGN	A	3	Fall 2011
✅	Basic Drawing - Min. Grade of C	ARTF 1302	BASIC DRAWING	A	3	Fall 2011
✅	3-D Design - Min. Grade of C	ARTF 1303	3-D DESIGN	A	3	Spring 2012
✅	ART HISTORY REQUIREMENTS					
✅	Ancient to Medieval Art	ARTH 2301	ANCT MED ART	A	3	Spring 2012
✅	Renaissance to Modern Art	ARTH 2302	REN MOD ART	A	3	Spring 2013
☐	STUDIO REQUIREMENTS					
	2-D Studio	ARTS 2371	PRINTMAKING I	IP	(3)	Spring 2014
☐		ARTS 2391	WATERCOLOR I	A	3	Fall 2013
		Still Needed:	1 Class in **ARTS** 2321 or 2351 or 3376 or 3376 or 2361			
✅	3-D Studio	ARTS 2331	FIBERS I	A	3	Fall 2012
✅	PRIMARY ARTC FOUNDATIONS - Take Concurrently					
✅	Communication Design Foundation I	ARTC 1301	COMM DSGN FOUN I	A	3	Spring 2012
✅	Imaging I	ARTC 1302	IMAGING I	A	3	Fall 2012

Figure 15: Texas State's Degree Audit Continued

Figure 16: Example DA pop-up more information on a specific class

Other features of the DA include a What-If Worksheet, Look-Ahead Worksheet,

Planner, and GPA calculator. The purpose of the What-If worksheet is to allow students

to explore their options with different or additional degrees, majors, minors,

concentrations, certifications, or student levels. By using the What-If feature, users are

able to see a new DA with their new specifications. The Look-Ahead feature lets students

input courses they plan to take in the future and again generate a new DA with these

possibilities. The Planner feature of the DA is utilized through interaction between

advisor and student. The advisor is able to enter a "plan" or suggested schedule by

entering class numbers in certain semesters. Students can refer back to this schedule

when registering or planning their course schedule. Finally, the GPA calculator is a

simple feature to allow students to gauge what grade point they must attain with their

remaining credits to achieve a desired GPA. By putting all their information in one place

and tailoring it specifically to their transcript, as Texas State's Online Degree Audit has

accomplished, students are beginning to be offered the power they need to take control of planning their own college path. However, there are still obstacles that students are encountering with this current Texas State system.

Student Opinion Survey

For this thesis, 194 Texas State Students were surveyed on their opinion of the current Degree Audit through an online Gap Analysis survey (See Appendix A for complete results). The survey was comprised of 65 different majors. The breakdown by class was: freshman 19%, sophomores 21%, juniors 24%, and seniors 37%. Twenty-two percent of participants were transfer students. When asked how familiar they were with their own degree plan, the modal response, 42.78% of the respondents, was that they were extremely familiar with it. The mean (x) answer was 4.15 corresponding to the "familiar" column of the Likert scale. The students responded that most of them have used the Degree Audit 11 or more times (43.81%). Very few students have only used it 1-2 times (2.58%). Four percent of the participants had never used the DA, and the most common reason was because they did not know about it. The mean response for familiarity with the DA system was 3.84 or "familiar." Forty-four percent of respondents felt that they were familiar with the DA, while 30% felt extremely familiar with the system. When asked about their experiences with the DA, students were asked to respond on a Likert scale of 1=False, 2=Somewhat False, 3=Neutral, 4=Somewhat true, and 5=True. They were first asked about their first experience with the DA: the mean response was 3.28 or "neutral" for understandability of the DA with the mode, or 70% of the students, responding that they somewhat understood how to use the DA. Students

found the DA initially quite helpful (x=4.35), but responded neutrally to their enjoyment of the DA (x=3.47).

The students were also asked about their reaction following the first time they used the DA. Students answered "somewhat true" when asked if they were satisfied with their first use of the DA (x=3.8). The majority of the students understood their degree path more clearly than previously (x=4.1). Respondents found that their degree path questions were generally answered with the DA (x-3.6). Majority of the students surveyed also claimed that they had somewhat of a better understanding of the courses they needed to take than previously (x=4.16). When asked if the students had a better understanding of how long it would take them to graduate after using the DA, the mode, or 31.96% of respondents, answered that they thought that was true. The mean response was "somewhat true" at x=3.62. Forty-one percent of the surveyed students felt confident in their ability to make decisions about their degree path. Participants responded that they felt somewhat confident after using the DA to make future decisions about their degree path (x=3.94). Respondents were somewhat satisfied with the information the DA provided (x=3.91). When asked if they would use the DA again, 68.56% of respondents said they would (x=4.63). Finally, 53.09% of respondents said they had more educated questions to ask their advisor after the use of the DA (x=4.27).

Students' Difficulties

While the DA has many features to assist with advising and degree planning, students still have difficulty interpreting and utilizing the current Degree Works Degree Audit and Texas State's other degree planning resources. For the purposes of this study, issues caused primarily because of programing/developing issues will not be addressed,

because this thesis is focused on the effectiveness and improvement of the program's visual communication concepts.

Firstly, while the provided catalog (printed or online versions) is very extensive and thorough, it is very hard to follow linearly and in terms of time. The catalog *does* try to address the physical time students must go through to graduate in its "suggested" schedule for a student pursuing a Communication Design major (see Figure 17). While this is a thoughtful tool attempting to put the many classes offered into context, this table of letters and numbers is not very easy to understand and does not allow for individual flexibility. What if the student comes into the university with dual credit for core classes? Or what if she/he wants to take study abroad classes? The recommended schedule is not helpful in answering these questions.

Bachelor of Fine Arts
Major in Communication Design
Minimum required: 121 semester hours

General Requirements:
1. All General Education requirements must be met including a minimum of 75 hours in Art, including 36 advanced hours.
2. Select any advanced ARTC course to satisfy ARTC electives, excluding ARTC courses already taken to satisfy course requirements.
3. To complete the 080 Social and Behavioral Science component of the core curriculum, Communication Design majors are required to take SOCI 1310 or PSY 1300.
4. To complete the 050 Visual and Performing Arts component of the core curriculum, Communication Design majors are encouraged to take the required course, *Introduction to Fine Arts*, in Dance, Music or Theatre.

Freshman Year	Hr	Sophomore Year	Hr	Junior Year	Hr	Senior Year	Hr
Course		Course		Course		Course	
Fall		*Fall*		*Fall*		*Fall*	
ARTF 1301, 1302, 1303	9	ARTC 2303, 2304	6	ARTC 3301, 3303	6	ARTC 4308	3
		ARTH 2301	3	ARTC 3316	3	ARTC advanced electives #2	3
		1 course from ARTS 2321, 2351, 2361, 2371, 2391, or 3376	3			1 course from ARTS 2321, 2351, 2361, 2371, 2391, or 3376	3
Spring		*Spring*		*Spring*		*Spring*	
ARTC 1301, 1302	6	ARTC 3307, 3320	6	ARTC 3304	3	ARTC 4000	0
		ARTH 2302	3	ARTC advanced elective #1	3	ARTC 4315	3
		1 course from ARTS 2321, 2351, 2361, 2371, 2391, or 3376	3	1 course from ARTS 2311, 2331, 2341, or 2381	3	ARTC advanced elective #3	3
						1 course from ART (C,H,S,T) advanced elective	3
Total	15	Total	24	Total	18	Total	18

Figure 17: Communication Design suggested schedule

Secondly, the provided department "checklists" do try to provide condensed, easier to comprehend versions of their degrees; however, they are flawed in a few ways

(see Figure 18 for BFA in Communication Design checklist). They, again, do not allow

for linear time planning, understanding of pre/co-requisites, and end up leaving out many

of the options that are available as electives for advanced students. Additionally, these

checklists do not seem to be helpful for students because they cannot find them or do not

know of this resource. As stated previously, each department also creates their own

checklists and their own layout; this results in no consistency or guaranteed usefulness of

these checklists between majors for any student trying to decide between more than one

major. Texas State advisors also mentioned that the checklists tend to cause issues when

students print them out and reference this one checklist for their entire college career;

because the department and majors are constantly making changes and updating the

requirements, the printed checklist quickly becomes obsolete and misleading if the

student is not aware of the changes.

Figure 18: Communication Design's checklist

Finally, the DA falls short as students try to understand the pre-requisites and

which classes/groups of classes they should focus on taking first—the program requires

the user to click on the class number, search through the class description, find the course number of the required class, and then search by description in the catalog. Texas State students mentioned that it is difficult to think linearly in terms of semesters when the DA lists all of its requirements in groups of classes rather than in a form more intuitive to the student's path of taking the courses. Again, there is the aspect of time and journey missing from this resource. Students have also mentioned that the DA's system of listing completed and required credits is confusing because it is difficult to delineate between what credits it is referring to in the language the program uses throughout the display. Lastly, while students mentioned that they do appreciate the What If feature of the DA, it does not allow for retaking a class or comparing more than one What If plan without backing out and resubmitting all of the requirements again.

Advisor Difficulties

This thesis focuses on improving the DA for students; however, students are only part of the advising/degree path equation. University advisors are a critical element in making the DA a constructive tool. Advisors use the DA and other degree planning resources as tools to help their interactions with their students. During advising appointments, advisors are able to reference the DA instantly and provide additional Texas State resources to help illustrate requirements or check on students' current standing with the university, course taken, transfer credits, etc.

Because they see many students and use the DA daily, the advisors at Texas State are knowledgeable about common student problems with Texas State's degree planning resources along with their own difficulties when using it. When current Texas State student advisors were interviewed, one of the central issues with the current resources

was that "students would just have to *know*" certain technicalities of each degree to successfully complete the degree. This issue stems from each degree curriculum being very different from each other, having varying degrees of difficulty to navigate, and these details are not written into the catalog. For example, in some degree curricula, a series of courses may be suggested by the department to be taken consecutively; however, there are exceptions. For example, two of the classes can be taken together, with permission, while two other courses can always be taken together, but this choice is not suggested because of difficulty and past student trends. These technicalities are not written into the catalog or the system because they are merely recommendations, and the rule-based system does not allow for suggestions.

Another noted difficulty with the current degree planning resources is the accuracy and reliability of the information provided to students due to inconsistently provided information, delayed changes, and overrides. The catalog resource is an example of inconsistently provided information: it is printed and provided to students and advisors every two years. However, the curriculum and requirements are constantly being updated—these updates are provided online. Students are provided two forms of the catalog, but the printed version is only valid until the first update is made. Advisors mentioned that they are able to use the printed version of the catalog because it is their job to know where the print version data is outdated. One advisor explains, "While we use the Degree Audit every day at work and can spot theses inconsistencies, students cannot possibly be expected to catch them" Overrides are another issue that advisors noted about the DA. Because there are thousands of credits available at Texas State, there are occasional courses that do not show correctly on the DA—specifically transfer

credits, honors courses, study abroad, etc. When this happens, advisors must override the

system and input substitutions. Advisors are also allowed a certain amount of

interpretation with course substitutions. Unfortunately, with these substitutions, certain

data is not included, and this causes issues with the overall DA. For instance, no transfer

credits will show in the DA as a Writing Intensive class; therefore, these credits will not

count towards Texas State's required nine hours of Writing Intensive course work. This

situation would require an advisor to override the system for certain courses. In doing

this, it occasionally will cause the DA's hour count to be incorrect for as long as the

override is included.

Even with these anomalies, the consensus from advisors is that this DA is an

invaluable tool they are grateful to have—especially when compared to the former

system, DARS (see Figure 19). However, through Communication Design and Project

Management techniques, this Degree Audit can be transformed into more visual form and

be able to address some of the issues raised in this research.

```
--------------------------------------------------------------

Minimum Texas State GPA of 2.00
Minimum Major GPA: 2.25
Minimum Minor GPA: 2.00

Note: All bachelor's degrees require a minimum
of 120 semester hours, including 36 advanced hours.
Some degrees may require more than 120 hours.
To learn more about your specific degree or major,
including required hours, please contact your
departmental advisor.

Junior College hours: Texas State will apply up to 66
hours from an accredited junior/community college.
(At the approval of the individual college dean, 6-8 hours
may be added.)

Honors: You must have 60 semester hours at Texas State to

   If both courses are from the same science, one may
   be non-lab.
   (Two CORE 030/031 acceptable as transfer courses).
       4.0 hrs. complete  2 COURSES TAKEN
   200512 CHEM 1141    1.0 C     031:GEN CHEM LAB I
   200605 CHEM 1341    3.0 B  RP 030:GENERAL CHEM I
      Course(s):   BIO 1320,1421  ANTH 2414  BIO 1430,1431
         CHEM 1310,1430,1342,1142  GEOL 1410,1420  PHYS 1310,
         PHYS 1320,1340,1350,1410,1420,1430,2425,1110,1140
OK    Humanities (Core Code - 040)
      EARNED:   3.0 HOURS    1 COURSE
      200405 ENG  2320 :J 3.0 B     040:BRIT LIT SINCE 17
                                    SOUTHWEST TEXAS JR COLLEGE
===================================================================
OK    Humanities-2 (Core Code - 041)
      EARNED:   3.0 HOURS    1 COURSE
      200412 PHIL 1305    3.0 A     041:WI:PHIL & CRIT TH
===================================================================
OK    Visual and Performing Arts  (Core Code - 050)
      EARNED:   3.0 HOURS    1 COURSE
      200412 ART  2313    3.0 B    050:INTRO FINE ARTS

===================================================================
OK    U.S. History (Core Code - 060)
      EARNED:   6.0 HOURS    2 COURSES
      200412 HIST 1310    3.0 D    060:WI:HIST US TO 187
      200605 HIST 1320    3.0 D  RP 060:WI:HIST US TO DAT
===================================================================
OK    Political Science (Core Code - 070)
      EARNED:   6.0 HOURS         2 SUB-GROUPS
      200312 POSI 2310 :J 3.0 B    070:PRIN OF AM GOV
                                   SOUTHWEST TEXAS JR COLLEGE
      200505 POSI 2320    3.0 B    070:FUNCT AMER GOVT
===================================================================
OK    Social & Behavioral Science (Core Code - 080)
      EARNED:   3.0 HOURS    1 COURSE
      200512 PSY  1300    3.0 D    080:INTRO TO PSY
===================================================================
NO    Physical Fitness and Wellness  (Core Code - 090)
      Choose two courses from Group 1, OR take one course
      from Group 1 and one course from Group 2.
      EARNED:   1.0 HOUR     1 COURSE
-->  NEEDS:                  1 COURSE
```

Figure 19: Texas State's former DA system, *DARS* (Detail)

Chapter III

STATEMENT OF THE PROBLEM

Potential

Improving advising and advising technology has been shown to directly affect students' overall experience with their higher education. According to Freeman in his 2008 study at The University of Wisconsin-Oshkosh, the most common incoming first-year student major is "Undecided," and 50 percent of students who did declare a major upon starting college changed their major before their second year (Freeman, p. 12). Students are indecisive about what they want to do for the rest of their lives, because the magnitude of their choices will directly affect their futures. This is where effective academic advising can have value in connecting a student and his/her personal goals with the university's resources (Grupe, 2005). This link can prevent students from taking classes that do not contribute toward graduation, help students to enjoy college, and help them persevere to graduation (p. 1). It is important to seek higher quality advising because it allows students not only to clarify their educational goals, and relate these goals to the curriculum and to future careers, but it also encourages them to pursue academic success, establish personal bonds, form a better appreciation of the benefits of a college education, be more involved, and have a stronger motivation for continued enrollment (Walz, 1984).

With the overwhelming evidence indicating that advising is critical to the success of a college student and the technology-based environment that exists today, it is surprising that few efforts have been made to utilize expert systems or any other form of artificial intelligence to help advisors or students with advising and degree planning

(Grupe, 2002). By introducing technology to the advising process, advisors can be relieved of repetitive tasks, have more time to dedicate to helping students plan their educational road maps, and can provide tools for the student to make better-informed decisions (Feghali, 2001). Most universities have "degree requirements that can be met by a multitude of courses, sometimes hundreds of them" while some students fail to receive advising because of self-selection or institutional barriers (Von Munkwitz-Smith, 2005, p. 47; & Metzner 1989). This is where a technology-based tool for advising assistance could help the students plan to take the correct courses, check the course listings, or confirm their satisfied prerequisites on their own time without constantly referring to their advisors thus reducing long-term planning errors and giving the student control and responsibility (Feghali, 2001).

This thesis focuses on improving technologies for advising as suggested above; however, the proposed VDA's purpose is not to *replace* Advisors. "Studies show that the connection with a faculty member, advisor, or staff member makes a tremendous difference in student attitudes towards an institution" (von Munkwitz-Smith, 2005). It is not the VDA's intention to replace the interaction between students and advisors, but rather to improve and complement those interactions. Universities must remember that students are not just a number going through the system, passing or failing, and graduating. Students are people, and this human element is where advisors are needed to work hand-in-hand with technology. For instance, students expect their advising experience to not only provide them with accurate information, but for their advisors to know them individually, provide both major and career information, be available and approachable while also being knowledgeable about majors outside of their own

program, provide frequent feedback, and assist with personal as well as academic issues

(p. 45). It may even be appropriate for the advisor to encourage withdrawal from school

due to identified personal issues, to ensure the student's likelihood of future academic

successes (Yarbrough, 2002). This personal connection cannot be captured by a rule-

based computer system based on a catalog and data entries—human advisors are needed

for these personal situations. Fowler's (2010) research states that students may be at

higher risk of dropping out if only academic factors are addressed during their advising

experiences. Advisors are also crucial when students insist on or are forced to select a

course in which their probability of success is not high; this is where an advisor could

offer remedies that could help early in the semester—i.e., using tutoring, study groups,

and supplemental instruction to improve the chance of success (von Munkwitz-Smith,

2005). There is little doubt that student-advisor academic advising will remain a

necessary component of college success.

Statement of the Problem

While much improved and evolving, the systems that are available today and the

ones used by Texas State still have issues that cause barriers that students must overcome

before being able to successfully navigate their higher education journey to graduation

and further success. One of the most prevalent barrier for students is that the current

system at Texas State requires the student to pool their information and understandings

from multiple resources that are often incomplete and redundant. For instance, each

degree checklist and each catalog entry is different between departments; also, the printed

catalog is quickly outdated because of constant curriculum updates online. Additionally,

there is often information that is not shared with students because it is not officially

integrated into the catalog. Students' personal experiences and advisors' learned wisdom can only be sourced by word of mouth or the source itself on a need-to-know basis. Similar to the issue that Feghali described at AUB (see Figures 2 and 3), Texas State's system requires the advisors and students to gather bits and pieces of the university's requirements, department requirements, personal details, and other various options/opportunities from a variety of locations before they are able to construct a degree path that satisfies the student's individual academic goals. This inefficiency causes much confusion and wasted time because of missing/incomplete information and the learning curve necessary to form a completed picture of the degree path options for a students' successful graduation.

A second problem with the current advising system is the narrow scope it presents to students while degree planning. Many of the described systems illustrated the ability to plan a semester at a time with the additional option to view current and previous records. However, to be able to plan for any long-term goal, the course planning must be able to do the same. Some courses can be taken in any semester, while others must be taken in a specific semester only after completion of other courses. Currently, the system provided has a narrow scope of planning for which courses are necessary overall and which of those courses need to be taken in the next semester. How can the student be able to choose the optimal courses without seeing the bigger picture of his/her final achievement?

With this narrow scope, the current resources do not offer an interface that provides the information to students or advisors to widen their scope and to get the information efficiently or completely. All of the current technology-based advising

applications and other Texas State resources tend to display the necessary information in list or paragraph form—list of required classes, list of completed courses, and description of the requirements. While lists are helpful to check off accomplishments and eventually accomplish a goal, they do not account for time. Time is essential for the student and the university. Completing a degree in a timely and goal-oriented manner is important for the student because of budgetary reasons—the longer they are in school, the more the student debts can accumulate and the longer they are not utilizing their degree in society. Additionally, in some situations, state regulations limit the number of credit hours students can take before they must pay more expensive out of state tuition. By giving little weight to the time-element in the degree planning process, this system is not accounting for a very important consideration/issue the student needs to account for when navigating his/her degree.

Currently, the resources and technology provided to Texas State students do not give the student full control over their journey in order to achieve their goals. The DA has limited interactivity, and the information is simply given to the students to decrypt rather than to manipulate and maneuver as they must do in order to plan for their optimal college education. Also, with this static information, there is little opportunity for the student to open a conversation or develop a relationship with their advisor. This relationship is essential for the improvement of the student's college experience as explained previously. With the current system, students are expected to initiate meetings with the advisors on their own terms, or are forced to when they face a major issue. As explained by a current Texas State advisor, this moment, when the student comes to an advising session because of an issue, can be a critical point when potential issues can be

resolved or explained in a personal interaction between advisor and student. Every

students' academic journey is different and very individually oriented; however, the

current system does not allow for the necessary advisor-student relationship to be built or

for the student to be able to manage it to his/her personal ambitions.

Hypothesis

This thesis poses that the development of a new Visual Degree Audit is necessary

to address the limitations of the current degree-planning resources. The design of this

new application will consolidate all of the resources for degree planning in one

application; further, this new application will consider usability—not only will the VDA

unite all of the data from the current resources, it will organize it in a manner that will

integrate how the students use this information into an intuitive flow within the

application itself. By merging all of the resources into one application, the issue of

inconsistencies between departments and majors will be remedied. There will be

standardization and thus a shallower learning curve and a more robust error management

between degrees and departments. The VDA will also embrace a small community

feature. Students, advisors and departments will be able to leave warnings and insights in

the form of comments and notifications on specific courses and details of the degrees.

This will provide a dialogue and a repository of knowledge for students to access and

interact with.

The VDA also aims to provide a wider view of the higher education path on

which a student is embarking. Instead of focusing on only one semester ahead, the VDA

will display the entirety of the student's journey, from enrollment to graduation, at once.

The software will do this by deemphasizing the list-format displays and presenting a

more complete view of the path to graduation. The VDA will use project planning techniques, graph theory, and Communication Design to organize and display a major in a graph-like form utilizing nodes and connections to illustrate course requirements and prerequisites. These nodes will originally be displayed on a semester-based timeline as a suggested schedule; additionally, through dragging and dropping, adding, and other interactions, the user will be able to explore other options for their personal path. The interface of the program will also include the capabilities to tailor the degree plan to the student's personal goals and preferences such as graduation date, hours per semester, additional electives or academics.

Finally, the VDA will create a stronger relationship and ongoing conversation between advisors and students while giving more control to the students. Advisors will be able to provide, suggest, and view plans and thus be able to more completely advise the student. The VDA will also include a "question bank" of saved questions the student encounters while navigating their degree audit. Students can save questions about specific classes or general academic questions to either ask their advisor at a scheduled appointment or send directly to the advisor. If the question requires more than a quick answer, the advisor can request that the student come in for an appointment. The question bank can also help advisors realize where students are having the most difficulty and where they can direct their efforts to resolve some of the most common difficulties. This newly developed Visual Degree Audit will be a more comprehensive tool for university degree planning and will decrease the student learning curve while increasing students' knowledge, efficiency, and personal control over their higher education journey.

Chapter IV

METHODS

When developing the new VDA, Texas State advisors' and students' suggestions were considered along with project planning and graph theory techniques, and Communication Design practices.

Student and Advisor Suggestions

Advisors utilize the current Degree Works Degree Audit every day. Therefore, they are very qualified to make suggestions on the features that tend to cause the most problems and which features are inherently important and useful. One of the favorite features noted by advisors is the ability to click on the classes suggested in the current DA to view catalog entries instantly. The extended information on a specific class is something that students and advisors find very useful. The concept of the What-If segment of the current DA is also a favorite feature among advisors. One "hidden" feature an advisor revealed was that this section can be used to reorganize the list of classes in a different format by manipulating the system to show an Undeclared Major's audit earlier than 2005. One advisor said that he found this useful when he needed to see a comprehensive simple list of classes outside of the normal DA layout. Advisors also pointed out that the DA provides critical information at the beginning of the student's DA with the heading: "unmet requirements" —however, this information is provided in the same manner as all of the other information on the page—undermining its importance. It was also suggested that the printed versions of the catalog provided to students may be more of a source of confusion for students than a necessity, because changes are

continuously being made to the active catalog before a new printed catalog is produced (every 2 years).

Student suggestions were also considered when developing the VDA. Students indicated the need to see more prerequisites when planning their classes because, currently, the student must click on the class's number to get to the catalog entry and scroll through multiple courses to find the list of other course prerequisites for the class. Students expressed a desire to have these prerequisites easier to access. Students also mentioned that they appreciate the DA's feature of being able to see all of the classes they have completed verses the ones the ones they have in progress or not completed. A few Texas State students mentioned that the current DA does "not have enough colors" or visual appeal; the entire aesthetic is too "blocky" and visually unattractive.

The Bobcat schedule builder is something that is fairly new to Texas State students; it is an online tool that helps students choose their class schedule for the next semester based on classes that they wish to take and additional "breaks" that they want to include. Students can try different combinations of courses and breaks to create the perfect schedule for registration. The general consensus on this tool is that it is very helpful for planning a class schedule for upcoming registration. While this tool does not fall in the realm of degree planning, but rather more in the realm of registration planning, it is a tool linked to degree planning. Student's love for this resource is a suggestion in itself to include some of its features in the VDA. Students mentioned that they believe that the DA provides all of the information they would want; however, it is simply not presented in a way that is intuitive to the students' needs, so a layout change may be all that the DA needs. Lastly, it was also suggested that the course number be replaced by

the course's name, because numbers are difficult to differentiate when planning degrees. The current DA requires users to click on the number before they can determine what course it is in colloquial terms.

Project Management Techniques

Project Management

The concept of Project Management can be correlated with the model a student and advisor follow to achieve a college degree for the student. The purpose of Project Management is to "optimize efficiency and effectiveness"—most students and universities can agree that this purpose mimics that of a student achieving a college education (Jugdev, 2005, p. 20). A project is defined as a complex, non-routine, one-time effort limited by time, budget, resources, and performance specifications designed to meet customer needs; it has a definite beginning and ending with several interrelated tasks, and it is usually associated with uncertainties and unknowns (Anantatmula, 2010, p. 3). For a student, the pursuit of a college degree fits the definition of a project perfectly; it is limited by time (the typical four year completion goal), budget, resources (i.e. advisors, scholarships etc.), and includes necessary performance specifications (classes and credits) to complete the goal of attaining a college degree. Additionally, a college degree has a definite beginning (enrollment) and ending (graduation) with the intermediate steps being relatively unknown. Project Management, or the "the application of knowledge, tools, and techniques to project activities to meet project requirements," is often identified by the "Iron Triangle" —the variables of time, cost and scope (Atkinson, 1999, p. 338). The management of a college degree can also be related to the same guidelines of Project Management: it is "constrained by schedule (number of years and

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number of credits), cost (tuition, books, room, and board), and scope (the chosen degree academic requirements)" (Anantatmula, 2010 p. 5). According to project management norms, practitioners (in this case, students) often manage multiple projects and encounter competing priorities on a daily basis, particularly as they simultaneously manage several projects at various stages of their lifecycles (Jugdev, 2005, p. 19). See Figure 20 for further comparison of a traditional project and the academic program.

	Traditional Project	Academic Program
Project	Project is distinctly different time-bound effort that has a definite beginning, definite ending. It could also have several related and interdependent tasks to create a unique product or service.	— Distinctly different — Time-bound (four years) — Definite beginning and ending — Interdependency of courses — Unique product (personalized diploma
Project Justification	Projects fulfill organizational objectives or strategic needs such as operational necessities, technological advancements, legal requirements, customer, and market	— Be more intellectually polished — Improve the ability to make more money — Be Involve in a certain sets of job or

Figure 20: Comparison between traditional project and academic program (Anantatmula, 2010, p. 5-6)

	demand.	professional endeavors
	Translated at operational level, projects are used as means to accomplish various business results such as the implementation of new processes, capital expansion, and new product or service.	— Have the opportunity to make friends with a particular segment of the society — Have the prestige of having a bachelor degree, or a graduate degree
Project initiation	A formal project selection method is employed to select the one that meets the need effectively and efficiently while fulfilling the project selection criteria.	— Evaluate the suitability of various degree programs and universities — Short-list a few for initiating the application process — Be guided by an informal and intuitive prioritization model
Project constraints	Project is concerned with completing a project on time, within budget, and according to the project specifications while satisfying both the customer and project team expectations.	— Complete within time frame — Complete within budget — Meet academic course requirements and policies
Project execution	Projects are executed in teams as they are driven by the need to integrate multiple disciplines and diverse skills to meet project objectives successfully.	— Characterized with increasing complexity and requires involvement of several people in managing a student's study plan

Figure 20 continued: Comparison between traditional project and academic program (Anantatmula, 2010, p. 5-6)

Using Project Management Tools for VDA Development

To transform Texas State's current Degree Audit/Degree Path planning system, Project Management techniques were used to organize the information and make it more useful for a student to navigate their degree. For students to better understand their degree plan (project), they must be able to grasp both the scope of the project ahead and the time the project requires. Scope can best be understood by using a Project Management tool called the Work Breakdown Structure (WBS) which "outlines project work by

decomposing the work activities into different levels of tasks" (Schwalbe, 2010, p. 57).

This structure is important because it is the foundation to deciding how to complete the

tasks, creating the project schedule, and forecasting the actual management of the project.

"A WBS is often depicted as a task-oriented family tree of activities, similar to an

organizational chart" (p. 187). According to Anantatmula (2010), the WBS will eliminate

omission of the possible key elements and improve the schedule's accuracy. Schwalbe

states, this "graphical representation academic plan is clear and easy to understand

compared to reading a document of instructions and mapping out the sequence for

themselves"—it is especially helpful for students who are visual learners (p. 11). As seen

in figure 21, the scope of the project, to graduate with a BFA in Communication Design,

was dissected into its fundamental tasks.

Art History and core courses are able to be taken at any time, while the major classes

have a procession the student must progress through to achieve graduation.
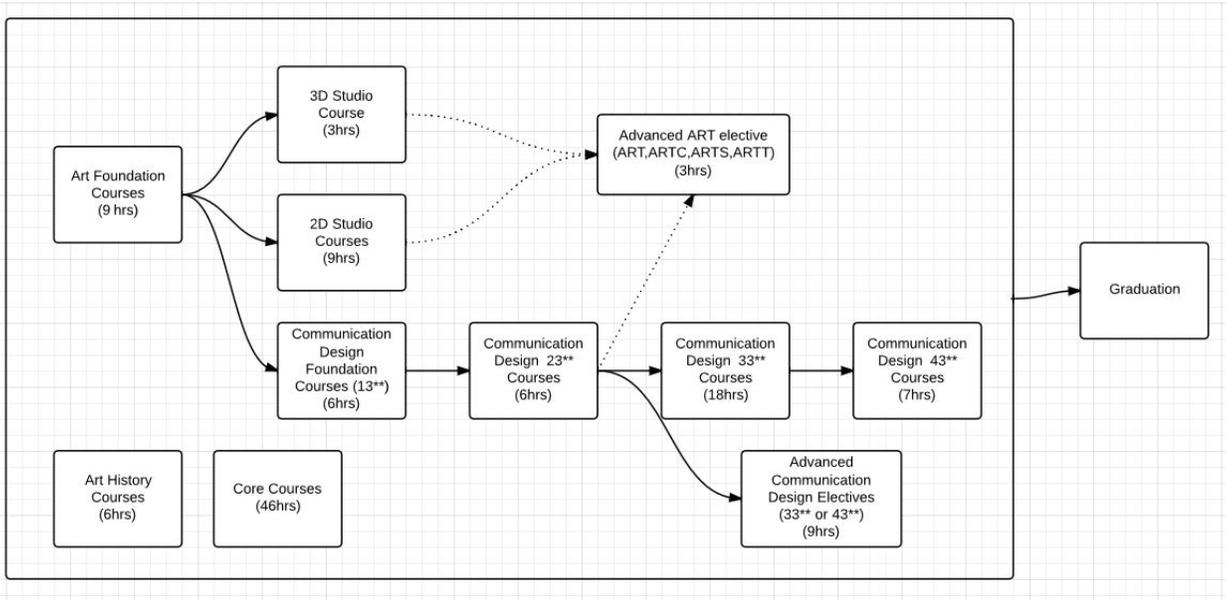
Figure 21: WBS of Communication Design major

When organizing the degrees used in the prototype, a Gantt chart and the Critical Path Method was utilized. "A Gantt Chart is a standard format for displaying project schedule information by listing project activities and their corresponding start and finish dates in a calendar format" (Schwalbe, 2010, p. 27). Gantt charts are displayed in a bar chart style, where each task (class or credit requirement) is displayed as a bar with its length corresponding to the length of time it takes to complete the class or credit. For a student degree plan, the duration is normally one semester. Where the Gantt chart visually assists with time management is with its arrows and overlapping bars. These features help delineate which classes can be taken together or which classes must be taken before the other. Figure 22 displays Project X, graduating with a Communication Design degree and Mass Communication minor, displayed in a Gantt Chart.
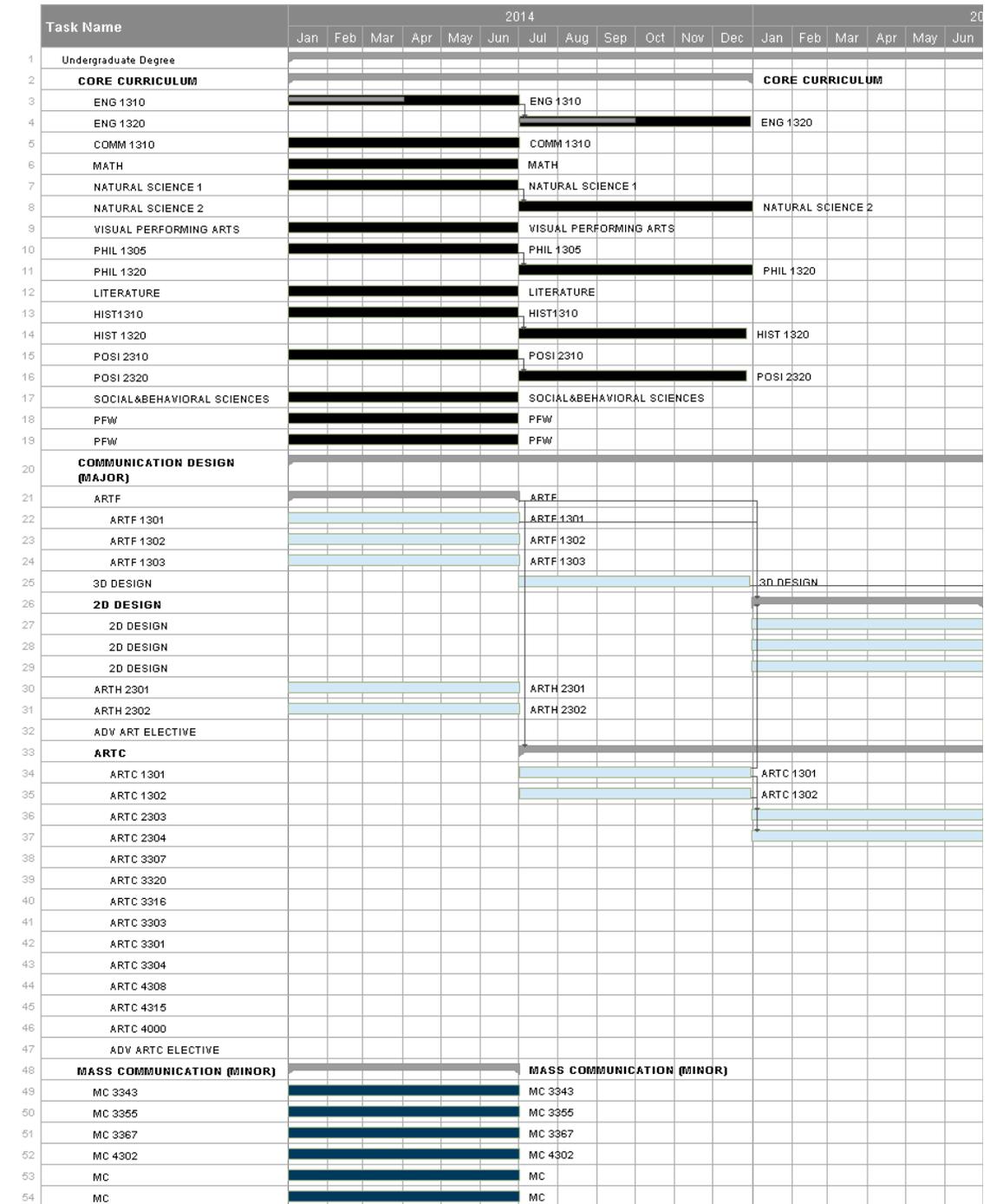
Figure 22: Project X Gantt Chart Detail

With this Gantt chart, the Critical Path, or the longest path through a network

diagram that determines the earliest completion of a project (topmost bar), can be

observed (Schwalbe, 2010). While the Critical Path can find the path in which the student

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may be able to finish their degree in the shortest amount of time, it also allows for the

project manager (student/advisor) to factor in Float, or "the amount of time an activity

may be delayed without delaying a succeeding activity or the project finish date"

(Schwalbe, 2010, p. 228). This is important to include because it may not be in the

student's best interest to take more than 18 hours per semester; therefore, the graph must

be flexible with the ability to move information around. Anantamula's (2010) research

reveals that "in terms of communication, the students agreed that these models have

helped them understand the requirements of the major study without ambiguity" and that

"students indicated that they are likely to use project planning techniques in their

professional lives" (Anantatmula, p. 14).

Usability and User Experience

To develop the VDA interface, User Experience (UX) needed to be considered to

elevate the students' interaction with the program. UX is defined as "a consequence of a

user's internal state, the characteristics of the designed system, and the context within

which the interaction occurs" (Lee, 2013, p. 689). This UX needed to have value, or the

user's conceptions of desirable means and end of action, for the users. The perceived

value can be introduced into the program by creating a pleasurable UX and User Interface

(UI) by focusing on satisfaction, efficiency, and effectiveness of an application for the

user.

Satisfaction

According to Hock-Hai Teo's, Professor of Information Systems and the Head of the

Department of Information Systems at the School of Computing at the National

University of Singapore, 2009 studies of interactivity and user attitude, "satisfaction may

be the largest contributing factor in forming user's perceived web site value" (2009, p. 297-8). Thus, satisfaction measures the appeal of Web sites through a sense of involvement, control, and affective feelings (p. 288). Involvement and control are derived from usability and interactivity or the degree to which users "have control over, and can exchange roles in their mutual discourse" (p. 286). This interactivity is thought to be the key technological feature for users trying to consume and understand the vast amounts of online information because of the user control and information exchange that becomes possible during interactivity (Jakobovits, 1997). "Interactivity by itself does not provide information but helps users in providing relevant and organized information on demand" (Teo, 2009, p. 289). Interactivity can create benefits such as a sense of fun and satisfaction, engagement and performance quality, and time saving (Teo, 2009). Teo states that the higher the interactivity level of a Web site, the more attractive it is, and thus appropriately utilized interactivity is vital when separating successful and failing web sites.

Available control	Example of Interaction	
Control over pace	Click to advance to the next thing	Increasing Level of Interactivity as User Control Increases
Control over sequence	Choose where to go at any time	
Control over media	Start/Stop video; search text; scroll or zoom the view	
Control over variables	Change the outcome of a chart; customize a database search	
Control over transaction	Enter a password; send a message	
Control over objects	Move things around screen	
Control over simulation	Change the perspective of view or the course of action	
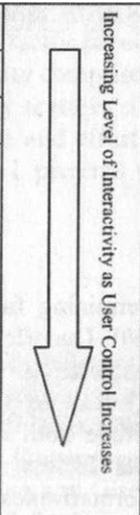
Figure 23: Interactivity Scale (Teo, 2009, p.287)

The second factor contributing to satisfaction is usability, defined by the International Organization for Standardization (ISO) as "the extent in which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use." In simpler terms, "usability really just means making sure that something works well: that a person of average ability and experience can use the thing—whether it's a Web site, a fighter jet, or a revolving door— for its intended purpose without getting hopelessly frustrated"—ease of use (Krug, 2000, p. 5). Usability has been a main focus of human-computer interaction (HCI) literature and design for many decades (Teo, 2003). Applications with good usability increase the chance that users will find the information they need, that they will understand more completely what is being offered, and that they will feel smarter and more in control when using the application (Krug, 2000). These benefits all contribute to the user finding value in the system and increase the probability of the user returning. Teo's (2009) research indicates that usability also produces positive benefits such as reduction in the number of errors, enhanced accuracy, more positive attitude towards the target system, and increased usage. Websites with low usability create unsatisfied non-returning users because of time loss and expended effort which leads to sites that cannot thrive or grow in the long-term.

Efficiency/Effectiveness

"Efficiency measures a web site's availability to help users get the required information quickly and easily as well as reduce irritations arising from extra information seeking effort and time" (Teo, 2003 p. 289). This trait is especially important for students because they are often on tight schedules, and the process of planning for their future is

already a stressful task in itself. "Irritation arising from offending effects or time wasted in using the Web site goes against users' value regardless of the type of Web site. Hence, the affect (feeling of satisfaction) and the cognition of the Web site's value may together influence Web user's attitude" (Teo, 2009, p. 285).

VDA Usability

A usable website is "made for humans, forgiving, accessible, self-evident, predictable, efficient, and trustworthy" (Bowles, 2011, p. 7). When designing the UX for the VDA it was important to understand that users habitually "glance at each new page, scan some of the text, and click on the first link that catches their interest or vaguely resembles the thing they are looking for" (Krug, 2011, p. 21). The VDA needed to be easily understood without much reading or prior knowledge of the program. To achieve this, introductory information screens were added to each page when the user first arrives at a page. Because users do tend to click through these coach marks before completely understanding them, they are stored in the top right info button for the user to access whenever he/she needs them again.

Other usability built into the VDA includes progressive disclosure through clickable. Once the user realizes that they are encouraged to click and interact with items on the page, they will be able to reveal information they need as they need it, rather than all the data being cluttered on one page or buried in multiple clicks. For instance, on the My Track Page and What If page (see Figures 33 and 35), tapping on the course nodes reveal more information relating to that specific class, and tapping it again hides the information. The user is also prompted to swipe back and forth through time with their degree path on these pages. The nodes are partially cut off beyond the screen-view,

implying that there is more information that can be revealed. The drag and drop interaction is included on the What If page to enforce the idea that the student has the control the move classes from one semester to the next and experiment with their schedule—it is no longer a static plan.

Rich Internet Application

When designing the VDA, it was important to consider what media the application would be delivered in. While the prototype was developed in an iPad mock-up, a Rich Internet Application (RIA) would be the intended final product because of its abilities for interactivity, responsiveness, richness, and ability to be available on more than one platform. An RIA is a "web application or web-based system that can easily be reached through the internet (via web browser) and normally is a task-oriented page" (MohdTuah, 2010, p. 219). These applications are known to "offer support for validation and error handling, drag-and-drop functionality and richer controls like calendars and sortable lists" which are all utilized in the design of the VDA's interface (Alexandru, 2011, p. 603). In recent years, RIA's have become so powerful that they have incorporated virtually all of the capabilities of desktop applications. This platform provides real time and updated information, eliminates the multi-screen interface, and, instead, offers a single application view while reducing interactions with business processes (Sireteanu, 2011, p. 601). Because users do not have a high tolerance for wait times, the use of an RIA system will reduce this problem because, by nature, RIA's reduce the server and network burden on resources (MohdTuah, 2010).

Design Methods

Design, or the aesthetics, can be defined as "users' responses to the visual appearance of a product or system and their relationships with other properties" (Lee, 2013, p. 689). Design can often be a subjective subject, like fine art; however, with Communication Design, there are design theories and tried practices that have been proven to qualify as "good design" and effective communication devices. One such theory, used in the design of the VDA is the Sequence of Cognition:

"The science of perception examines how individuals recognize and interpret sensory stimuli. The brain acknowledges and remembers shapes first. Visual images can be remembered and recognized directly, while words have been decoded into meaning. Reading is not necessary to identify shapes, but identifying shapes is necessary to create. The brain acknowledges distinctive shapes, which make a faster imprint on memory. Color is second in the sequence. Color can trigger an emotion and evoke a brand association. Distinctive colors need to be chosen carefully, not only to build brand awareness, but also to express differentiation. Companies, such as Kodak and Tiffany have trademarked their core brand colors. The brain takes more time to process language, so content is third in the sequence behind shape and color" (Wheeler, 2009, p. 9).

This sequence was important to consider when developing the VDA because measuring the speed of the user's understanding of this new display of the degree information is imperative when determining if the application is actually easier or more helpful for students. The Sequence of Cognition was imperative when developing the visual language for the course nodes on the My Track and What If pages (see Figure 24).

Trapezoids and hexagons were used to delineate between foundation-level courses and

upper level courses in both the major and minor classes. The rectangles were used

exclusively for core classes. The second part of the sequence, color, was then applied to

differentiate between major, minor, and core courses (turquoise, dark blue, and black

outline). Finally the language, or writing of the course numbers and class names were

applied to the colored shapes to add the next level of information. This method puts

emphasis on shape and color to enhance understanding whereas the former DA used only

written language as its primary communication method.
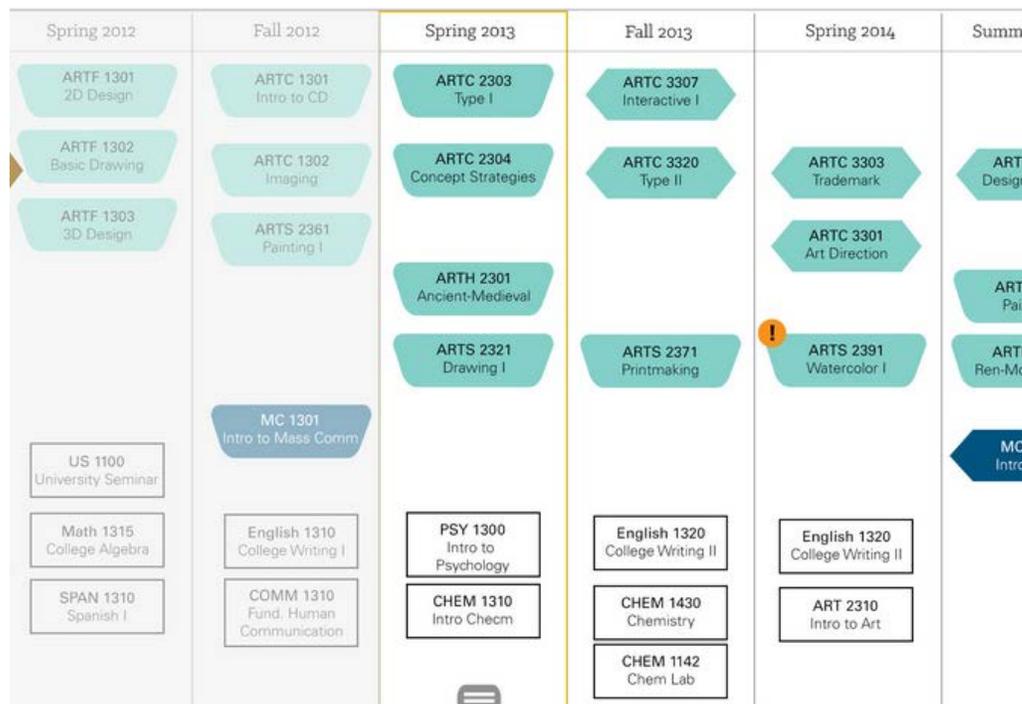
Figure 24: My Track page application of Sequence of Cognition

Another crucial Communication Design method was applied to the VDA was

visual hierarchy. Creating a clear visual hierarchy helps to clearly and accurately portray

the *relationships* between items on the page and give the audience a visual cue of what

items are most important or related to each other (Krug, 2000). "Dividing the page into

clearly defined areas is important because it allows users to decide quickly which areas of the page to focus on and which areas they can safely ignore" (p. 36). While it is not the goal to allow the user to ignore any feature of the VDA, as explained before, it is a habit of users to skim a page and tap the first item they think is important. With this knowledge, creating a visual hierarchy was important so that the VDA's design could lead the user to the most important information first. Hierarchy was achieved by setting up a primary left navigation which is large, colored, and always visible on the page. Each page also includes wayfinding in the top bar indicating which page the user is currently on using a color strip and a title. Additional visual hierarchy is achieved by utilizing font, font size and weight, and placement on the page—simply stated, the flow that the user's eyes is drawn through, mimics the flow of data importance on screen.

Prototyping

Because the goal of the VDA is to develop a visual and more useful DA for the current students of Texas State University, it was necessary to list and categorize all of the features of the current DA. This was done by systematically breaking down the DA by listing each feature on an individual sticky note, and grouping them by categories on a white-board (see Figure 25). When completed, it became obvious that the categories were somewhat convoluted. Profile information and What If features were the most defined groups of features, however, class requirements, "look ahead" features, and other miscellaneous features such as the GPA calculator were simple utilities with few sub-features.
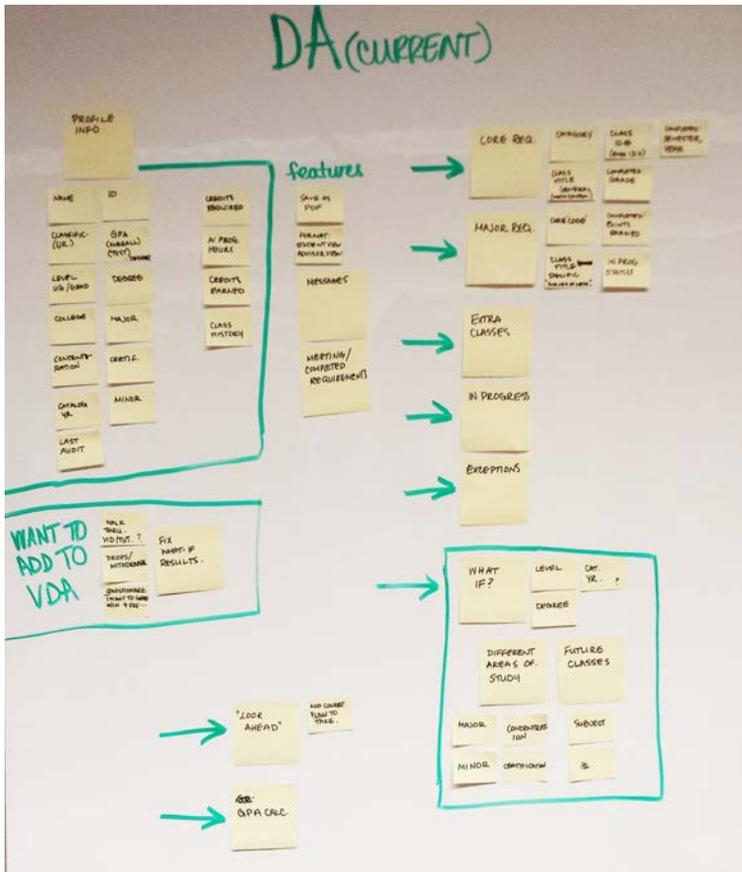
Figure 25: DA sticky note process
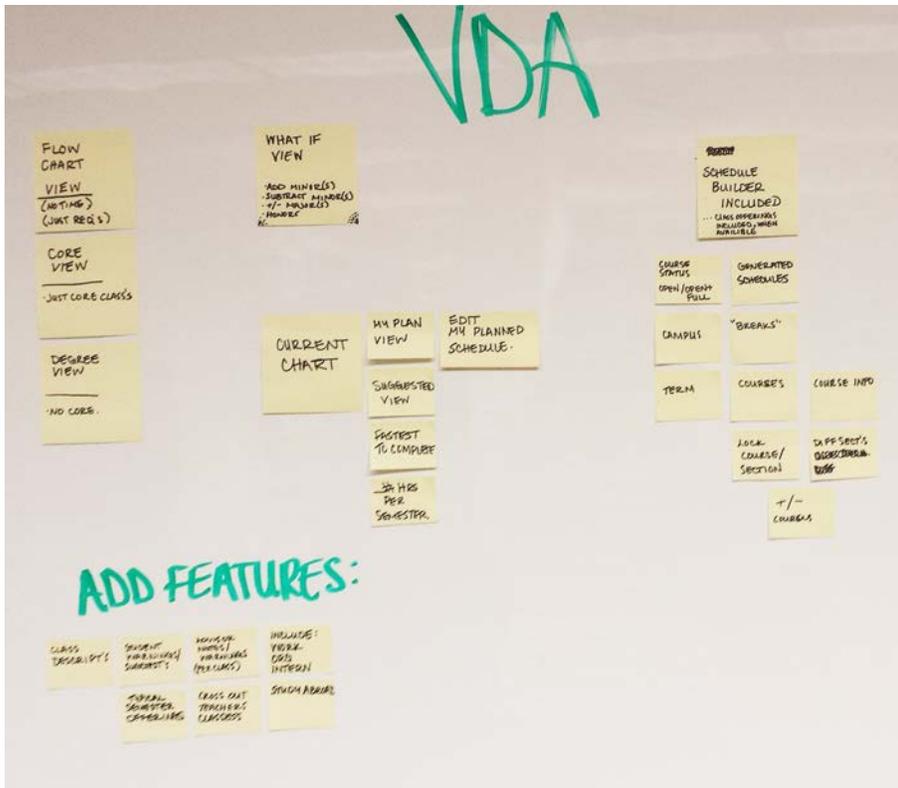
Figure 26: VDA sticky note process

The next step to developing the concept for the VDA included identifying new

features that needed to be added to the VDA and combining all of these features into an

interface that was easy to comprehend and use (See Figure 26). The VDA organized the

features into five sections—My Profile, My Track, What If, Schedule Builder, and Other

Resources. The first three pages were the main focus for the purpose of this thesis.

Figures 27-35 show the wireframes and final designs developed while designing the

VDA.

The My Profile page houses all of the personal academic information of the user

(see Figure 32) such as his/her current standing, declared major/minor, GPA, etc. It also

serves as a portal for the student's current progress in his/her degree.

My Track is a view of the student's current degree plan. As seen in Figure 34, every semester until graduation is shown with course "nodes" denoting each semester. The first time the student uses this application, the semesters will be pre-populated in an order related to the catalog's suggested schedule, but, over time, the user will adjust their personal timeline and class nodes to their preferences and own planning—this will be explained in later sections.

The What If page is where students are encouraged to experiment with their degree plan (see Figure 35). Their current plan is visible in the same way it was displayed on the My Track page, but, on this page, users are able to drag-and-drop courses to different semesters and add elective classes outside of their declared (or newly picked) major/minor. As the students experiment with moving their classes into different semesters, they are able to save different versions of their plan—this feature allows them to quickly compare their plan options. When they are satisfied with their plan, they can save as My Track to commit the changes and set it as their main plan on the My Track page.

Each of these pages have features that were designed to address the issues previously mentioned in this paper—condensing the resources into one useful location, creating an interface that allowed for more big-picture degree planning, and more advisor/student communication and interaction. The first challenge of making the VDA the student's comprehensive resource for degree planning was solved in a few ways: the catalog information was dispersed into the interface by providing suggested schedule views and by tapping on an individual classes to view their descriptions (Figure 36). The full online catalog is also provided as a link in the Resources tab. As previously

mentioned, one resource students gather information from, is through the personal guidance they receive from upperclassmen and from advisors with "off the books" advice, or recommendations they have learned from experience with other students. This information may not be classified as official department/catalog content. Currently, this advice could only be collected by conversation and happenstance of talking to the right person. However, the VDA provides a platform where for these tips can reside in. When the user taps on a class or pulls up the info drawer on the My Track or What If pages, the middle column of the screen is reserved for comments. These comments can be left by students, advisors, and the user at any time during their university career. Users can also filter the view of the comments to only advisors or students. Department advice or set catalog requirements are also integrated in the VDA's warnings. Warnings show up on the corner of a class node as small orange bubble with an exclamation point. When the student taps on one of these bubbles, they can view the warning (see Figure 38). Warnings would show up on the class nodes only when they are moved to a semester that causes an issue such as before a prerequisite is completed, there are more than the recommended hours being taken, or when the class is normally offered in a different semester. These warnings are a little more formal than the comments, because they would need to be approved by the department and coded into the class itself to show up.

The second concern the new VDA addresses from the old DA, is the narrow scope that degree planning currently resides in. The VDA aims to expand the view of students to a more complete picture of their degree path rather than just planning for the next couple of semesters ahead. This is accomplished in a few ways. On the My Profile page, all of the progress and requirements of the entire degree(s) are displayed in graphs,

which break down the requirements into segments. As seen with the progress bar, users

are compelled to view how many hours they have in relation to the total number of hours

required and how many they have left to complete the bar. Each section of the major and

minor are also viewed as graphs being filled to their completion. Even the course list is

viewed as a whole, all of the classes required are listed, and completed courses are

crossed off as they are completed. The My Track and What If pages are also designed to

encourage the user into thinking long-term. This is achieved by laying out each semester

with the required class nodes until graduation (see Figure 34). By populating the

semesters with every requirement the student needs to graduate (based on their declared

major/minor and previous completed courses, etc.), the user is encouraged to look ahead

and plan their semesters in relation to others. Another critical feature that assists with

long-term planning is the prerequisite arrows. These arrows, or "links" as they would be

called in graph theory, represent the prerequisite trail that is required. For instance,

ARTC 2303 (Type I) is required before ARTC 3320 (Type II), therefore an arrow is

placed connecting the two course nodes together. These links are not user-editable and

actually "stick" to each node as they migrate semesters. Type I and II's prerequisite links

may be easy to understand, but often, co-requisites and multiple prerequisites per class

are evident in degree requirements. The web of classes can get complicated, and it can be

difficult to remember the intricacies, so these arrows help keep that information within

the application rather than requiring the user to remember them as the previous DA

requires. The links also help the student understand what they *should* take in a certain

semester and also help determine which classes the student has flexibility to customize in

their schedules. For instance, a student my opt to take Type II next semester over a core

class with no prerequisites, because Type II is required before two other major classes can be taken; the core class can be completed in any semester and may be more better taken at a later time. The final way that the VDA helps the users think of their degree in a larger scope is through the Goals feature on the What If page. When the students are experimenting with their degree, many have set goals for their college career, including their goal GPA, whether or not they want to be in Honors, and their graduation date. With the Goal's pane (Figure 37), students can set these goals and view how they affect their overall timeline and degree path. This allows users to understand the viability of their goals, or even show them that new goals are possible that they did not think were possible before.

The final problem that the VDA aimed to improve was to increase the student-advisor communication. As indicated by Texas State students, most students only talk with their advisor one time per semester when they are about to register or when there is a vital issue with their DA. The VDA seeks to create a more open conversation between the two parties by including a Question Bank in its interface (Figure 39). This Question Bank is on every page of the VDA and is meant for students to be able to write and save any questions they may encounter while using the VDA, whether it be viewing, planning, or more for general questions. Students can then either set up an advising appointment with these questions or send them to their advisor via the application—as an email. Ideally, if the question can be answered via email, the advisor would reply directly, and if the question poses a bigger issue or is difficult to answer via email, the advisor would encourage the student to set up an appointment where the specific question can be addressed.

Figure 27: VDA initial wireframe for Profile Page layout
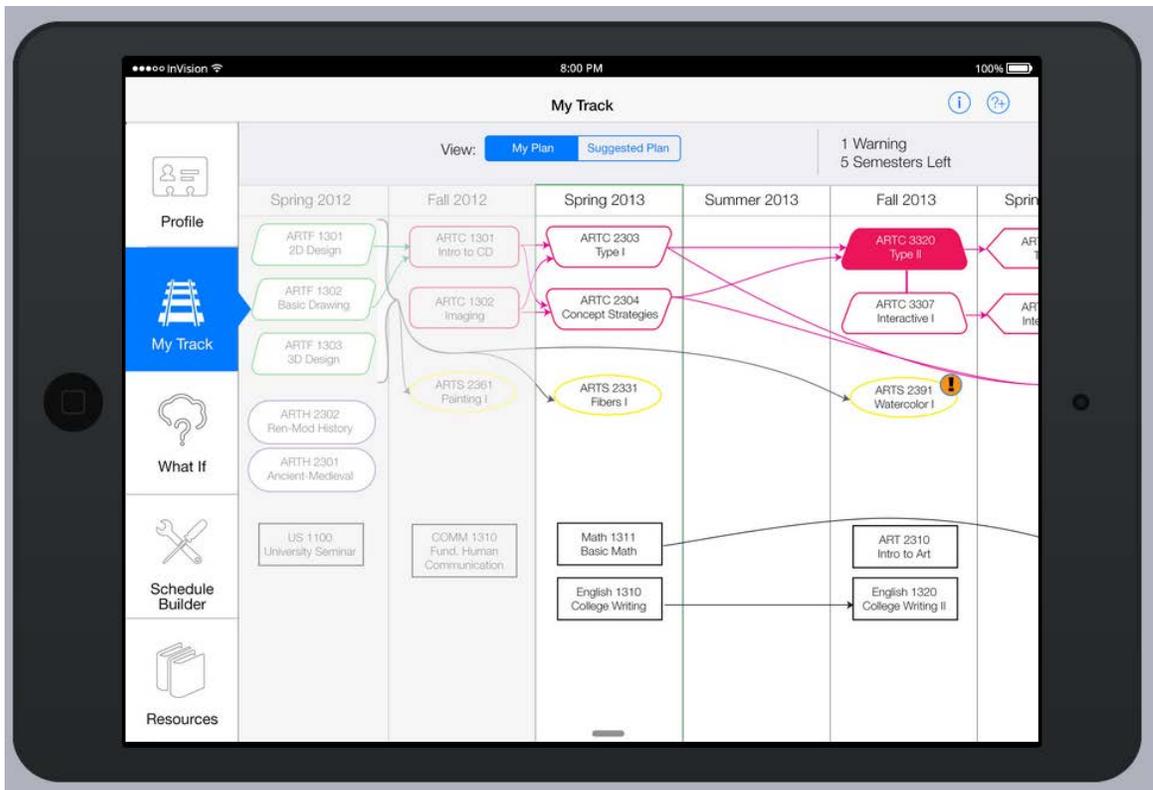
Figure 28: VDA initial wireframe for My Track Page layout
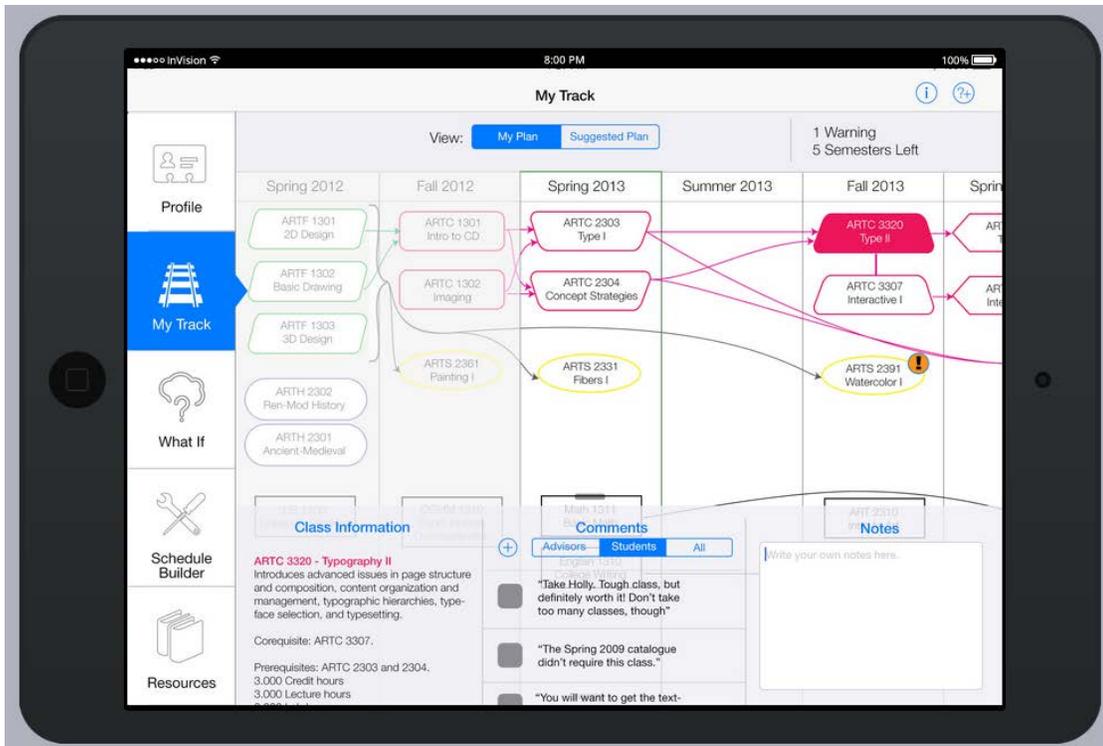
Figure 29: VDA initial wireframe for My Track Page drawer
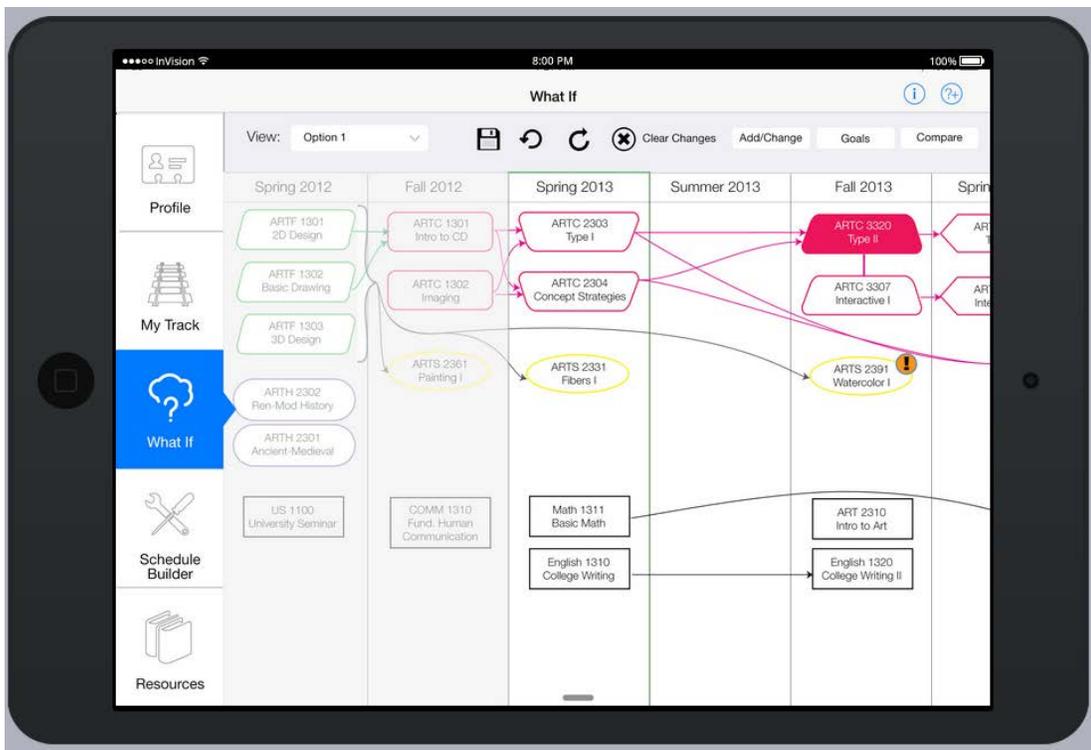
Figure 30: VDA initial wireframe for What If layout
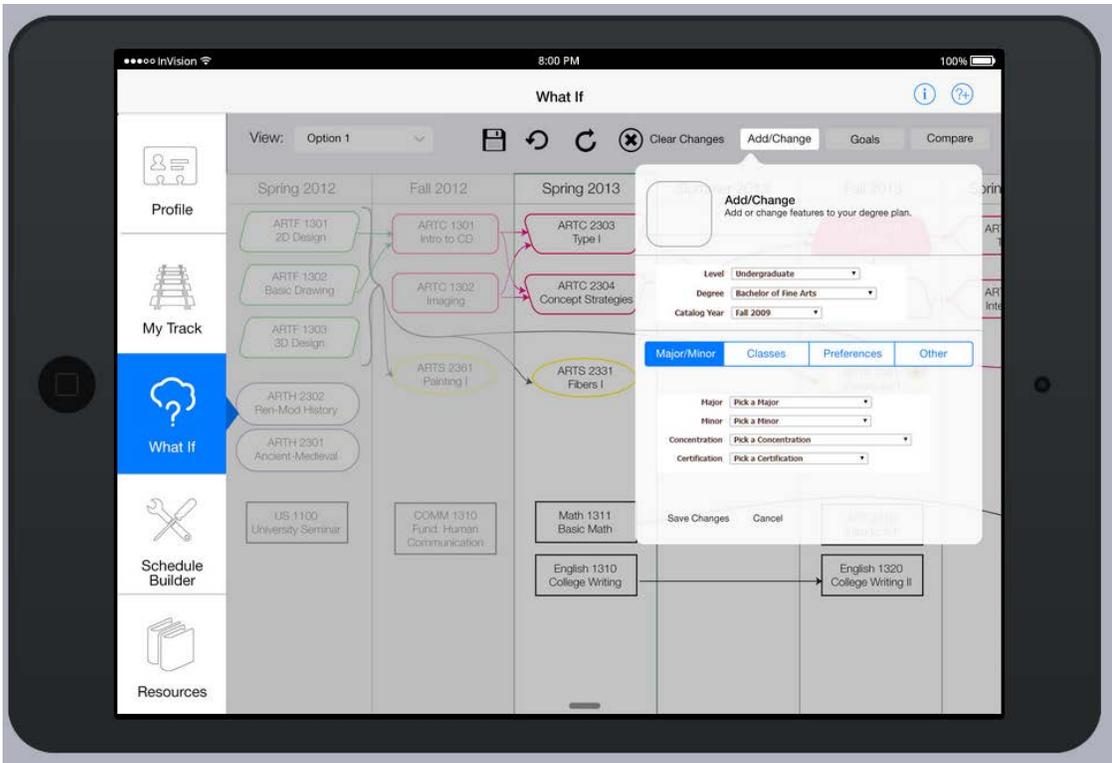
Figure 31: VDA initial wireframe for Add/Change options

Figure 32: Final VDA design for Profile Page

Figure 33: Final VDA design for My Track Page
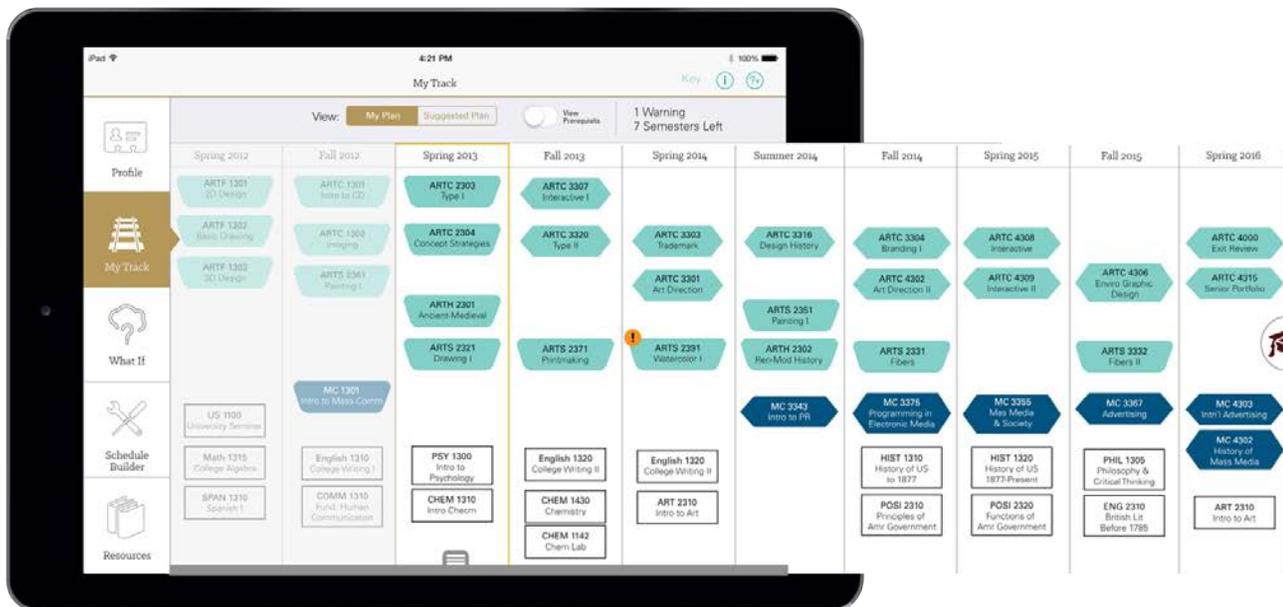
Figure 34: Final VDA design (expanded) for My Track Page
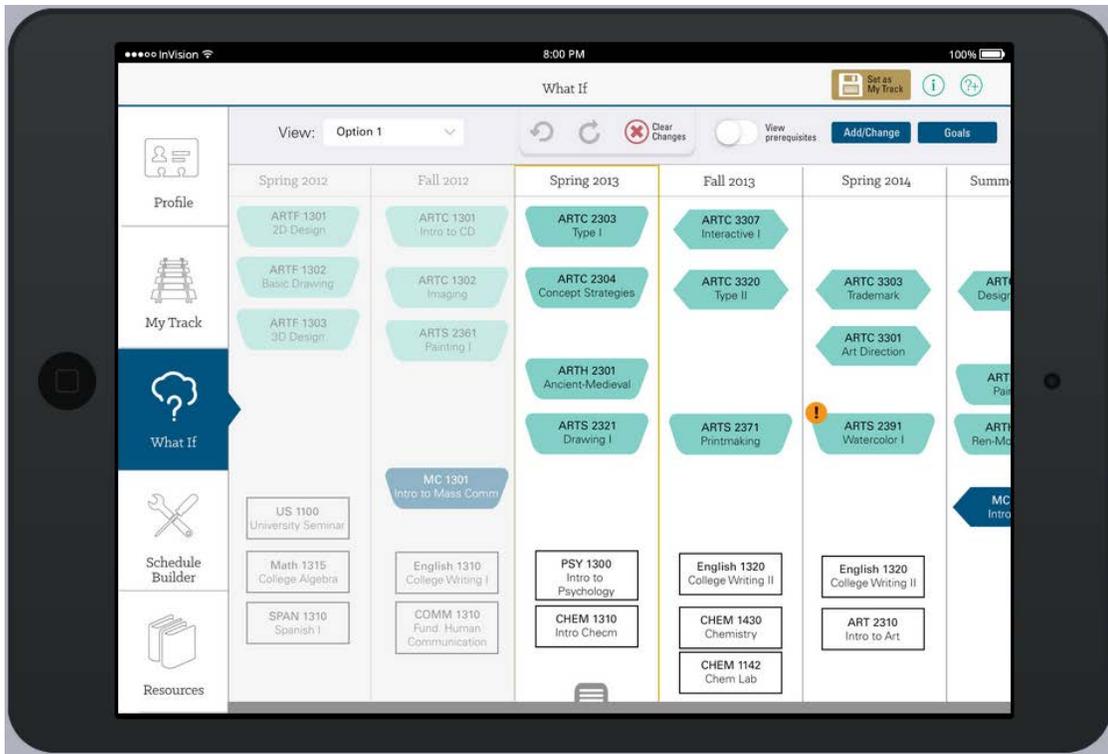
Figure 35: Final VDA design for What If Page

Figure 36: Specific class details
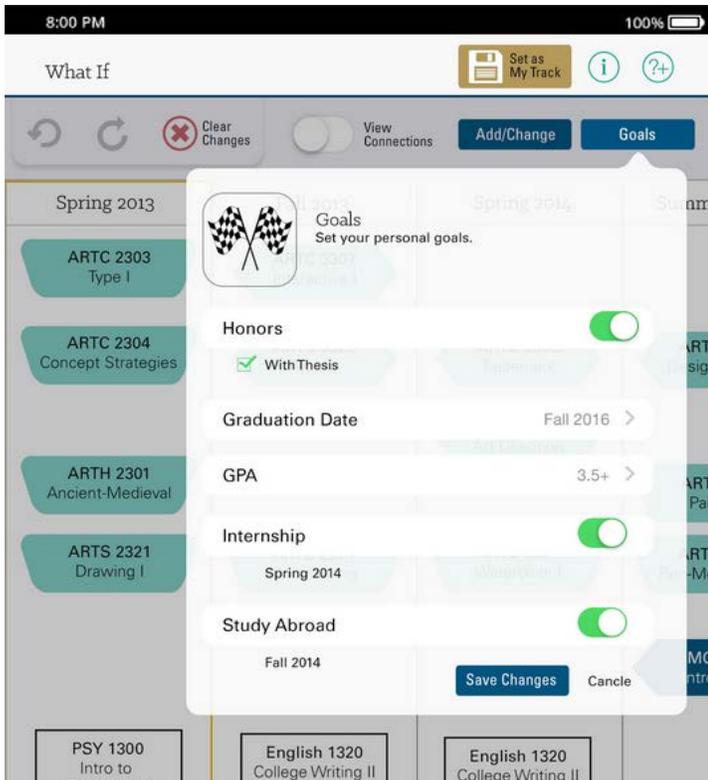
Figure 37: Goals Pane
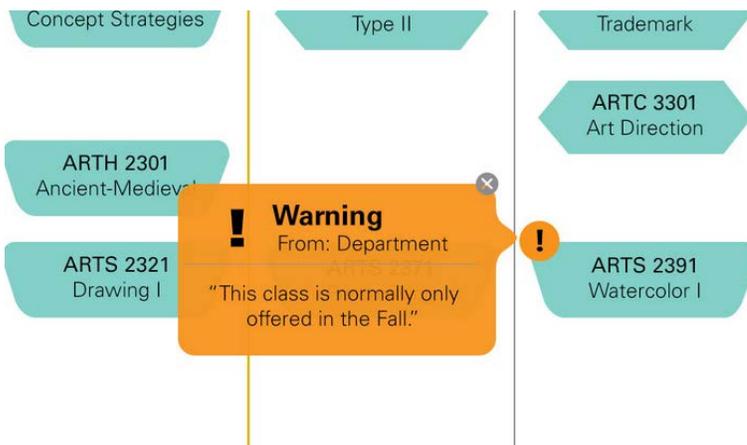
Figure 38: Warning bubble detail
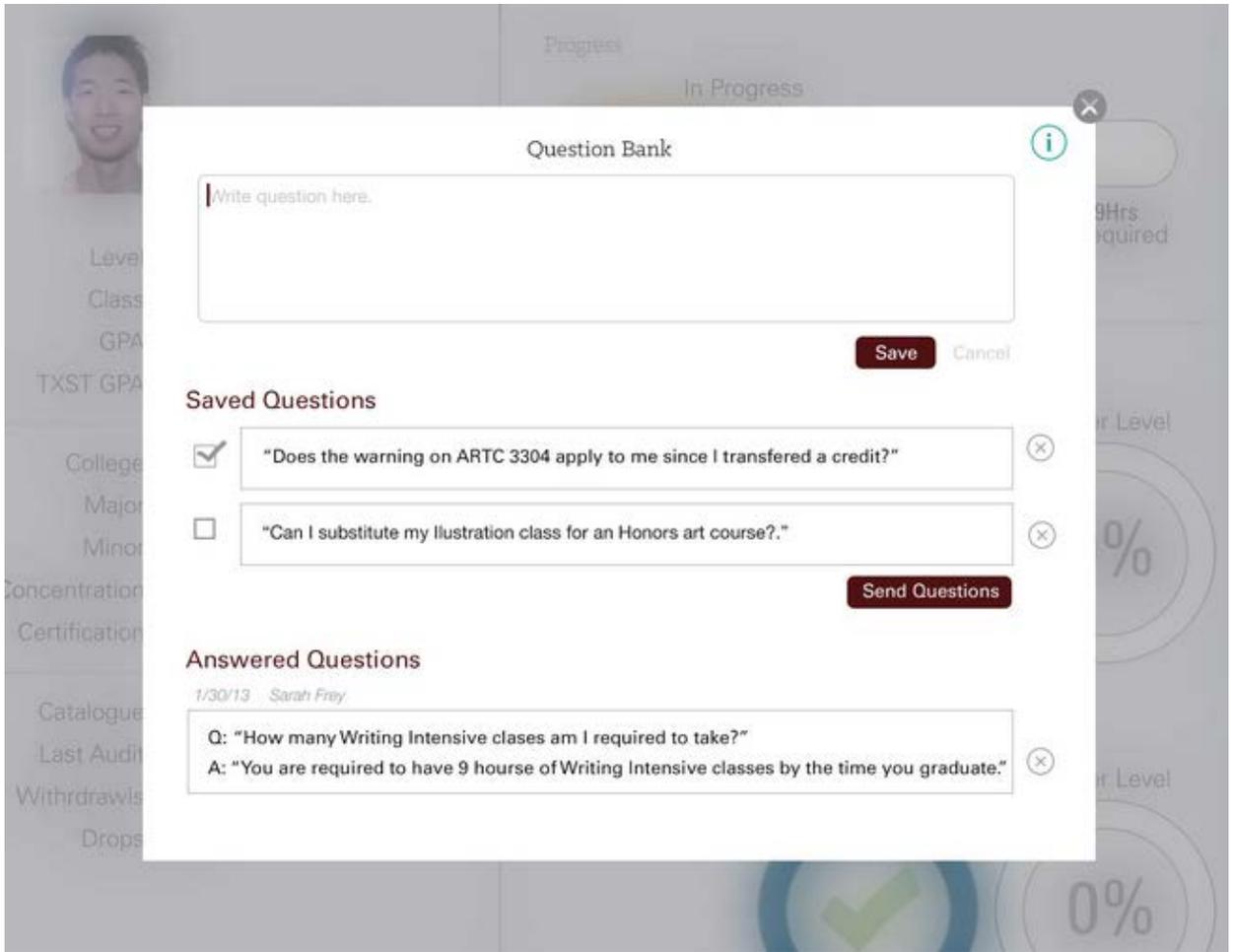
Figure 39: Question Bank
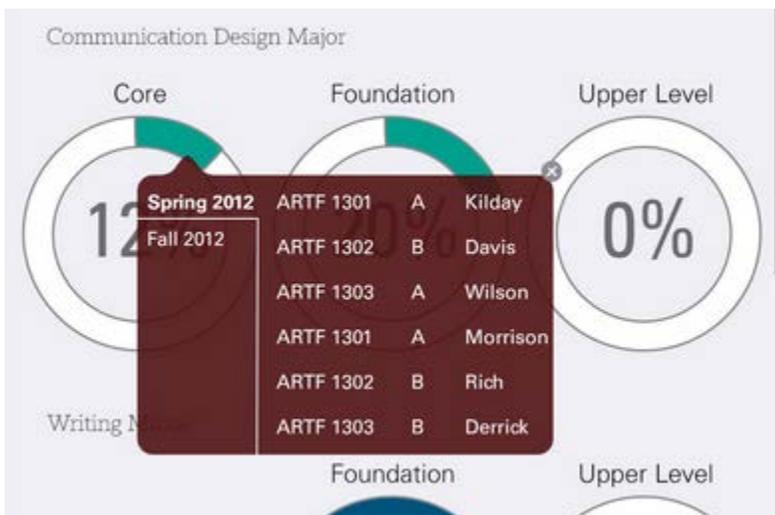
Figure 40: My Profile Page Detail

Chapter V

TESTING

An online prototype was used to user-test the VDA on an exploratory group of

five students. It was set up using a web application called inVision, which is designed to

help designers make interactive prototypes of mobile and desktop applications without

diving into the technicalities of coding. It allows the designer to upload screens that can

then be turned into clickable hotspots that imitate the interaction that a user would have

with the application. Because this study's goal is to determine if the VDA is successful in

its design and concept, this preliminary stage of creating an application is appropriate to

test on. To view the prototype used for application testing, visit the website:

http://invis.io/7DPRCGNM

At the end of the preliminary Gap Analysis survey, participants were asked if they

would be willing to participate in further user testing. Willing participants were contacted

via email for the one-on-one prototype user testing. Users were then told that, for the

purpose of this test, they were being converted to a Communication Design major and

Mass Communication Minor at Texas State—a major/minor they were not familiar with

on a system they were also not familiar with—thus creating a situation that is

fundamentally the same position a new student would find themselves in at the beginning

of their college career. Initially, the subjects were asked what questions they now have,

knowing they are starting a new unknown degree plan (these questions were used later in

the evaluation). The participants were then moved to the prototype on the computer and

asked to use the application as they would as a student trying to learn more about their

new major/minor. They were also asked to verbally narrate much of their actions

including any comments, concerns, or questions as they worked through the application's

features. The testing process progressed through each page of the application

sequentially, initially allowing the student to explore the page's features. After the

student seemed to finish considering the page's features, the test administrator began to

ask degree-planning related questions to see if the student was able to complete the task

and if so, how much time on task and how easy it was for them to complete the task. A

sample questions for the profile page included: "how many credits do you have left to

graduate?" and "what core courses do you still need to take?" See Appendix B for the

complete testing script.

The What If page was initially tested in the same manner as the Profile and My

Track pages, in that the student tapped through the introductory slides and was allowed to

explore the page before the administrator intervened. Because inVision is limited in its

ability to illustrate drag and drop features, some of the What If features had to be

visualized using a different web application called Lucid Chart. This application is

traditionally used as a diagramming program; for the purposes of this study, it was used

to illustrate the "flow chart" style class nodes and pre-requisite links. Because the

application keeps the connections of the prerequisites attached to each node as it is picked

up and dropped to another position, it was able to effectively prototype the interactivity

that the What If page was designed to include. The administrator helped explain the

correlation to the test participant.

These first three pages: My Profile, My Track, and What If, were prototyped

extensively for evaluation of the VDA's validity and success in its goals to create a visual

version of the current degree audit and better assist in degree path planning. However, the

final two pages were included to demonstrate that the VDA is designed to provide all of the resources necessary for the student's planning process. The Schedule Builder's page and Resources page were shown to users and their purposes were briefly explained after the user was allowed to observe the interface. No user testing was performed on these two pages.

Next, the questions that the user previously provided when asked what questions they initially had about their "new" major and minor were stated again, and the user was asked if the VDA had answered those questions. Finally, participants were asked if they had any other suggestions or remaining questions before the guided-user test was completed. To conclude the session, subjects were asked to complete a final post-evaluation survey online.

Evaluation

User Test

During the user tests, the subjects' time on task, program understandability and tendencies were observed to gather insight into the successes and weaknesses of the current prototype of the VDA. Participants were also asked to verbally mention any thoughts they had while interacting with the VDA.

User A, a freshman nursing major, seemed to understand the functionalities and information displays of the VDA very quickly and correctly. She answered each of the task-based questions quickly, navigating the interface with purpose. The user was very excited about the prerequisite arrows and commented twice on the helpfulness of this feature. When asked about what she would do if she saw something incorrect on her path and needed an override (question #9), the user answered that she would instantly contact

her advisor, rather than use the question bank feature that the question was designed to test. While the VDA does feature the question bank, designed to help facilitate better communication between the advisor and the student, the fact that the user would already go straight to the advisor indicates that the question bank may be an unnecessary feature. However, after the test administrator explained the purpose of the feature, the user said it could be helpful, now that she understood its function. At the conclusion of the user test, User A commented that she considers herself a visual person and that this VDA is friendlier to her learning style. She also enjoyed the "playing" aspect of the drag and drop features that the What If page provided.

User B, a sophomore physics major, was a little slower to grasp the program than User A. On the profile page, she gravitated towards the course list display rather than the visual graphs to answer the test questions. When asked how far along she is in her chosen degree, she answered 20%, the amount that the VDA was showing she had completed of foundation courses. After a couple more questions on this page, the user realized she had overlooked the progress bar and was then able to track back and answer the questions more correctly. She commented that the display of how many drops and withdrawals was a feature she found helpful. As User B moved to the My Track page, she seemed to grasp the VDA much more—she was able to answer the questions quicker and more correctly. This suggests that the VDA was quickly learnable. She also commented that she "really liked" the prerequisite arrows feature, and she mentioned many times that the warning bubble is an element that she found extremely helpful. Similarly to User A, User B answered that she would directly talk to an advisor about an issue on the VDA. Upon further questioning from the administrator, the user found the question bank and

understood its features. She also commented that she liked the feature in the question bank that allowed the student to send their advisor an email-like message within the program, because it skips the unnecessary steps of separate emails. While the users' first instinct was not to go directly to the VDA's question bank, this tendency could also indicate that the users are not inclined to look for a feature like the question bank because it is a completely new feature that does not mimic any other option on the current DA. To conclude the user test, User B was asked her general opinions. She mentioned that she liked that all of the resources are in once place because it is "annoying to go to different places" to get information, such as prerequisites and class names. She enjoyed that the VDA is "not as boring" as the current DA in its display and "liked the colors."

User C is a sophomore English creative writing major. During her user test, she clicked through the coach marks quickly, and consequentially did not completely understand the features—she mentioned that she tends to do this because she does not believe that they "can answer all the questions she would have anyways." This user also gravitated towards the course list to answer the question on the Profile page. User C had an issue with delineating the difference between the colors in the circle graphs (Figure 32). It was not obvious to her which color (blue or white) indicated her completed progress in the category. However, she commented that the progress bar was very helpful with understanding her degree path. As the test progressed to the My Track page, the user also mentioned that the arrows, while helpful, are a bit confusing because of their jumbled appearance in certain areas. She was able to quickly answer the questions on this page. This user also mentioned that she really enjoyed the comment feature built into each class node, the shape/color differentiation of the major, minor and core courses, and

the warning features. When asked the question about the question bank, User C answered similarly to previous users, in that she would contact the advisors first. When asked her overall opinion of the program, the user mentioned that she thought the VDA is more organized than the DA and that she thought many of the features are very helpful and something she would use for her degree planning.

User D is a freshman computer science major. During his user test, User D was able to answer the task-based questions in a reasonable amount of time with good accuracy. His overall method of viewing the program was slower and more methodical than the other users. This can best be illustrated by the time he took to read and comprehend the coach marks before entering each page. On the My Track page, when he turned on the arrows, he suggested using color-coded arrows to help distinguish them when they got close to each other. This seemed to be his most prevalent discomfort with the VDA. User D called the warning bubbles "definitely helpful". He was also able to very quickly figure out what classes he needed to take before each other. This user had many helpful suggestions for feature inclusions, such as adding a button to the question bank that allows the student to set up an advising appointment within the VDA and adding other academic resources such as the hb2504 link and SLAC lab information (tutoring/academic service offered at Texas State). User D commented that the VDA is much more visually appealing when organizing the information.

User E is a junior business exploratory transfer student. He was able to quickly identify how far along he was in his major during the user test. Although User E performed math to answer the question of how many hours he had left to graduate, he was able to arrive at the correct conclusion. He also went directly to the course list to find

how many classes he still needed to take. He later mentioned that he did this because it was less clicks than the VDA's added feature of clicking the circle graphs for the answer. He was also able to quickly answer many of the questions on the following pages. When asked about adding honors with a thesis, User E had difficulty finding where to add it to his plan. When he did find the feature, he commented that he was not sure that he would consider honors as a "goal" as it is categorized in the VDA. As a transfer student, this user had other suggestions on how to make the VDA more helpful for transfer students, such as the inclusion of a link to accepted transfer classes in the Resource page, an indication of when you are eligible to enter the college based on requirements, or have a feature that helps find helpful electives to fill spaces in schedules. These are features that he indicated he wished the DA had and that would be helpful to include with the VDA.

Data Evaluation

To evaluate the VDA's success in its goals to be the one-stop tool for all degree planning and decrease the student learning curve while providing the student with more control, the results of the exploratory group's preliminary survey about the DA were compared to their post-user test survey answers about the VDA. Both surveys feature five point Likert scale questions; see Appendix C for complete responses. Additionally, the comments and actions of the user-test participants were analyzed (See Table 1 and Figure 41 for comparisons).

In the post-evaluation survey, the same questions from the original gap analysis of the DA were asked about the VDA. This post survey showed that 100% of participants responded that they agreed that the VDA was helpful. The exploratory group's mean for the DA's helpfulness was 3 while the mean for the VDA's helpfulness was a 5 (1=False,

2=Somewhat False, 3=Neutral, 4=Somewhat True, 5=True). This indicates that the VDA

is successful in being more helpful than the DA. The mean for the VDA's

understandability was a 4.8, which is higher than the 2.6 mean from the gap analysis of

the, indicating that the VDA is easier to understand than the DA. The exploratory group

also believed that the VDA was generally easier to understand in comparison to the

current Texas State Degree Audit and resources (x=4.8). The post-evaluation survey

revealed that the participants responded that they were able to easily find the information

they needed using the VDA (x=4.6) and that the program is more efficient than the DA

(x=4.8). Additionally 100% of the VDA users responded that they would use it again

(x=5)—a higher mean than the DA received at 4.2. Users were asked if they enjoyed their

experience and if they were satisfied with their experience: for both questions, the VDA's

mean was the highest rating at 5, while the DA's mean of satisfaction was only a 3.4, and

the mean of enjoyable experience was 2. This response indicates that the VDA is

successful in being a more enjoyable and satisfying experience than the current DA. One

hundred percent of VDA users also believed that the program was more visually

appealing than the DA.

Resources

One of the main concerns with the current degree planning system was that

students had to pull information from multiple provided resources that are often

incomplete and redundant. When asked if the VDA provided all of the resources they

would need for the purposes that they would use it for, the participants responded with a

mean of 4.8 out of 5. To determine if the information provided was displayed in a way

that is as helpful or more helpful for students than the current system, the participants

were asked if they felt they understood their degree paths more clearly than prior to using the systems. The VDA users responded with a 2 point higher mean than the DA's mean of 2.8 (VDA x=4.8). According to this data, the VDA helps users understand their degree path better than the DA. When asked if the programs provided answers to their degree path questions, the exploratory group responded with a mean response of 3.2 for the DA, but jumped to a higher mean of 4.6 for the VDA indicating that the VDA is a more successful question answering resource for students. The exploratory group responded 100% in agreement that the VDA is more helpful when planning a degree path than the current DA and other Texas State resources (x=5). These participants also responded that the VDA 100% truly helped them understand what classes they needed to take (x=5).

Scope

In its design, the VDA was attempting to accomplish a larger scope of degree planning than the current system encourages students to think about. Firstly, the exploratory group was asked if they thought that the VDA's added feature of being able to plan for the entirety of their degree is helpful: the participants responded that the VDA's future planning is 100% true in its helpfulness (x=5). After using the VDA, users responded with a mean of 4.8 that they believed the program helped them have a broader scope of degree planning than the DA. The VDA also proved to help the participants better understand when to take their classes than the DA (x=5). The post-evaluation survey results show that 100% of the participants felt that the VDA gave them a better understanding of how long it would take them to graduate (x=5), 2 points higher than their opinion of the DA (x=3). The exploratory group also showed that they had a better understanding of what classes they needed to graduate (x=5) than with the DA (x=3.6).

Interactivity

Finally, increasing the interactivity and control a student has with their DA and the advisor-student interaction were goals that the VDA aimed to accomplish with its design. After testing the VDA, users felt confident that they could make future decisions about their degree path with a mean response of 5 (100%), a higher response than the DA's 3 with the exploratory group. These users also felt that they had more educated questions to ask their advisor after using the VDA (x=4.6) than with the DA (x=3.8).

==	DA (all surveyed)	DA (exploratory group)	VDA
When using the program for the first time, I understood how to use it.	2.28	2.2	4.8
When using the program for the first time, I found it helpful.	4.35	3	5
When using the program for the first time, my experience was enjoyable.	3.47	2	5
After using the program for the first time, I was satisfied with my experience.	3.8	3.4	5
After using the program for the first time, I understood my degree path more clearly than previously.	4.18	2.8	4.8
After using the program for the first time, my questions about the degree path were answered.	3.66	3.2	4.6
After using the program for the first time, I had a better understanding of what courses I need to take than previously.	4.16	3.6	5
After using the program for the first time, I had a better understanding of how long it will take me to graduate than previously.	3.62	3	5
After using the program for the first time, I felt confident in my ability to make future decisions about my degree path.	3.94	3	5
After using the program for the first time, I was satisfied with the information provided.	3.91	3.8	4.8
After using the program for the first time, I would use it again.	4.63	4.2	5
After using the program for the first time, I had more educated questions to ask my advisor.	4.27	3.8	4.6

Table 1: Likert Scale responses from Gap Analysis survey and Post User-test evaluation survey
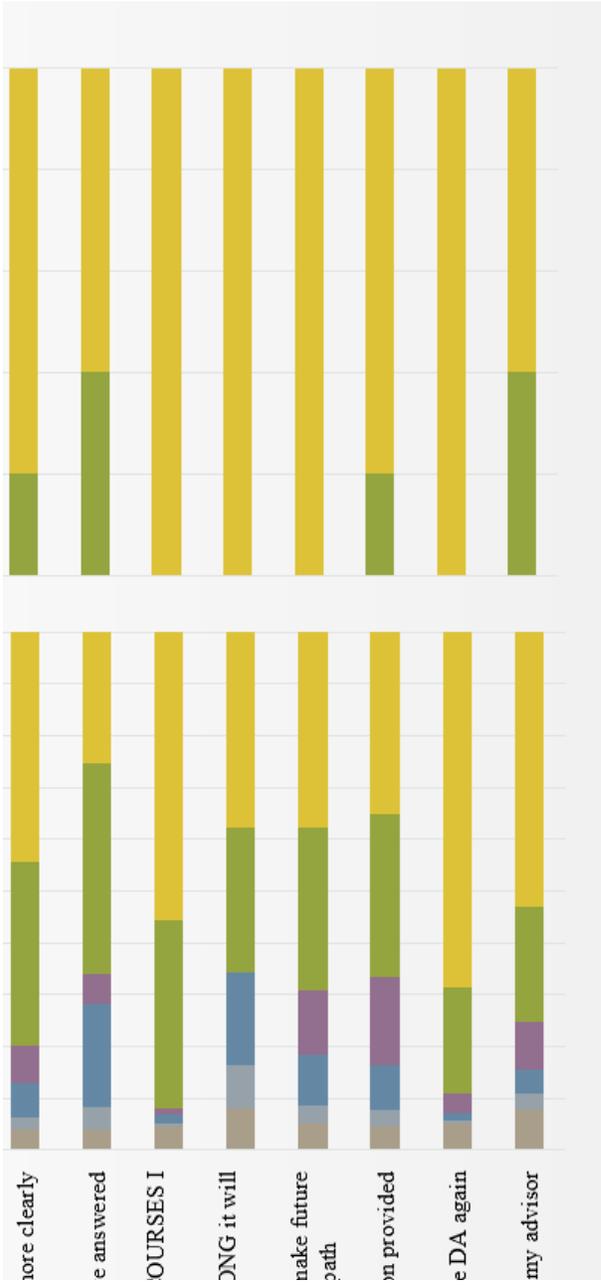
Figure 41: Comparison of DA Gap Analysis survey answers to VDA post-test evaluation survey responses.

Chapter VI

CONCLUSION

This study documented the design and construction of a comprehensive visual tool, the Visual Degree Audit (VDA), which addresses and resolves the limitations of the current degree-planning resources at Texas State University. After administrating gap analysis surveys of the current Degree Audit (DA) system, user tests of the VDA, and comparing the results of the post evaluation surveys, it has been suggested that the VDA is successful in decreasing the student learning curve while increasing students' knowledge, efficiency, and personal control over their higher education journey. It was able to provide a comprehensive resource application for students to access the information they need to plan their degrees in one place. Also, the VDA proved to widen the scope of degree-planning from a semester-semester mindset to a more comprehensive view of a college career. Additionally, the VDA was successful in providing a more interactive, controllable interface for students to gain control of their personal ambitions and a platform to allow for a stronger advisor-student relationship.

Future Research

With the indicated success of this preliminary study and development of the VDA concept, future research should include further and more extensive user-testing of a higher number of students to determine if the VDA is successful in successfully helping the majority of students and majors. Additionally, to gather more comprehensive data, the tested VDA should be at least primitively developed by a programmer as to provide a more accurate version of the VDA's intended functionality.

The VDA also has several areas where it can be improved. Users seemed to tap through the introductory instruction/explanation coach marks before fully reading and comprehending the information, resulting in some confusion about how to use the application. This could possibly be resolved by developing a quick introductory "tour" video so that users could see the VDA's features in action to better grasp the application's usability with the first view. Other improvements include small usability and design changes and additions that were revealed during the user tests such as making the question bank button larger and more visible, adding more suggested resources, indicating majors' acceptance points, and altering the prerequisite arrows to be more readable.

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Appendix A: Gap Analysis

How familiar are you with your degree plan?

N/A, Undecided	Not familiar	Somewhat familiar	Familiar	Extremely familiar
0.52% 1	3.09% 6	19.59% 38	34.02% 66	42.78% 83

How many times have you used Texas State University's Degree Audit?

1-2 times	2-5 times	6-10 times	11+ times	Never used it
2.58% 5	19.59% 38	29.90% 58	43.81% 85	4.12% 8

How familiar are you with Texas State University's Degree Audit?

I have never used it.	I have used it, but am not very familiar.	Somewhat familiar	Familiar	Extremely familiar
4.12% 8	7.22% 14	17.01% 33	43.81% 85	27.84% 54

When using the Degree Audit for the first time...

	False	Somewhat false	Neutral	Somewhat true	True	N/A
I understood how to use the Degree Audit	10.82% 21	19.07% 37	13.92% 27	36.08% 70	15.98% 31	4.12% 8
I found it helpful	2.06% 4	4.12% 8	7.22% 14	32.47% 63	50.52% 98	3.61% 7
My experience was enjoyable	8.25% 16	10.31% 20	27.32% 53	27.84% 54	22.16% 43	4.12% 8

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After using the Degree Audit for the first time...

	False	Somewhat false	Neutral	Somewhat true	True	N/A
I was satisfied with my experience	3.61% 7	9.28% 18	16.49% 32	31.96% 62	34.54% 67	4.12% 8
I understood my degree path more clearly than previously	2.06% 4	6.70% 13	7.22% 14	35.57% 69	44.33% 86	4.12% 8
My questions about my degree path were answered	4.12% 8	20.10% 39	5.67% 11	40.72% 79	25.26% 49	4.12% 8
I had a better understanding of what courses I need to take to graduate than previously	0.52% 1	6.70% 13	6.19% 12	32.47% 63	50.00% 97	4.12% 8
I had a better understanding of how long it will take me to graduate than previously	7.22% 14	14.95% 29	15.46% 30	23.71% 46	31.96% 62	6.70% 13
I felt confident in my ability to make future decisions about my degree path	3.61% 7	9.79% 19	12.37% 24	31.44% 61	37.63% 73	5.15% 10
I was satisfied with the information provided	3.09% 6	8.76% 17	17.01% 33	31.44% 61	35.05% 68	4.64% 9
I would use the Degree Audit again	0.52% 1	1.55% 3	3.61% 7	20.62% 40	68.56% 133	5.15% 10
I had more educated questions to ask my advisor	3.09% 6	4.64% 9	9.28% 18	22.16% 43	53.09% 103	7.73% 15

Appendix B: User-Testing Script

1. For this study, you are a Communication Design major + Mass Communication Minor now. What are the first questions that that you consider?
2. How would you solve these questions using the current system?

Profile Page

3. How far along are you?
4. How many credits do you have left to graduate?
5. How many core courses do you still need to take?

My Track

6. How many semesters will it take you to graduate?
7. Are you eligible to take ARTC 3301 next semester? When?
8. Please tell me what the students think about Type II.
9. You see a class that you've already taken at community college, and you need an override, what do you do?

What if (Lucid Chart)

10. What *should* you take next semester?

What if (inVision)

11. You are considering adding Honors and want to graduate with Honors (thesis); How would you do this?
    o With the info given, are you able to make an educated decision whether or not you want to embark on the Honors path?
12. Restate answers from question 1

Post-Survey

13. Do you have any other questions/suggestions?

Appendix C: Post-Test Evaluation

When using the Visual Degree Audit prototype today….

	False	Somewhat false	Neutral	Somewhat true	True
I understood how to use the Degree Audit	0.00% 0	0.00% 0	0.00% 0	20.00% 1	80.00% 4
I found it helpful	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 5
My experience was enjoyable	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 5
It was easy to find the information I needed	0.00% 0	0.00% 0	0.00% 0	40.00% 2	60.00% 3

After using the Visual Degree Audit today…

	False	Somewhat false	Neutral	Somewhat true	True
I was satisfied with my experience	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 5
I understood "my"degree path more clearly than previously	0.00% 0	0.00% 0	0.00% 0	20.00% 1	80.00% 4
My questions about "my" degree path were answered	0.00% 0	0.00% 0	0.00% 0	40.00% 2	60.00% 3
I had an understanding of what courses "I" needed to take to graduate	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 5
I had a better understanding of how long it will take me to graduate than previously	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 5
I felt confident in my ability to make future decisions about "my" degree path	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 5
I was satisfied with the information provided	0.00% 0	0.00% 0	0.00% 0	20.00% 1	80.00% 4
I had educated questions to ask my advisor	0.00% 0	0.00% 0	0.00% 0	40.00% 2	60.00% 3
I would use this Visual Degree Audit again	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 5
I would recommend this Visual Degree Audit to a friend	0.00% 0	0.00% 0	0.00% 0	20.00% 1	80.00% 4

		0.00% 0	0.00% 0	0.00% 0	20.00% 1	80.00% 4
▼	For the purposes that I would use this program, all of the resources I would need were available in the program.					

Appendix D: Post Evaluation—Comparison

In comparison to my previous experiences with the current Texas State University Degree Audit and other degree planning resources, this new Visual Degree Audit....

	False	Somewhat false	Neutral	Somewhat true	True
would get me to communicate with my advisor more.	0.00% 0	0.00% 0	40.00% 2	20.00% 1	40.00% 2
allowed me to have a broader scope of degree planning (looking more into the future).	0.00% 0	0.00% 0	0.00% 0	20.00% 1	80.00% 4
allowed me to better understand WHAT classes I need to take	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 5
allowed me to better understand WHEN I needed to take my classes	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 5
is visually more pleasing.	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 5
is more helpful when planning my degree path	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 5
is easier to understand.	0.00% 0	0.00% 0	0.00% 0	20.00% 1	80.00% 4
is more efficient.	0.00% 0	0.00% 0	0.00% 0	20.00% 1	80.00% 4