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Ambition, Confidence, Focus and Academic Performance

An Interactive Qualifying Project Report

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by

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Abstract

This project is the culmination of three terms of preparation, research and analysis. It examines the origins and results of levels of focus, confidence and ambition demonstrated by students of the class of 2002 as they made the transition between high school and college. It considers trends concerning these levels by investigating academic performance of students at the high school and college level through the utilization of a dataset containing CIRP, MBTI, high school grades and WPI first-year grades. The paper concludes that confidence levels in students entering WPI are an indicator of their academic future.

Executive Summary

This project set out to investigate the origins and results of levels of focus, confidence and ambition demonstrated by students of the class of 2002. The trends concerning these levels were investigated with academic performance of students at the high school and college level through the utilization of a dataset containing CIRP, MBTI, high school grades and WPI first-year grades. The tools used to generate the results were SPSS and Microsoft Excel.

The paper concludes that confidence levels in students entering WPI are a strong indicator of their academic future. Levels of ambition and focus, though more difficult to determine and interpret, show considerable promise as indicators as well. Combining some of the factors produced strong correlations and would produce better results with a larger database to draw from. Combining data sets of multiple graduating classes is key to more conclusive evidence in the future.

Should the study be replicated in the future, developing more complete factors is essential. Most attention should be paid to further the developing of the focus factor. Each year, the CIRP allows schools administering the test to append between 10 and 20 optional questions of its choice. Using questions that would aid in further defining levels of ambition and focus in the student would be a very good way of developing these other factors.

Chapter 1 - Background

I. Introduction

This chapter will discuss how the project began and what problems were encountered along the way. There were many setbacks and adjustments that occurred throughout the study, but all were dealt with and the analysis of the data moved forward. The project began in the B-term of the 2000-2001 academic year and was completed in D-term. The original plan was to analyze "Self Image and Academic Performance". The focus of the study was transformed into "Ambition, Confidence, Focus and Academic Performance". It focused on the academic ambition, confidence and focuses of each student and identified relationships between them and the first-year grades of the students of the WPI Class of 2002.

Throughout the paper, we will make reference to two different tests that are completed by all incoming students at WPI. These tests are the CIRP and the MBTI. CIRP data refers to the "Cooperative Institutional Research Program" test, which is completed by more than 9 million freshmen every year. Alexander W. Astin and other members of HERI (Higher Education Research Institute) of UCLA created the CIRP. The MBTI data refers to the Myers-Briggs Type Indicator, a personality measure often used in career choice and as a measure of learning style. (Hammer) The MBTI questionnaire has many purposes. It can assess a person's cognitive style and it can be used to examine group dynamics and leaderships. MBTI data is very versatile. All data that is used in this study comes from the data produced by WPI freshman in their survey responses, grades and high school transcripts.

Other references are SPSS and Microsoft's Excel. These are the programs that we used for our analysis of the data. These programs make it easier to prepare raw data for analysis. They also can make bars graphs and tables very quickly, if the information is put together correctly. Should this study be replicated in the future, we suggest that those people doing the study become familiar with SPSS well before getting involved in the analysis.

II. Setbacks and Triumphs

There were many difficulties that needed to be surmounted throughout this study. The first problem occurred at the start of the project: configuring the data sets themselves. Since neither of the team members had much experience with Excel and no experience in SPSS, reading and understanding the data was a difficult task in itself. All the data was stored in SPSS files so the decision to adapt to and learn the SPSS software was made.

Even having the data sets in Excel format did not prevent setbacks from occurring. Formatting of the data differed between sets, so it was difficult to merge and compare data at times. Although this did not stop us from moving forward, it did slow us down on certain occasions. As we became more familiar with SPSS, we used it more frequently in our analysis. The power of the SPSS software made this process much easier with experience.

One of the major setbacks was narrowing the topic to one main theme with the accessible information and data at hand. The original plan was to use the dataset from the Class of 2001. Knowing that 90% of the Class of 2001 completed the CIRP, the

study was to be based on MBTI types and scores as well as high school grades. 545 MBTI's were completed in the 2001 dataset. Only 25% of high school grades were accounted for, however. We knew that finding the missing 2001 data would prove to be tedious and troublesome, but the process to fill the holes began nevertheless.

A list of cases in the dataset that were missing high school transcript data was formed from the discovery of post cards, letters, and permission slips that had been previously sent out by another group. We drafted a copy of a request for permission to look up high school records and included a request to finish the MBTI if that data were missing or incomplete.

In order to complete the study, the holes had to be identified before the students from the class of 2001 graduated at the end of the academic year. With the help of others, we planned to first fill the gaps in the 2001 dataset and then use that data as the basis of our study. In fact, the help never came from other groups, at least not fast enough. We planned to do the bulk of our work in one term, and could only use the data available when that time came. Unfortunately, when that time did come, it did not include a completed dataset for the class of 2001.

A major decision was made to keep the project from slowing down. Because the promise of this completed dataset was there, we decided that if the data was gathered and ready for use, it would be analyzed. We knew, however that if even nothing came through, the project still needed to be completed. For this reason, the more complete dataset of the Class of 2002 became the new focus for which the project would be based. Keeping this project independent of the ability of other groups to come through for us

and allowing it to continue without major delays is what made it successful in the time provided.

III. Data

The study was to be based on MBTI data and linked to high school grades. Having looked at the data sets for 2001 graduates and the 2002 graduates, it was clear that the 2001 dataset still needed some work. If the two sets were to be linked at some future point the 2001 dataset needed to be completed and that work was at a standstill. Our project had to move fast and get into analysis but this was also the last chance before the senior class graduated to fill the gaps in the 2001 dataset or at least obtain permission slips to do so later.

Our efforts alone to fill in the gaps were still not enough, as the data set was not repaired and most of our first term of work done. Time constraints had developed into a problem and clearly our proposed project could not be done with the class of 2001 data set. We decided to shift our study from the 2001 to the 2002 data set, because it already was in readable form with good completion percentages. The CIRP data was nearly complete for the class of 2002, and the team working on it had obtained and linked the CIRP data successfully (and it included high school transcript data for 80% of the students already). We would still be focusing on the use of MBTI and the high schools records, but greatly reduced our data preparation period.

We had hoped to compare 2001 and 2002 data sets to see if the findings replicated. Unfortunately the completion of the 2001 set was not available before time elapsed in the study. As a result, our study was based only on the class of 2002 data.

IV. Other Groups

At the beginning of this project, a decision was made that there was not going to be any relying on other people to produce needed information. Although there were other groups working somewhat in parallel to us, and some information overlapped, we did not want to be slowed down by other people. For this reason, we minimized interactions and dependencies between our project and other concurrent projects.

V. Advances

When the decision was made to primarily use the CIRP for the study, the theme of the study changed. Instead of the original topic of "Self Image and Academic Performance" (see Figure 1.1), a theme of "Ambition, Confidence and Academic Performance" (see Figure 1.2) became a better fit. This theme concentrates more on ambition, drive to succeed, and confidence levels. We hoped to identify characteristics that make up more successful students. The questions on the CIRP that were used were determined to be indicators of our three variables. We felt that these variables had the potential of being good indicators of a potentially successful student at the college level, which is what our project ultimately set out to do. These variables are: 1.) Focus, 2.) Ambition, and 3.) Self-confidence.

"Ambition, Confidence and Academic Performance"

We will be gathering data on the class of 2001.
We will be basing academic performance on the first year grades.
We will be using select responses to questions posed in the 1997 CIRP test to assess the degree of ambition and confidence (or lack thereof) of the individual students in the class of 2001. Some of the factors that will be studied include:
- The student's drive to achieve
- The frequency in which students skipped classes
- The education of the parents of the students
- The livelihood of the parents of the students
- The goals and values of the students

We hope to incorporate high school records into our study as a means of Comparison of academic success and as a further insight into the Varying levels of ambitions and confidence in the students.
If possible, we would like to link this data set to the data set for the Class of 2002.
We will also be comparing the academic success between males and Females in their first year at WPI.
The records of those students that did not make it past their first year of study will not be taken into consideration.

Figure 1.1: Original Goals

"Self Image, Expectations and Academic Performance"

We will be gathering data on the class of 2001.
We will be basing academic performance on the first year grades.
We will be using the CIRP data as a means of determining Self-image and expectations.
We may draw from high school data to help in determining students' Expectations and self-images, along with providing a means of Comparison in performance.
If possible, we would like to link this data set to the data set for the Class of 2002.
Potential Problems:
- Need more students to take the CIRP test
- Need permission to view first year grades
- Need permission to view high school records

Figure 1.2: Revised Goals

At the onset, the study had much promise. The possibility of linking the two data sets appeared to be a huge step towards discovering definitive relationships between the academic success of students and their degree of ambition, confidence and focus. Linking these variables with gender differences provided another means of good analysis

as well. With these possibilities in mind, it was hard to narrow our focus into something that could be completed in a seven-week time frame but we felt that this study could be a great step in the right direction for determining consistencies in students that performed well academically, both in high school and in college. This team went into this study knowing that this was uncharted territory. We feel that another team could replicate our findings with a larger or different data set and have more reliable results from a more refined and detailed analysis.

Chapter 2 - Ambition, Focus, Confidence and Academic Performance

I. Introduction

It is increasingly evident that SAT scores are not the best way to determine a student's academic aptitude and certainly are not a clear indication of how a student will do during their first year in the system of higher education. The search is on to find the perfect formula for predicting a student's potential for succeeding in a university such as WPI. There are many different approaches that can be taken in deciding what qualities are indicators of a top caliber student. In this study, we aspire to fill in a few pieces of this puzzle by focusing our attention on the levels of ambition, confidence and focus of the student as expressed by a student just as s/he enters the college world. By linking CIRP survey data to the first year grades of the student and incorporating the various personality types indicated in the Myers-Briggs Type Indicator (MBTI), which is taken by all students upon entrance into the school during their new-student orientation, we hope to distinguish patterns, trends and tendencies based on personality type, which will ultimately help in answering the question of what is the mark of a superior student and will help determine whether an interview designed to elicit information on ambition, confidence and focus would be an effective way to screen..

Certain terminology that will be used throughout the paper will be introduced and defined at this point in the report. To restate, the study will focus on three main composite indicators constructed from items on the CIRP. These are: focus, confidence and ambition. These three key indicators will be linked to personality type and academic

performance, certainly in the first year and beyond that if the necessary data are made available.

Webster's Random House College Dictionary defines focus as "a central point, as of attraction, attention or activity." When studying the focus of a student, one is indeed narrowing down the central point of attention or key attraction of the students as they attend college. The focus of the student can be viewed in many ways, so it is important to establish what exactly "focus" of the student embraces as we mean it. When discussing the focus of the student, the core concept deal with the degree to which a student knows what s/he wants to take away from his or her college experience. What field of study s/he sees as the path from high school to the future career choices is also a key aspect of that as well. Focus is a particularly important aspect of this study; where a high degree of focus on a career path or field of study could drastically increase the level of ambition or confidence found in a student if things have been going well. If things have not been going well however, the student with less focus can see exactly opposite effects, as ambition and confidence are drained completely and the student is left directionless and alone.

The confidence of the student entering college is the second key aspect of this study. Confidence is important in determining the student's insight to his or her own capabilities and weaknesses and seeing how these students respond to their self-trust or lack thereof. As many athletes like to point out, there is a very fine line between a high degree of confidence and cockiness. Cockiness is one of the characteristics that the study will try to isolate. It is most noticeable in those who display a high level of confidence and show signs of resisting and/or looking down upon the help of others, and go on to

perform at a sub par level at college. The exact opposite of this trait will be researched as well: those students who performed at a high level but entered college with a low confidence level will be examined. Confidence grounded in a strong high school background, and that which has no such basis is also of interest, though a clear theory on it has not yet been established. That section will be much more exploratory and descriptive.

II. Study Breakdown

The underlying theory of this project is that there are direct relationships between the levels of the three factors of ambition, focus and confidence in the student and the success that they have at WPI. Furthermore, the theory also holds that these levels of confidence originated from prior academic success at the high school level. It can therefore be stated that high school grades directly affect levels of confidence, ambition and focus in the student and these levels straightforwardly affect the academic success of the students at WPI. Figure 2.1 is a block diagram showing the logic behind the theory.

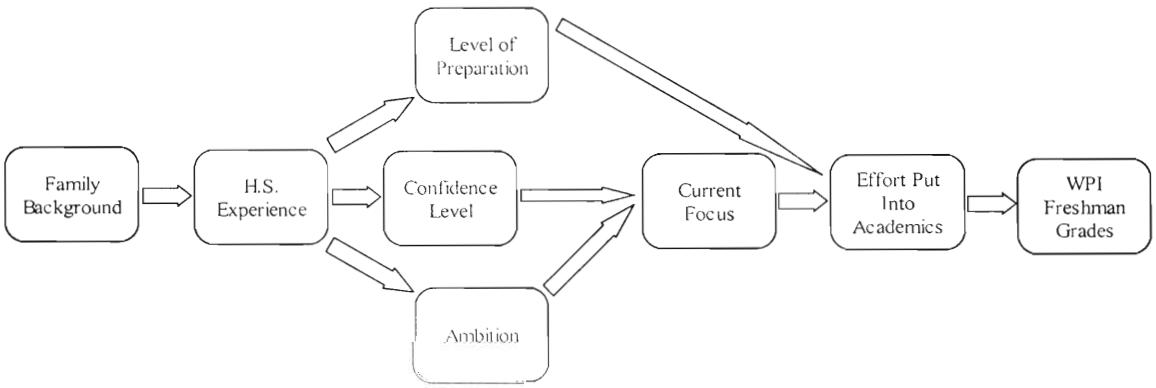


Figure 2.1: Theoretical Assumptions

Now that the three key factors to this study have been discussed, determining a means of analysis is necessary. The study will really be twofold. First, a method of determining an accurate method for depicting the levels of ambition, confidence and focus in the student must be determined. As mentioned earlier, this will be done by selecting questions from the CIRP data from the class of 2002. These questions will be selected based on their relevance to any one of the factors that is being dealt with in the study. Figure 2.2 – 2.4 show the original list of questions from the 1998 CIRP that were identified as being relevant to the study.

Questions on Confidence:

40-45 (Will need remedial work in a subject area)
103 (felt overwhelmed by all I had to do)
118 (self rating: academic ability)
126 (self rating: mathematical ability)
129 (self rating: public speaking ability)
130 (self rating: intellectual confidence)
131 (self rating: social confidence)
132 (self rating: writing ability)
249 (future activity: fail one or more courses)
257 (future activity: make at least "B" average)
258 (future activity: need extra time for degree
261 (future activity: drop out temporarily)

Figure 2.2: Questions Relating To Confidence

Focus:

60-61 (highest degree planned anywhere)
98 (studied with other students) *positive*
123 (self rating: drive to achieve)
191 (time spent doing homework) *positive*
263 (future activity: transfer to another college)
275 (future activity: marry while in college)

Figure 2.3: Questions Relating To Focus

Questions on Ambition:

60-61 (highest degree planned anywhere)
107 (asked teacher for advice after class)
108 (overslept and missed class/apt)
123 (self rating: drive to achieve)
136 (education of father)
137 (education of mother)
165 (probable student career)
166 (father's career)
167 (mother's career)
191 (time spent doing homework)
193 (time spent talking with teacher outside of class)
199 (time spent watching TV)
228 (goal: become accomplished in performing art)
229 (goal: become authority in own field)
230 (goal: obtain recognition from colleagues)
234 (goal: have administrative responsibility)
237 (goal: make theoretical contribution to science)
238 (goal: write original works)
240 (goal: be successful in own business)
250 (future activity: graduate with honors)
257 (future activity: make at least "B" average)
258 (future activity: need extra time for degree)
259 (future activity: get bachelor's degree)
261 (future activity: drop out temporarily)
262 (future activity: drop out permanently)
274 (future activity: be satisfied with college)

Figure 2.4: Questions Relating To Ambition

The first half of the study will be dedicated to the analysis of the first year grades of WPI students from the class of 2002. This will be our means of measuring the academic performance of the students. The possibility that first year grades will not be entirely indicative as to how a student will perform for the duration of their time spent at the institute has led us to seek sophomore grades for the students from the class of 2002

as well. It is our hope that the combination of the freshman and sophomore year grades will suffice in accurately portraying the academic success (or lack of) at WPI.

The first year grades will be looked at both as a whole and on a term-to-term basis. The reasoning behind this is that there is a hope that trends lying between different levels of the three different factors may surface when looking at performance on a term-to-term basis. For example, perhaps some common thread running through all students with low confidence but high ambition and high focus will surface. It is our hope that by comparing these three factors of focus, confidence and ambition with the first and second year grades at WPI, we will be able to identify trends among the three factors. As an example, it may turn out that there is a direct relationship between high ambition and outstanding overall academic success at WPI. This is the type of relationship that will be looked for in the study.

The second half of the study will be dedicated to the high school grades of the class of 2002. The high school grades will be compared against the three factors as well, with the same hopes of drawing out relationships between some of the factors and high school performance being kept in mind. The grades will be looked at as a way of seeing whether some of these attitudes of confidence, focus and ambition found in the student originated with experience in high school or are just associated with a certain attitude or personality.

The primary difficulty in this study will be simply determining what classification for each of the three factors that student falls into. It may not be evident whether a student falls is confident or not confident, focused or not based on the scales for each item. Some students will lie somewhere between the two extremes on a particular factor, which raises

the questions as to what should be done about these in-between cases. Few, if any, of the cases will be 100 percent clear as to how a student may be categorized. For this reason, each of the three factors will be separated into quartiles, with each section representing 25% of the overall student population. These quartiles will include the two extremities of each factor (example: least ambitious and most ambitious) and the two middle quartiles will contain those students that fall into the 50% range of students that do not indicate so strong a tendency towards either of the two extremes. The quartiles will be assigned after each of the factors has been weighted, which will provide a means for ranking students on the three main variables of the study. The weighting system is discussed in the next chapter.

One other key aspect of this study will be the inclusion of the MBTI as a learning style indicator. We will also try to draw out relationships between MBTI types and varying levels of the three factors. It is our hope that by looking at the MBTI data, along with grades data from both high school and WPI, strong relationships will develop that shows trends originated in high school and held constant through their years at WPI.

Another very important distinction that must be taken into account is the difference in gender. Previous studies have indicated that there is (with a sometimes striking) but clearly noticeable difference between the academic performance of males and females. The difference is particularly noticeable in some personality types indicated by the MBTI data. (See Tara Murphy's analysis using class of 2003 data.) Given the difference found between males and females in past studies, it is our opinion that when studying these different personality types, gender is an important statistic to track and

monitor. It is our intention to find and expose distinctions and/or similarities between the sexes.

A final issue is to evaluate the effect of students that do not make it past their first year in this school on the dataset. Certainly, a key topic in this study will be one that concerns students that did not succeed at WPI. We intend to see what (if any) factors, be it personality, ambition, confidence or focus that these students had in common. The main problem introduced by these students that did not make it past their first year is that their grades may misconstrue the data gathered for averages and comparisons in the study. The theory supporting this concern indicates that students tend to travel on a path of rapid deterioration once it has become evident to them that their success at the school is improbable. For this reason, the student basically gives up and stops caring about grades, etc...

With this assumption, it has been decided that students who did not make it past their first year of college at WPI will be omitted when doing any sort of numerical comparison between different types. They will be included when studying the success and failure rates of students falling into different personality types and when looking at levels of ambition, focus and confidence of the students when entering the school.

III. The "Data Link Layer"

One of the best ways to make a data set more representative of the population being studied and more accurate in defining patterns and regularities in the data is to increase the size of the database. The results from one class are a very good start, but the possibility of linking data sets yields a much more diverse database from which much

more can be read from and analyzed. Linking multiple databases raises some issues, both good and bad. The reported relationships become much more reliable or statistically significant when the database grows, but questions also arise on how compatible the data are when they are taken from slightly different sources, although in this case, the classes of 2001 and 2002 databases are almost identical. With the pros seeming to outweigh the cons, an effort will be made to combine data sets in this study.

With the linking of two data sets, the data becomes more useful and the conclusions drawn from the data become much more significant, as they represent a wider spread of the population being studied. This reasoning comes twofold: in certain cases, determining what type of personality or trait a certain student may fall into will be rather ambiguous, but with a larger dataset, the ease in which a student can be categorized as a certain type becomes an easier task. Also, as the number of subjects being studied grows, so do the patterns strengthen in their regularities and become a better asset to those studying them. This increase in advantage is due principally to the larger data set, which acquiesces greater reliability.

The other major benefit of linking the databases is the potential of determining trends that differ from year to year. A pattern that may be overwhelmingly evident in one set of students may differ completely the next year. The benefit of linking the datasets together is not always immediately beneficial, but may lead to future studies that can be based on similarities or differences between data sets. Linking the datasets allows researchers an opportunity to study trends and how they change either throughout a certain span of time or how they differ between different groups of people.

In this study, an effort will be made to pool the CIRP data set from the class of 2002 with the CIRP data set from the class of 2001. It is our hope that the combination of some of the types studied will prove useful as it allows us to work with a much larger set of data. The data will become a more powerful asset as it helps in developing more defined categories of students, which will in turn provide more information for developing trends and patterns and thus make the study much more valuable.

Because the CIRP is not identical between the two years, the possibility of some issues on incompatibility when determining the different types may arise. Had the incompatibility been too great, it still would have only been a factor in some of the subjects that may have appeared to be on the line between two different types, whether it lie in the degree of ambition, confidence or focus in the student. Fortunately, the two tests are almost identical with the exception of one question relating the confidence level of the student, which was omitted in the CIRP for the class of 2002. For this reason, the possibility of linking these datasets shows great potential for being a great improvement in the authority of the study.

Chapter 3 - Determining Correlation Coefficients

This chapter was written primarily for any group that may wish to repeat our study and wants a more in-depth understanding of the process, which we used to obtain our data. With this in mind, it is not necessary to understand this process if the primary interest is to simply evaluate the results of the study. In simpler terms, if you don't want to repeat our study, this is a good section to skip.

In order to classify the students in the class of 2002 by our three variables (focus, ambition, and confidence), a set of questions from the CIRP were correlated with each other. In order to assess the degree to which they are associated, these coefficients were used. Hence, the correlation coefficients allowed us to look at a group of questions at one time and see the degree in which the questions were related to one another. A coefficient of .400 or greater (16% of the variance in one explained by the other) was used as being an indicator of compatibility and was then used in determining the final list of questions that was taken from the CIRP when assessing the categories that students fell into on the three main variables. These coefficients were then taken and multiplied by a number relating to the degree in which the student answered the question and a weight for each question was determined. This process will be discussed later on, however.

We used the software program SPSS to develop the correlation coefficients by developing a factor matrix. SPSS contains, among many other features, a means of data reduction by selecting certain factors that the user would like to isolate.

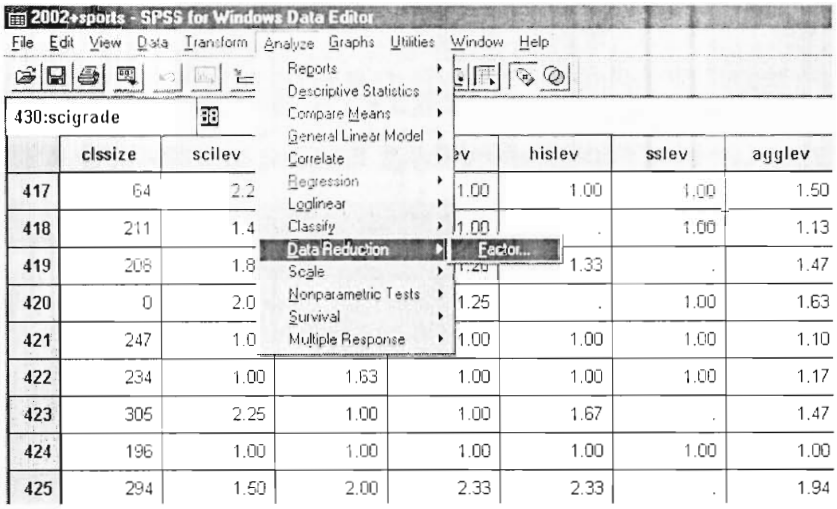


Figure 3.1: First step of factor analysis

This feature can be found by going to Analyze Data Reduction Factor... This link takes the user to a new screen, which allows the user to choose the factors that s/he believes to be influential in the particular study. For example, when studying the level of ambition in the student, some of the items chosen in the original analysis were, drive to achieve, leadership ability, etc...

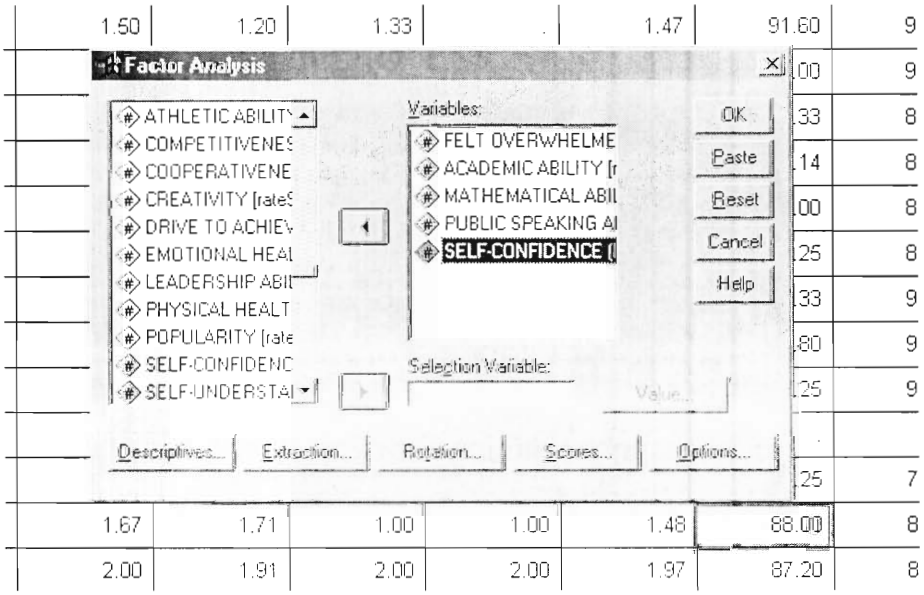


Figure 3.2: Selecting Factors

The next step in developing these correlation coefficients was determining the way we would look at these factors that we had selected and to see how exactly we were going to relate them to one another. In this first step, we chose the correlation coefficients to calculate the factor loadings. In particular, we choose to look specifically at the coefficients and the significance levels to give us an idea of how the items related to each other. Other options included viewing the variable relationships in terms of determinants, or as inverses of each other.

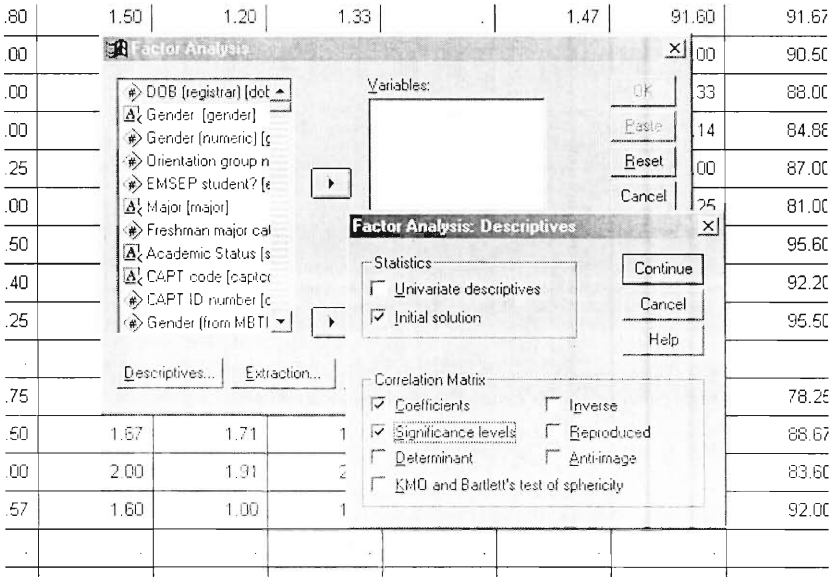


Figure 3.3: Descriptives

After the descriptives had been taken care of, the next thing to do was determine a technique for extracting the relationships between the variables.

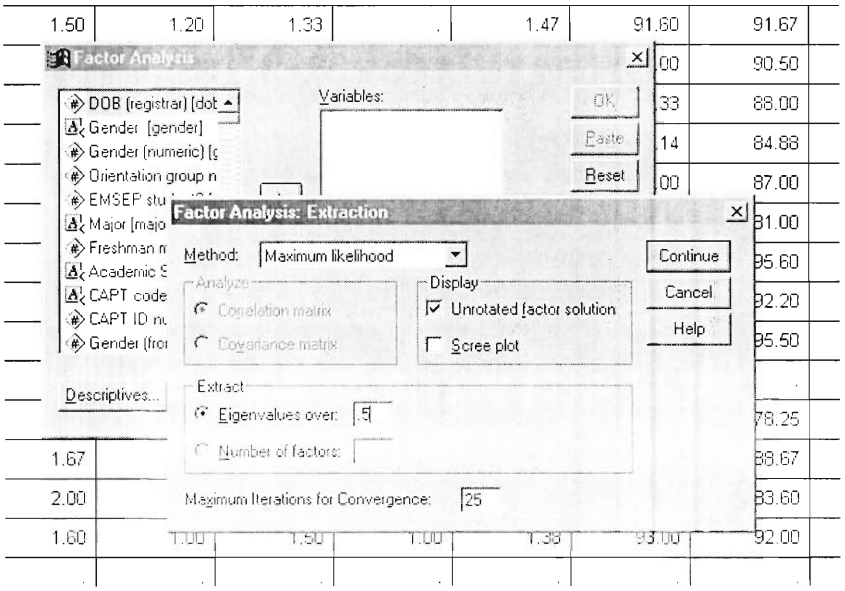


Figure 3.4: Extraction

In extracting the factors, we chose to use the method of varimax, or maximum-likelihood, which would in turn show us how the factors related to each other in terms of probability of responses to questions in the CIRP correlating with each other between students. The maximum-likelihood solution requires the assumption of multivariate normality of variables. It is here that we also specify that we wish to extract eigenvalues over 0.5. The eigenvalue (also known as the characteristic root), for a given factor measures the variance in all the variables that is accounted for by that factor. Simply put, eigenvalues measure the amount of variation in the total sample accounted for by each factor. (Factor)

The next step taken in the development was determining the method of rotation to be used in the analysis. We chose the varimax rotation method, which allows us to view the correlation coefficients as they pertain to a multitude of different factors. "Varimax rotation is an orthogonal rotation of the factor axes to maximize the variance of the

squared loadings of a factor (column) on all the variables (rows) in a factor matrix, which has the effect of differentiating the original variables by extracted factor. That is, it minimizes the number of variables which have high loadings on any one given factor. Each factor will tend to have either large or small loadings of particular variables on it. A varimax solution yields results which make it as easy as possible to identify each variable with a single factor. This is the most common rotation option." (Factor) One may ask why rotation is necessary and the answer lies in the fact that in solutions with two or more factors, rotation of the axes causes the factor loadings of each variable to be more clearly differentiated by factor than if the solution was not rotated. (Factor)

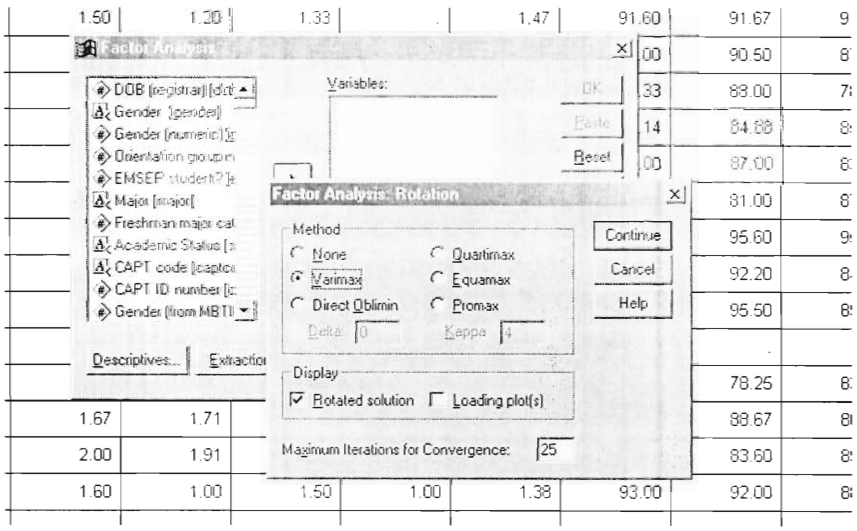


Figure 3.5: Rotation

The final step taken in developing the correlation coefficients was to simply determine how to handle missing variables encountered in the data files.

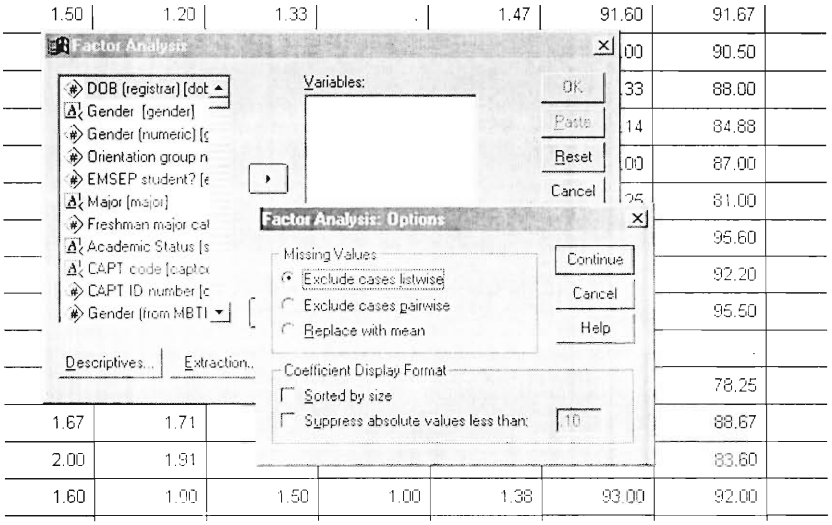


Figure 3.6: Other Options

By choosing to exclude cases list wise, we were able to maximize the correlations between the variables that we had. This brought about the possibility of corrupting a lot of data. The data we were able to use however was sufficient for the task. We were able to use about 400 cases out of a possible 600.

At this point, the program was ready to run. The resulting factor matrix with the correlation coefficients was produced and the factors that most relate to each other could then be defined easily. The relevant correlation coefficients that were decided upon for this particular case are circled in the figure below. Although other correlations existed, we felt this was the best group of the bunch.

Factor Matrix[a]

	Factor								
	1	2	3	4	5	6	7	8	9
FELT OVERWHELMED	.999	2.635E-03	8.388E-04	1.711E-04	5.067E-04	-1.18E-04	1.846E-04	7.586E-05	-1.04E-05
ACADEMIC ABILITY	-.123	.422	.563	-2.51E-02	.171	1.592E-03	-.192	-9.02E-02	-7.69E-02
MATHEMATICAL ABILITY	-.131	.583	.693	-.242	-9.64E-02	3.810E-02	2.473E-02	3.117E-02	1.641E-02
PUBLIC SPEAKING ABILITY	-9.00E-02	6.559E-02	7.784E-03	4.118E-02	.570	.321	-.114	.277	-9.76E-02
SELF-CONFIDENCE (INTELLECTUAL)	-.206	.350	.281	6.443E-02	.546	-9.99E-02	.166	-.267	-3.72E-02
SELF-CONFIDENCE (SOCIAL)	-.206	.191	-4.10E-02	-3.87E-03	.575	-.145	.281	.161	9.052E-02
WRITING ABILITY	1.343E-02	.149	.101	.206	.353	.229	-.419	-.104	.157
DROP OUT TEMPORARILY	9.754E-02	-.751	.579	9.773E-02	2.289E-02	-2.94E-02	-1.16E-02	-1.47E-02	9.948E-04
DROP OUT PERMANENTLY	-3.19E-02	-.604	.440	1.532E-02	2.141E-02	-3.49E-02	7.450E-02	.171	-1.29E-02
FAIL 1 OR MORE COURSES	.128	-.456	-9.52E-02	-.243	-6.18E-02	.524	.207	-.129	-4.21E-02
MAKE AT LEAST "B" AVERAGE	-.115	.462	.220	.731	-.132	8.044E-02	7.301E-02	1.541E-02	-1.13E-02
NEED EXTRA TIME FOR DEGREE	3.677E-02	-.285	1.277E-02	6.017E-02	-1.10E-02	.283	.170	-7.27E-03	.227

Extraction Method: Maximum Likelihood.

a. Attempted to extract 9 factors. More than 25 iterations required. (Convergence=5.846E-02). Extraction was terminated.

Figure 3.7: Factor Matrix

In the case above, the factor matrix was done for confidence with the different variables taken into account on the left hand side. As indicated in the figure above, six of the 12 items seemed to relate to each other while the others did not as much. These factors would later result in a refinement of the list of variables used in determining the confidence of the student.

Chapter 4 – "The Story of the Correlation Coefficients"

I. Factor Reselection

After examining the degree of correlation of the three different factors, it was evident that some of the original questions that had been targeted as focus questions for the study were not all related to each other. As a result, we needed to confine these questions into a list of those that simultaneously correlated well with each other and also represented what we believed was the best indicator of the factor that we were dealing with. One problem lying in this scenario was that some of the questions that we expected to best represent a particular factor did not necessarily correlate well with the other questions used for the analysis. This resulted in a compromise between questions that we felt best indicated a particular factor and questions that best correlated with other questions in the factor.

We originally generated a list of 26 questions (See Figure 2.2) as potential indicators of ambition. Having determined that a correlation coefficient of 0.4 or greater would be a sufficient indicator of compatibility with other variables. All other questions with a correlation coefficient would be disregarded. The result was an elimination of 22 of the original questions, leaving us with these four core questions as an indicator of levels of ambition in the students:

Ambition:	Weight	Scale
Obtain recognition from colleagues	0.803	1-4
Become authority in own field	0.592	1-4
Have an administrative responsibility	0.419	1-4
Make theoretical contributions to science.	0.407	1-4
Minimum Weight: 2.221 Maximum Weight: 8.884		

Figure 4.1: Ambition Weights

These four questions were the best collaboration of both compatibility and an indication of ambition from the original set of questions and were selected as the final list of questions to be used in the analysis of ambition in the study.

We had a bit more luck with our confidence factor. We started with 12 questions (See Figure 2.3) that best indicated confidence in the student and finished with seven final questions. We made one exception when selecting the final list of questions by allowing the question relating to the student's self perspective on his or her intellectual self-confidence, which only had a correlation coefficient of .350 to stay. This allowance was made because of our certainty in the face validity of the relationship between this variable and the factor at hand. Below is a list of the final questions from the CIRP that were used to assess student confidence in the study.

Confidence:	Weight	Scale
Academic Ability	0.422	1-5
Mathematic Ability	0.583	1-5
Intellectual Self Confidence	0.35	1-5
Fail one or more courses	-0.456	1-4
Make at least B average	0.462	1-4
Drop out temporarily	-0.751	1-4
Drop out permanently	-0.604	1-4
Minimum Weight: -5.427 Maximum Weight: 6.812		

Figure 4.2: Confidence Weights

Our biggest surprise came when looking at the group of questions relating to the focus of the student. We initially came up with a list of six questions (See Figure 2.1) but after running the factor matrix, we discovered that none of the questions that we had come up with correlated at all with the others. Several attempts were made to recreate the group of questions indicating the focus factor. All attempts were relatively unsuccessful and a decision had to be made as to the fate of the focus factor in the study.

Two variables continued to show up as correlating well by themselves, but not at all with each other. They were the student's attitude towards his or her likelihood of transferring to another college and the student's report of how many hours s/he spent doing homework and studying in the past year. Because we felt that our definition of student focus more closely pertained to their likelihood of staying at the institute, we decided that focus would simply be determined by this sole factor. We realize however, that this brings about a high degree of skepticism as to whether that item is a valid indication of our concept, "focus" – and this should be kept in mind in interpreting the results. Below is the factor matrix of the final list of questions pertaining to focus before

the decision to isolate one variable as the indicator of focus in the student was made. The two high correlations are circled.

Factor Matrix[a]

	Factor	
	1	2
STUDIED WITH OTHER STUDENTS	6.409E-02	.269
HIGHEST DEGREE PLANNED AT THIS INST	-.156	-8.41E-02
TRANSFER TO ANOTHER COLLEGE	.999	9.181E-06
STUDYING OR HOMEWORK	-7.78E-03	.846
DRIVE TO ACHIEVE	-9.36E-02	.187

Extraction Method: Maximum Likelihood.

a. Attempted to extract 2 factors. More than 25 iterations required. (Convergence=1.000E-03). Extraction was terminated.

Figure 4.3: Factor Matrix for Focus

II. Weighting System

Indicated below the list of questions used for both ambition and confidence, a minimum and maximum weight for the factor is listed. These maximum and minimum weights represent the highest and lowest possible scores attainable in ascertaining the level of the factor in the student. In the case of ambition in the student, the highest score the student could achieve was 8.884, while the lowest score was a 2.221. A score of 8.884 would indicate that the student was very ambitious, while a score of 2.221, or in that proximity would indicate that the student was low in ambition.

The individual weights are simply beta weights based on the correlation coefficients of the questions used in the final lists for the ambition, confidence and focus factors. The overall score for a particular student in a factor is simply the sum of the products of the response of the student to the question at hand and the weight of the question. If the question happened to have an inverse correlation, and thus a negative

weight, the score would just be subtracted as opposed to being added. Below is an example of composite scoring the confidence of a student.

Question	Weight	Scale	Score	*Product*
Academic Ability	0.422	1-5	4	*1.688*
Mathematic Ability	0.583	1-5	5	*2.915*
Intellectual Self Confidence	0.35	1-5	4	*1.4*
Fail one or more courses	-0.456	1-4	2	*-0.912*
Make at least B average	0.462	1-4	4	*1.848*
Drop out temporarily	-0.751	1-4	2	*-1.502*
Drop out permanently	-0.604	1-4	1	*-0.604*
	Student's score in Confidence:			4.833

Figure 4.4: Example Calculation of Student Confidence

III. Original Statistical Breakdown

Our original objective was to separate each of the factors into one of three categories: high, low and intermediate. The students that scored in the intermediate range were to be considered neither strongly orientated in either direction, and would therefore be omitted from the dataset. The boundaries originally set were at 40% and 60% of the maximum attainable score. For example, when studying the ambition factor, all students with an ambition score less than 40% of the maximum score would be considered to be not ambitious, all students that scored above 60% of the maximum score would be considered ambitious and the students that scored between 40% and 60% would be omitted from the study, as they showed signs of being neither ambitious or unambitious.

Factor	Max Weight	Min Weight	40%	60%
Confidence	6.812	-5.427	-0.5314	1.917
Ambition	8.884	2.221	4.8862	6.2188

Figure 4.5: Factor Breakdown – 40% and 60% cutoffs

With three factors, each having two extremities serving as focal points of the study, we believed that we could come up with correlations between the factors being studied that would be suitable in the analysis that would follow.

IV. Data Distribution

There were two main problems with our original approach. First, omitting students that fell between the 40% and 60% mark resulted in a vast reduction of data, which would have made the study less useful and less indicative of any trends that could have been stumbled across. The second problem, which was the biggest problem, was the fact that almost every student from the class of 2002 at WPI registered as a confident person. We had not taken into account that WPI recruits a specific type of student that generally falls into the category of ambitious, focused and confident so we'd be looking only at relative difference. Below are the results of the scores of the students in the various factors.

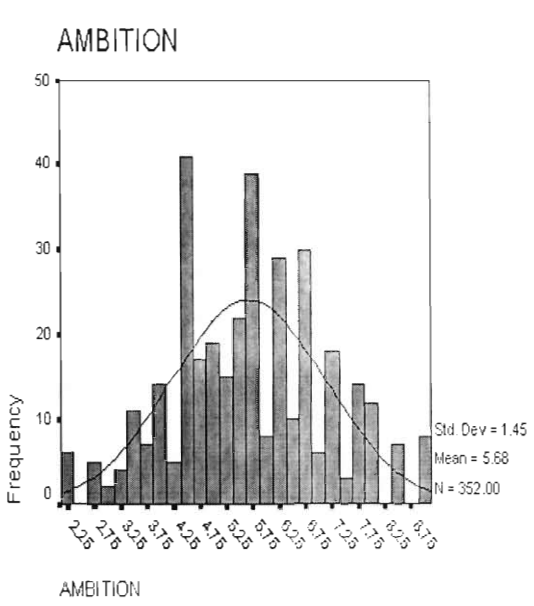


Figure 4.6: Student Ambition Scores

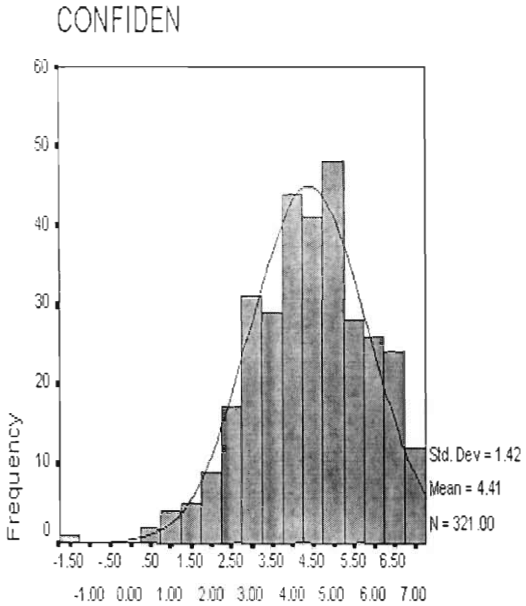


Figure 4.7: Student Confidence Scores

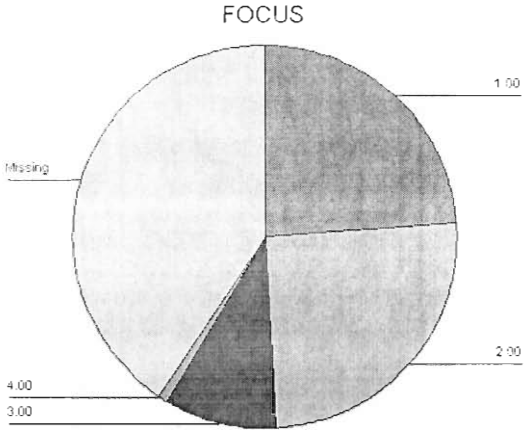


Figure 4.8: Student Focus Scores

With the breakdown of 40% and 60% cutoffs, all students that scored a –0.5314 or lower in the confidence factor would be considered to be not confident and all students that scored above a 1.917 would be considered confident. This means that 5% of the students comprised the "no confidence" and "neither confident nor not confident" section, while the other 95% of the students scored as being confident students. Similar

results, although not as drastic a skew was found in the ambition variable created by factor analysis.

V. Revised Breakdown

As a result of the skewed results in the data, some sort of compensation had to be made, so that an appropriate study with reasonable data sanctions could be conducted. The decision was made to make all variables relative to the range of scores in the data being used. Also, as opposed to using a high extremity, a low extremity and a disregarded middle ground, the decision to break up the students into equal quartiles was made. In the quartiles, the students are divided into 4 separate ranges, with each range encompassing 25% of the students. Each of the three categories was broken into quartiles. The breakdown of scores among the factors for the different quartiles is shown in Figure 4.9.

Statistics

		AMBITION	CONFIDEN	Focus Categories
N	Valid	352	321	336
	Missing	212	243	228
Mean		5.6759	4.4063	3.21
Median		5.6520	4.5390	3.00
Skewness		.038	-.519	-.620
Std. Error of Skewness		.130	.136	.133
Percentiles	25	4.4540	3.5370	3.00
	33.33333333	5.0340	3.9560	3.00
	50	5.6520	4.5390	3.00
	66.66666667	6.2560	5.0010	4.00
	75	6.6630	5.4505	4.00

Figure 4.9: Factors Split into Quartiles

Once the factors were split into quartiles, each of the factors was then recoded back into the dataset as a different variable name. The new variable was based on the quartiles that the individual scores fell into. As an example, the ambition variable was

first broken up into quartiles and then recoded into a new variable, where each score was given a score based on the quartile it fell into. The score was the associated with a particular label, as demonstrated in Figure 4.10.

Ambition		
Quartile	*Score*	*Meaning*
0 - 25%	1	least ambitious
26 - 50%	2	2nd quartile
51 - 75%	3	3rd quartile
76 - 100%	4	most ambitious

Figure 4.10: Recoded Ambition Values

A similar process was done for the data regarding both the WPI data and the high school data. Contrary to the ambition, confidence and focus factors, the grade data was split up into six different categories, each category representing $1/6^{th}$ of the students in the dataset. Figure 4.11 demonstrates an example of how the grades were split up.

Overall GPA		
Section	*Score*	*Meaning*
0 - 17%	1	lowest GPA
18 - 33%	2	low GPA
33 - 50%	3	low - average GPA
51 - 67%	4	high - average GPA
68 - 83%	5	high GPA
84 - 100%	6	best GPA

Figure 4.11: Recoded Grade Values

After all the high school grades, WPI grades and the study factors had been converted into their new form, the analysis could begin to be conducted. Each quartile of the factors could now be compared to each of the 6 categories that the grades fell into.

Chapter 5 - The Approach to the Analysis

I. The Dataset

Once we were through adding variables to the dataset, scrutinizing them and consolidating the result, there were finally three additional columns of information containing data on our two composite variables of confidence and ambition and our indicator of focus. The data on both WPI first year grades and high school grades for students of the class of 2002 were also constructed into new categorized variables. Figure 5.1 shows the new information added to the dataset.

Dataset: 2002+sports.sav (SPSS File)			
New Information Variable Name	**Contents**	**New Information Variable Name**	**Contents**
ambition	Raw ambition score of student	***bgpa_cat***	B term GPA of students broken up into 6 different categories ranking from worst GPA to best GPA
confiden	Raw confidence score of student	***cgpa_cat***	C term GPA of students broken up into 6 different categories ranking from worst GPA to best GPA
focus	Focus score ranking between 1 and 4 for each student	***dgpa_cat***	D term GPA of students broken up into 6 different categories ranking from worst GPA to best GPA
amb_cat2	Ambition broken up into 4 quartiles ranking from least ambitious to most ambitious	*hsgpacat*	High School GPA of students broken up into 6 different categories ranking from worst GPA to best GPA
con_cats	Confidence broken up into 4 quartiles ranking form least confident to most confident	*hsenggpa*	High School overall English GPA of students broken up into 6 different categories ranking from worst GPA to best GPA
gpa_cats	First-year GPA of students broken up into 6 different categories ranking from worst GPA to best GPA	*hsmatgpa*	High School overall math GPA of students broken up into 6 different categories ranking from worst GPA to best GPA
agpa_cat	A term GPA of students broken up into 6 different categories ranking from worst GPA to best GPA	*hsscigpa*	High School overall science GPA of students broken up into 6 different categories ranking from worst GPA to best GPA

Figure 5.1: New Dataset Variables

Because of the difficulties we had in obtaining a reliable set of data concerning first-year grades and high school data on the class of 2001 from John Oexner, we were forced to drop it from the study for lack of outcome dependent variables and a key independent variable. Although this prevented us from creating a much larger dataset, and therefore a much more diverse and rich dataset, we felt that the data gathered from the class of 2002 was adequate for this particular project. At some later time, we expect that an analysis of the 2001 CIRP data will replicate what we formed with 2002.

II. Relationships

There were a number of ways the analysis could be approached because there were so many views in which to view the variables. The main goal was to divide the students up into categories of people based on their levels of ambition, confidence and focus, and to then look at these different clusters of people and see how they both fared at WPI in their first year, and also to see where some of these attitudes may have come from. With the high school records, the focus was the identification of trends associating high school performance with levels of ambition, confidence and focus. Once this was completed, it was then time to look at first year grades at WPI and compare them to these same levels. With this approach, efficiently identifying which of the theorized attitudes helped students excel at the school, while also identifying the traits in students that kept students from doing their best at WPI was possible. Also, with the high school data, indicators of what kind of high school academic performance would bring about these same qualities that help students to excel at WPI could be targeted.

As indicated above, the analysis was really broken down into two main parts: analysis of levels of ambition, confidence and focus vs. high school grades data and an investigation of the relationships between WPI first-year grades and levels of ambition, confidence and focus in the students. Figure 5.2 shows the different relationships investigated in the high school data, while Figure 5.4 portrays the different relationships examined in the WPI data. Figure 5.3 shows other various relationships that were investigated in the analysis.

Ambition Isolated	**Focus Isolated**
Ambition vs. Overall GPA	Focus vs. Overall GPA
- Layered with MBTI types	Focus vs. A Term GPA
- Layered with gender	Focus vs. B Term GPA
Ambition vs. A Term GPA	Focus vs. C Term GPA
Ambition vs. B Term GPA	Focus vs. D Term GPA
Ambition vs. C Term GPA	
Ambition vs. D Term GPA	
Factor Correlations	**Confidence Isolated**
Ambition & Confidence vs. Overall GPA	Confidence vs. Overall GPA
Ambition & Focus vs. Overall GPA	- Layered with MBTI types
Confidence & Focus vs. Overall GPA	- Layered with gender
	Confidence vs. A Term GPA
	Confidence vs. B Term GPA
	Confidence vs. C Term GPA
	Confidence vs. D Term GPA

Figure 5.2: Various High School Data Relationships

Ambition vs. Confidence
Confidence vs. Focus
Focus vs. Ambition

Figure 5.3: Other Investigated Relationships

Ambition Isolated	**Focus Isolated**
Ambition vs. Overall GPA	Focus vs. Overall GPA
- Layered with MBTI types	Focus vs. Math GPA
- Layered with gender	Focus vs. Science GPA
Ambition vs. Math GPA	Focus vs. English GPA
Ambition vs. Science GPA	
Ambition vs. English GPA	
Confidence Isolated	**Factor Correlations**
Confidence vs. Overall GPA	Ambition & Confidence vs. Overall GPA
- Layered with MBTI types	Ambition & Focus vs. Overall GPA
- Layered with gender	Confidence & Focus vs. Overall GPA
Confidence vs. Math GPA	
Confidence vs. Science GPA	
Confidence vs. English GPA	

Figure 5.4: Various WPI First-Year Grades Relationships

III. Method of Analysis

Our main method of analysis was a simple cross tabulation of the two or three variables being examined. To do this, we used the crosstab function provided in SPSS. Figure 5.5 shows the location of the crosstab feature, while Figure 5.6 shows some of the various options when using the crosstab element.

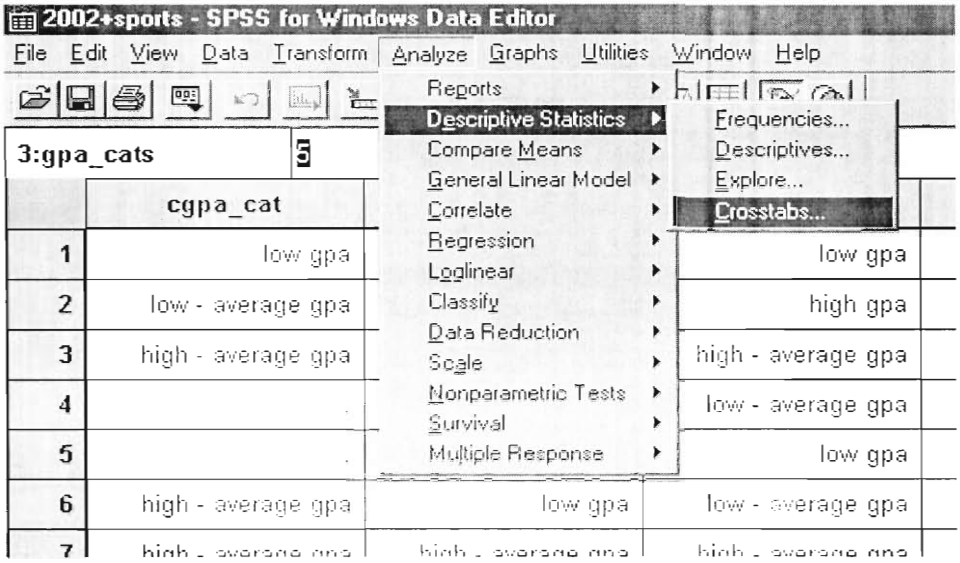


Figure 5.4: SPSS Crosstab Function

The option of creating simple bar graphs showing the correlations between variables is shown in Figure 5.6 (circled) and was used heavily in the study. It provided a very vivid and easily understandable method for portraying trends and tendencies in the dataset.

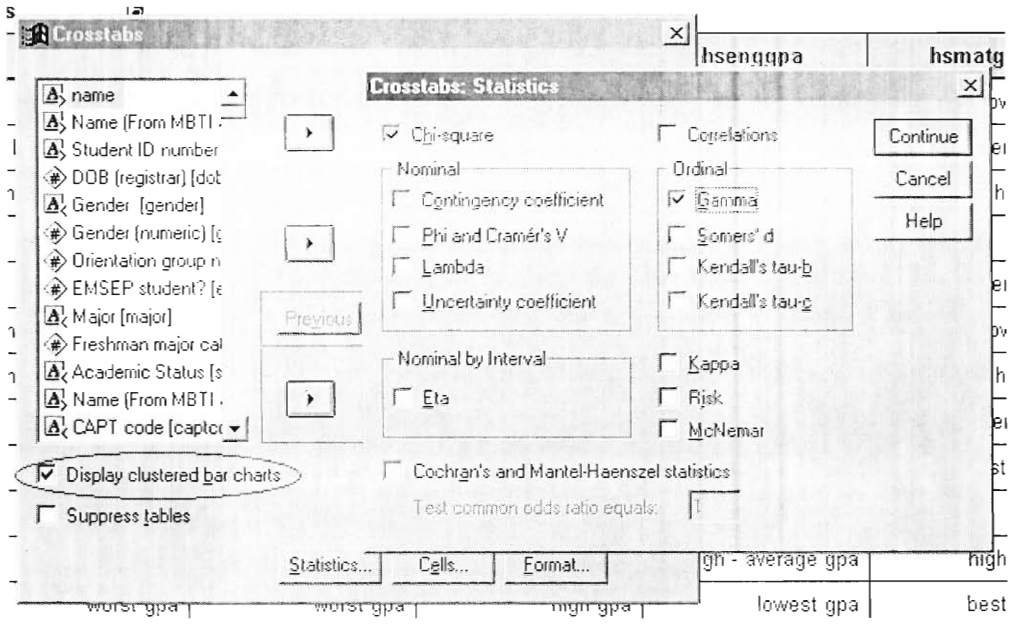


Figure 5.5: Various Options of the Crosstab Function

Using the crosstab function provided us with an excellent method of analyzing the data and examining relationships in it. It also allowed us to study the various correlations between variables and provided a means of exposing these correlations. Also, because of the relative ease of use of the function, it makes the process very easily reproducible, which would be of great benefit to any person that wished to replicate the study or do a modified study in the future.

IV. Data Conversion and Manipulation

The data from the class of 2002 was analyzed to show if a relation existed between high school grades and confidence as well as focus and ambition, as measured by CIRP items. The first step before even working in the data set is to find out if the person who entered the high school transcript information did it accurately (i.e. assess the reliability of data entry and validity of the resulting data set). If the data were less than 95% accurate, it would not be precise enough. In that case a double check was done to distinguish if the data could be used in analysis without being crosschecked case by case. The result was that the data met or standard and could be used. In order to ascertain this, 25 (5%) of the high school transcripts from students from the class of 2002 were randomly selected from the collection of approximately 500 transcripts and were matched against the recorded data. Of these 5% of the high school transcripts, a 5% error rating was deemed to be the maximum acceptable error rate. Simply stated, if less than 5% of 5% of the high school transcripts were error free, then the data set as a whole would be considered reliable and acceptable to use in the study.

An acceptable mark of some sort was needed to determine adequate variation in reported grades versus a non-satisfactory variation. A disparity of +/- 4% was decided upon, meaning that if the reported grades were within 4 points of the calculated average from the transcript, the grades were considered valid, else the data was considered invalid. One issue that arose here was when grades were reported as a letter (A, B, C, etc...) as opposed to a numerical grade, which could be much more easily used in comparing grades. To deal with this, letter grades were converted to numerical grades in accordance to the chart below:

Letter Grade	Numerical Conversion
A +	100
A	96
A -	92
B +	88
B	86
B -	82
C +	78
C	76
C -	72
D +	68
D	66
D -	62
F	0

Figure 5.6: Letter Grade Conversion

These numerical grades were then used to compute an overall average in a particular subject area and were then compared to the recorded high school average found on the dataset.

Of the 25 transcripts that were compared, which encompass about 40 keystrokes each, two records could not be found in the dataset and only one of the records did not fall within the acceptable range of +/- 4%. In this particular case, records for only the

freshman year of high school could be found. Even with this limited resource, the grades only varied by approximately seven points, which may very well have been correct for the student. The grades were still considered invalid however, because of the standard that had been previously established. This translates into 900 keystrokes total and about 20 done wrong by a coder trained and checked by Greg Doerschler, which gives an error rate of 2.2%, which was deemed to be acceptable. Doerschler had identified problems with the level variable for each course (college, honors, AP, etc.) so our study bypassed that and concentrated on only the grade received in the course. The cross linking of high school transcript and self report data from the CIRP findings have provided considerable reassurance that the information in the dataset is accurate.

Chapter 6 – Analysis of the High School Grades

I. Introduction

High school grades were evaluated as well as the WPI first-year grades for the class of 2002 to enhance the study. The experience of being in college for the first time may affect the first year college grades. No other indication of the student's ambition, confidence and focus before they took the CIRP or the MBTI is available, other than high school grades. At this point in their lives they should be at the point were they are hoping to do well in college, confident because they made it this far and were admitted to a good college, and focused on graduating from that college. This chapter provides the evidence to support this theory.

As mentioned in chapter five, the analysis of the high school grades was broken into four main sections. The first three sections examined the relationships between the grades on an individual study level and overall vs. the three individual factors. The fourth section was dedicated to trends concerning a combination of two of the three factors vs. high school grades.

Displayed throughout the chapter are the graphs associated with high school data for the class of 2002 and the various levels of ambition, confidence and focus evident from their CIRP surveys. It was discussed earlier that these curves do not necessarily cover the whole spectrum of ranges associated with these values. Due to the high scoring of WPI students, the findings from this chapter and Chapter 7 are compared and discussed in Chapter 8, which will show if they relate or not. For information on how this analysis was done, look at Chapter 5 for the process.

Figures 6.a – 6.d illustrates the distribution of grades overall and in individual studies. The bell curve on these figures seems to show that a typical student falls into an average 84 – 92% range. The figures may differ from other schools such as state schools, but WPI, a technical school, receives the better student, which produces this strong grade distribution.

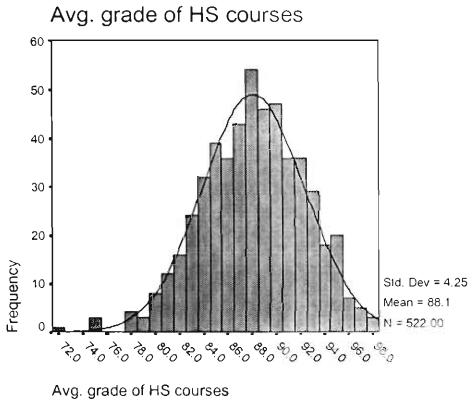


Figure 6.a: HS GPA Histogram

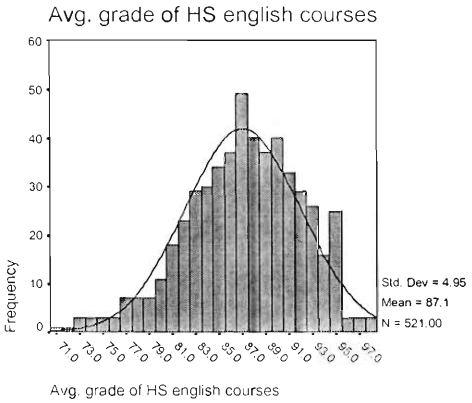


Figure 6.b: HS English GPA Histogram

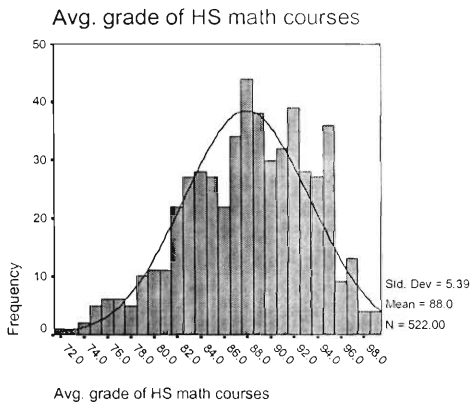


Figure 6.c: HS Math GPA Histogram

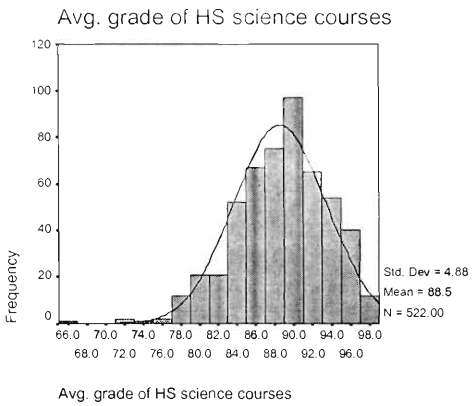


Figure 6.d: HS Science GPA Histogram

II. Findings in the Ambition Factor

If one had to rate the findings on the three factors of this study on a scale of 0, 1, or 2, with 0 being the worst and 2 being the best, this chapter would receive a 1. While the study was limited to the questions asked on the CIRP, these questions provided an

idea about the level of ambition a student has. One item to mention before looking at Figures 6.5 and 6.6 and other figures using gender, males outnumber the females with a ratio of over 3:1, which is typical of WPI in this period, though some recent years the ratio has been 4:1.

In the high school GPA analysis, ambition produces trends representing relationships in two ways. One trend that is noticeable is a drop in English GPA (Figure 6.1), the decrease in ambition is associated with an increase in the frequency of those with the lowest GPA. This trend cannot be seen in the other direction; grades do not increase with ambition. In the study of science (Figure 6.3), the ends of the spectrum show no trend, but in the middle quartiles of ambition, one finds a disproportionate number of students with the best GPAs. When ambition was plotted vs. high school math GPA, no trends were immediately evident, as the GPAs tended to be dispersed fairly equally across the whole spectrum.

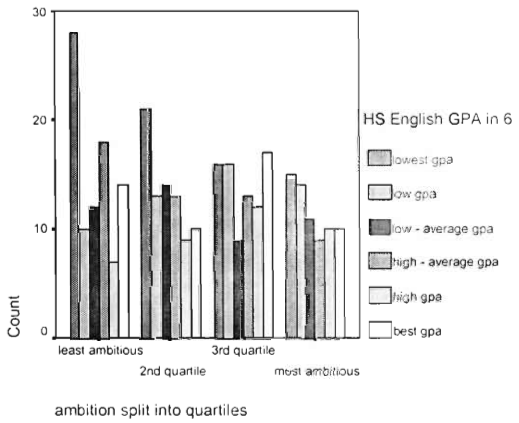


Figure 6.1: Ambition vs. HS English GPA

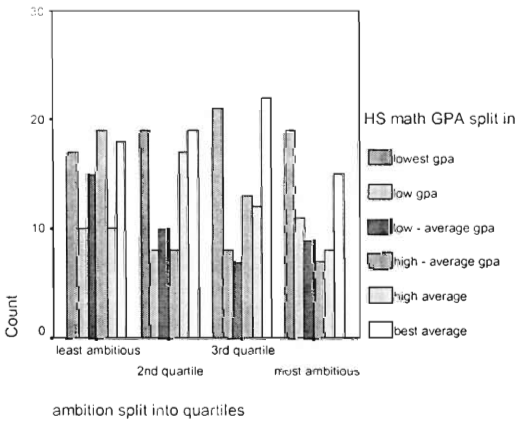


Figure 6.2: Ambition vs. HS Math GPA

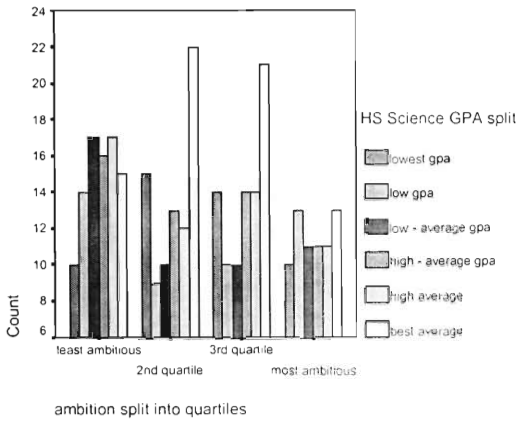


Figure 6.3: Ambition vs. HS Science GPA

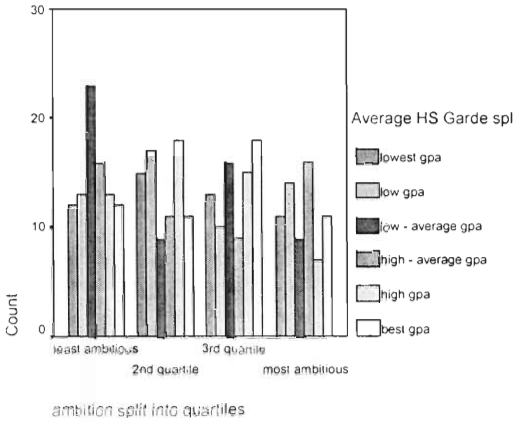


Figure 6.4: Ambition vs. Overall HS GPA

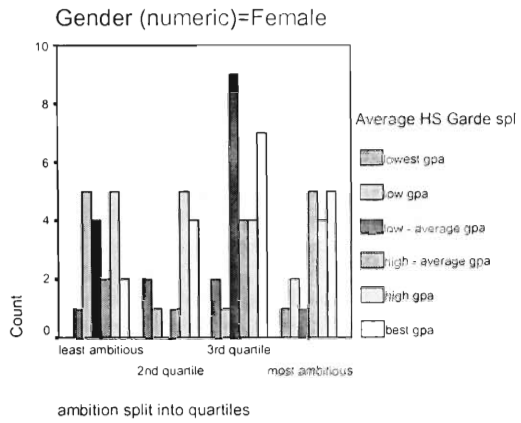


Figure 6.5: Ambition vs. Overall GPA (Female)

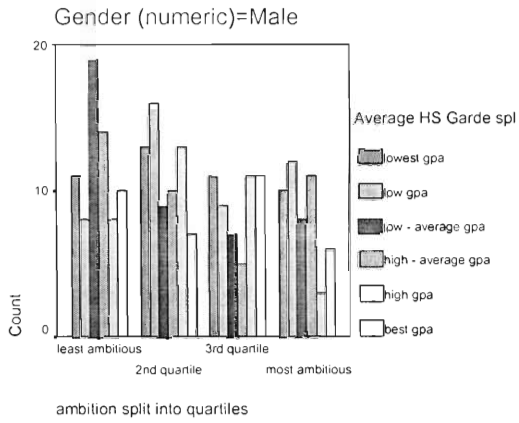


Figure 6.6: Ambition vs. Overall GPA (Male)

Our approach to looking for any links between the high school grades and the MBTI types ran afoul, due to the small number of students of certain types. We expected to find a strong relation between psychological type scores and higher or lower grades depending on the level of ambition. Figure 6.9 came close to showing that the least ambitious people have lower grades; the other quartiles show no relative result. No great outcome came from the MBTI layering of overall GPA. However, it was clear that the type varied considerably in average level of ambition and average grades.

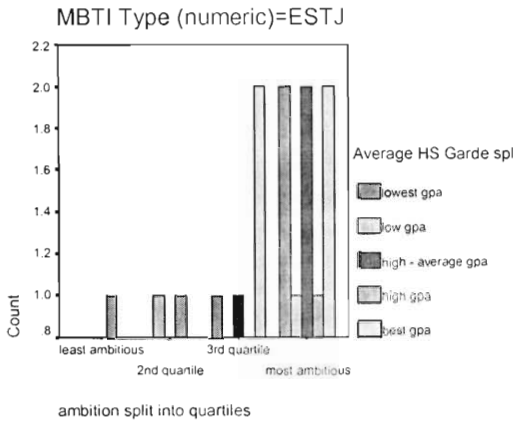


Figure 6.7: Ambition vs. Overall GPA (ESTJ)

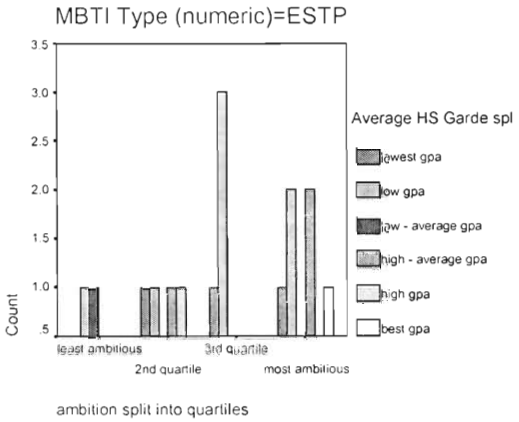


Figure 6.8: Ambition vs. Overall GPA (ESTP)

The first type to be distinguished is the group of students categorized as type ESFP. As seen in figure 6.9, there are not many of them in general, but what is so apparent is the poor academic performance regardless of the ambition levels. Students falling into the category of ENTJ (Figure 6.12) receive a similar distinction.

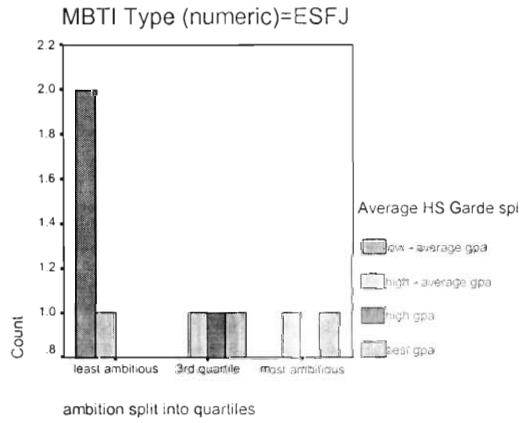


Figure 6.9: Ambition vs. Overall GPA (ESFP)

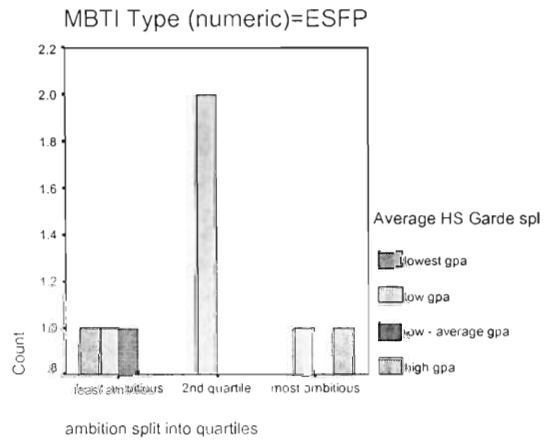


Figure 6.10: Ambition vs. Overall GPA (ESFP)

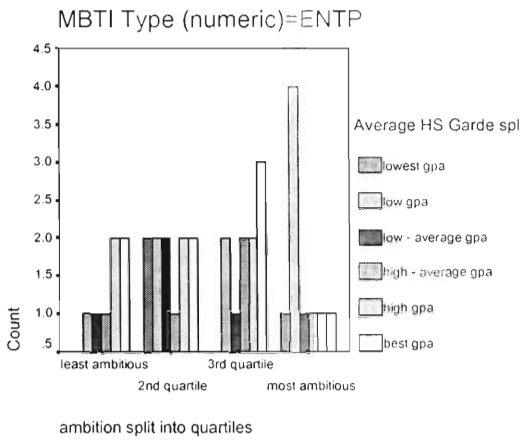


Figure 6.11: Ambition vs. Overall GPA (ENTP)

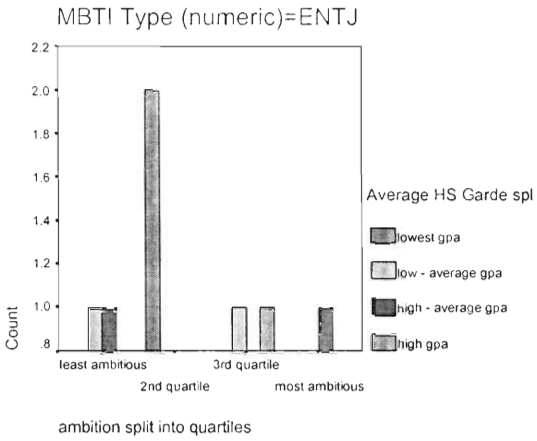


Figure 6.12: Ambition vs. Overall GPA (ENTJ)

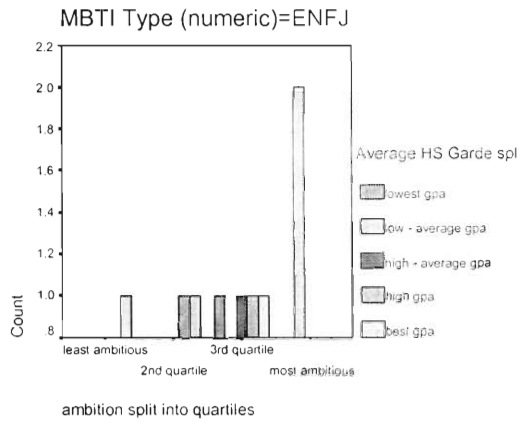


Figure 6.13: Ambition vs. Overall GPA (ENFJ)

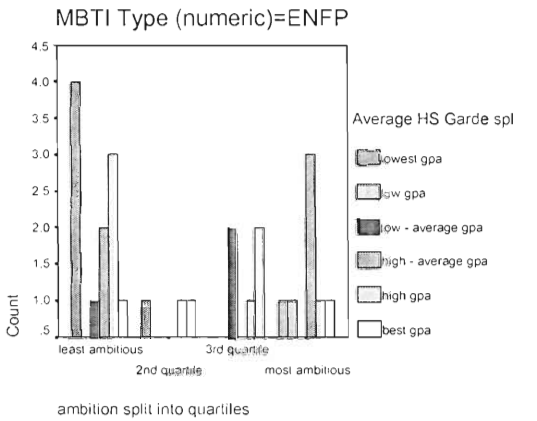


Figure 6.14: Ambition vs. Overall GPA (ENFP)

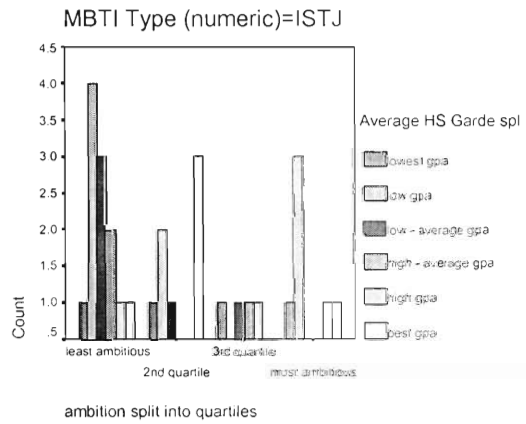


Figure 6.15: Ambition vs. Overall GPA (ISTJ)

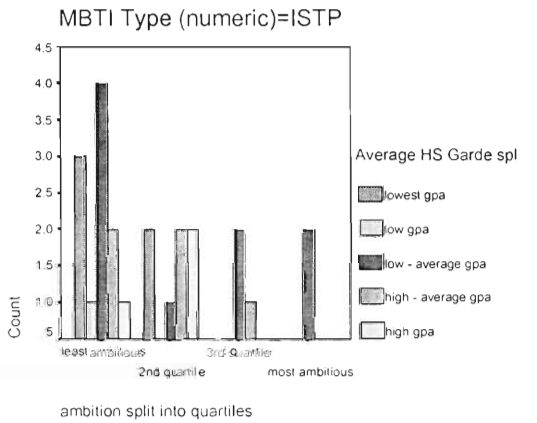


Figure 6.16: Ambition vs. Overall GPA (ISTP)

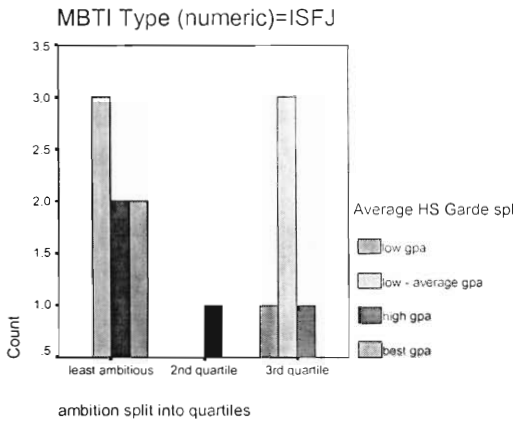


Figure 6.17: Ambition vs. Overall GPA (ISFJ)

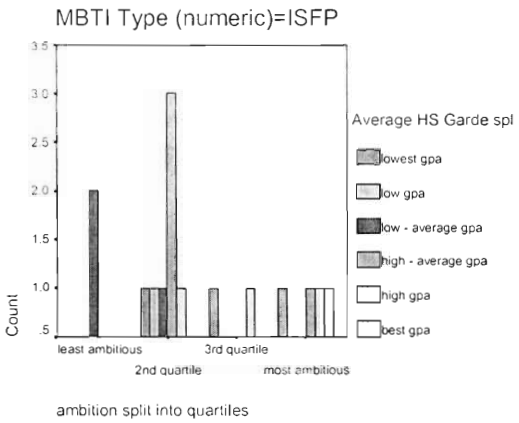


Figure 6.18: Ambition vs. Overall GPA (ISFP)

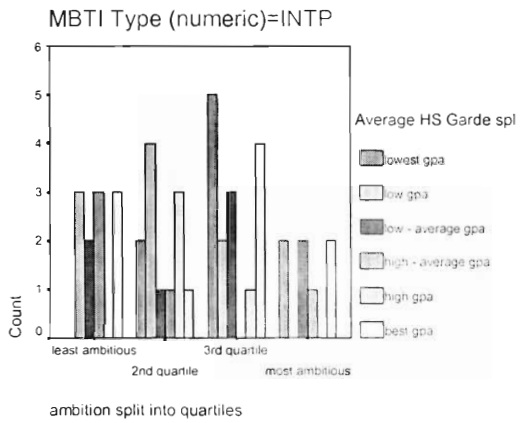


Figure 6.19: Ambition vs. Overall GPA (INTP)

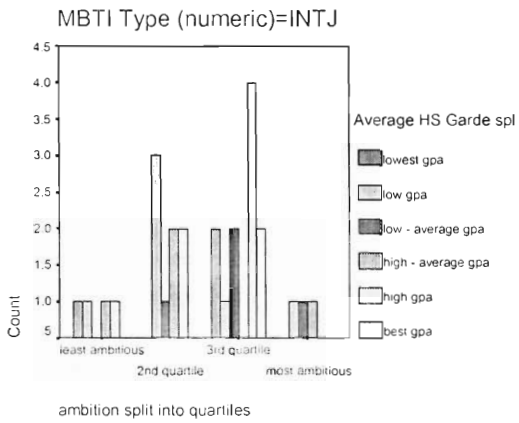


Figure 6.20: Ambition vs. Overall GPA (INTJ)

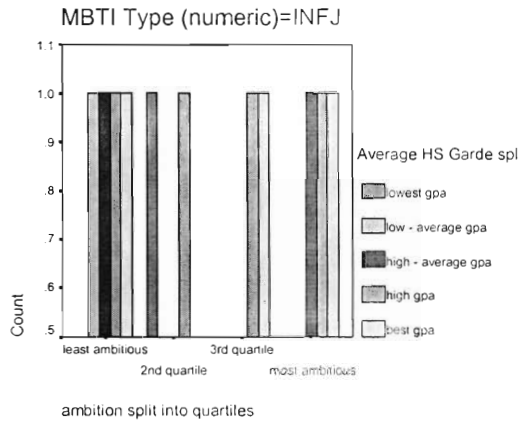


Figure 6.21: Ambition vs. Overall GPA (INFJ)

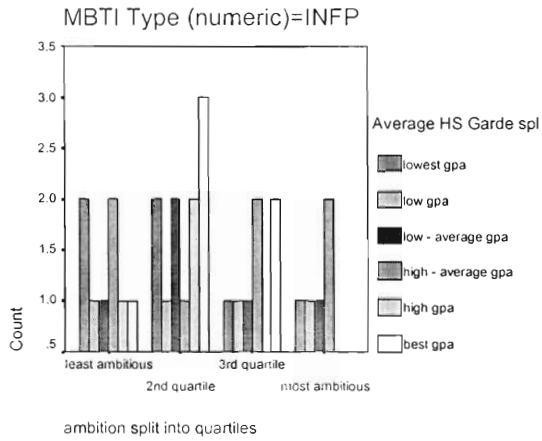


Figure 6.22: Ambition vs. Overall GPA (INFP)

Overall, the ambition factor seemed to say very little about how the student would perform during high school. Although the MBTI comparisons showed minimal trends in

academic performance, at least in some of the types, these patterns had little to do with levels of ambition in the students. Because of the relatively small number of participants in the study, drawing conclusions from the data proved difficult, if not impossible. That's why this factor received a 1 rating in the study.

III. Findings in the Confidence Factor

The confidence factor produced the best relationships, the rating given the variable would be a 2. Most of the figures show a relationship that suggests with an increase in confidence the number of students that had the best GPA went up. A decrease in confidence is also associated with an increase in the number of lowest GPA students. This could also be explained in the reverse role as well. Good grades in high school could lead to higher levels of confidence and vice-versa. This can be easily revealed in Figure 6.25. An expediential relation can be seen if averagely placed on the charts. This evidence proves that the factor of confidence can be shown to be related to the success a student has in high school.

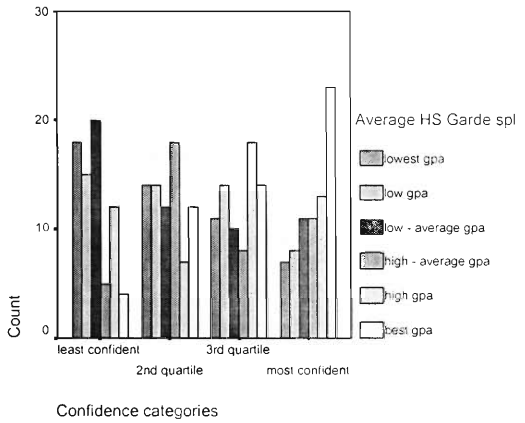


Figure 6.23: Confidence vs. Overall HS GPA

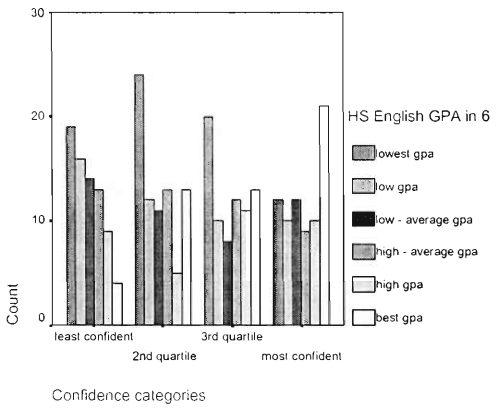


Figure 6.24: Confidence vs. HS English GPA

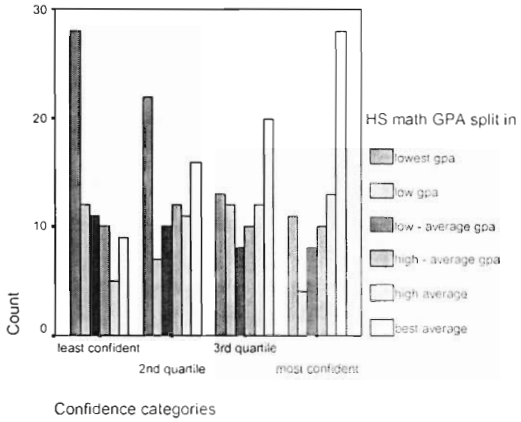


Figure 6.25: Confidence vs. HS Math GPA

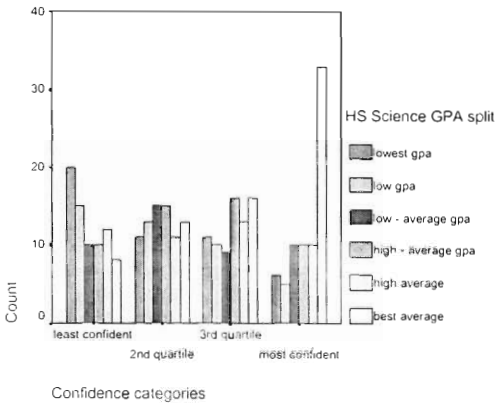


Figure 6.26: Confidence vs. HS Science GPA

Once again in Figure 6.27 and 6.28 the number of females causes the chart not to shown the relation that was found in other charts. It can also be said that females tend not to have confidence affect their high school grades, while it is evident that males either increase their confidence with success or have confidence shape their academic success more consistently than females.

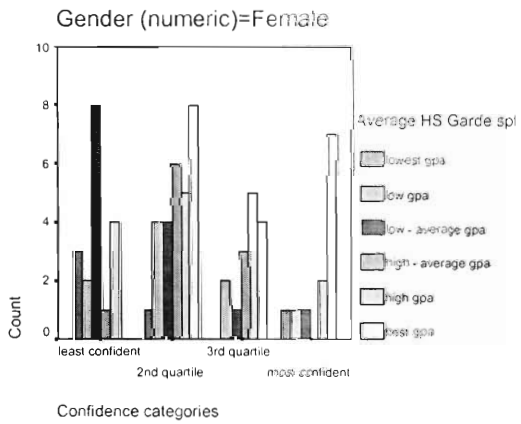


Figure 6.27: Confidence vs. Overall GPA (Female)

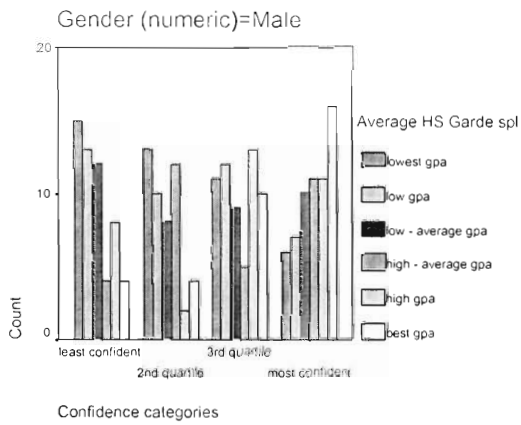


Figure 6.28: Confidence vs. Overall GPA (Male)

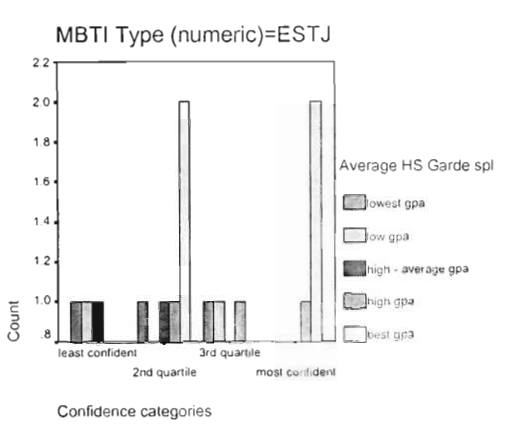


Figure 6.29: Confidence vs. Overall GPA (ESTJ)

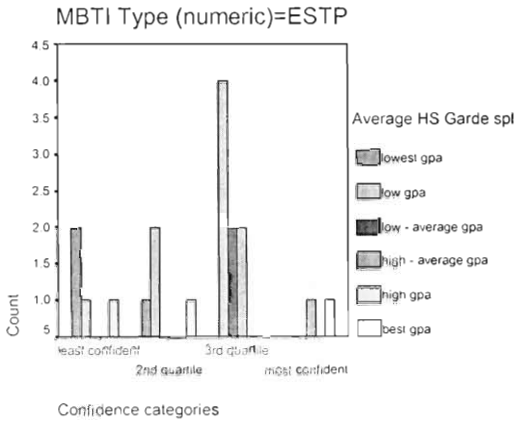


Figure 6.30: Confidence vs. Overall GPA (ESTP)

There is not much to be said concerning the MBTI data when dealing with confidence. Students classed as ENFP (Figure 6.32) tended to follow the pattern of performing at an academic level that was even across the quartiles, given an equal count of people but with no individual trend.

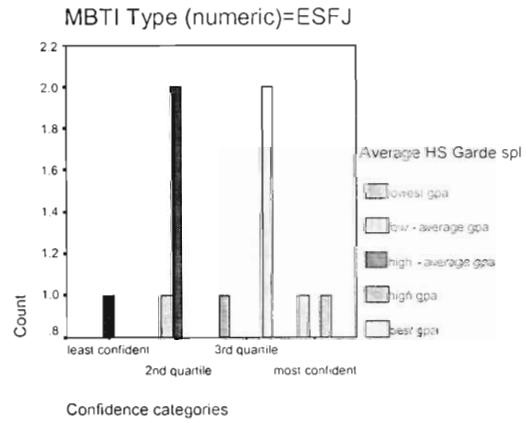


Figure 6.31: Confidence vs. Overall GPA (ESFJ)

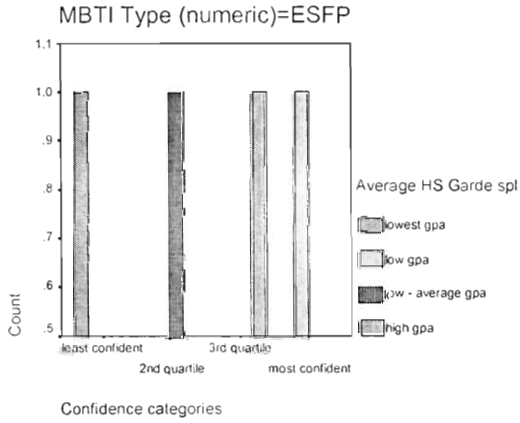


Figure 6.32: Confidence vs. Overall GPA (ESFP)

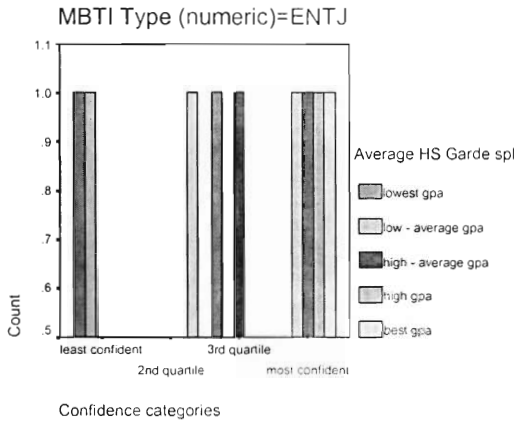


Figure 6.33: Confidence vs. Overall GPA (ENTJ)

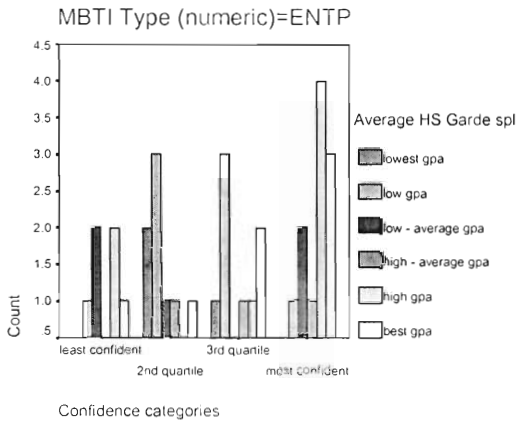


Figure 6.34: Confidence vs. Overall GPA (ENTP)

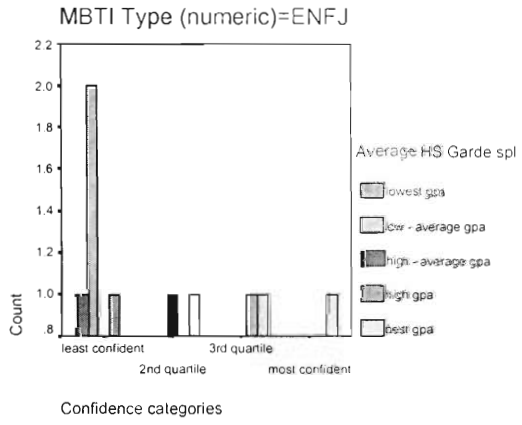


Figure 6.35: Confidence vs. Overall GPA (ENFJ)

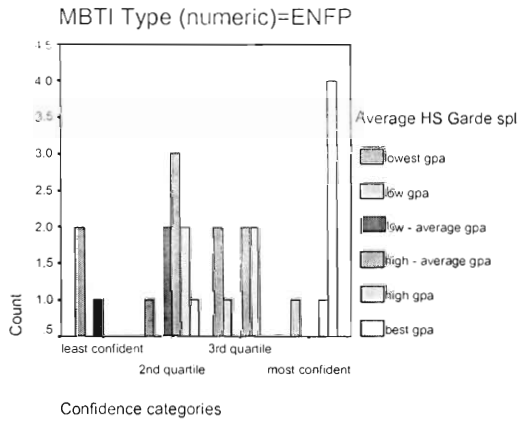


Figure 6.36: Confidence vs. Overall GPA (ENFP)

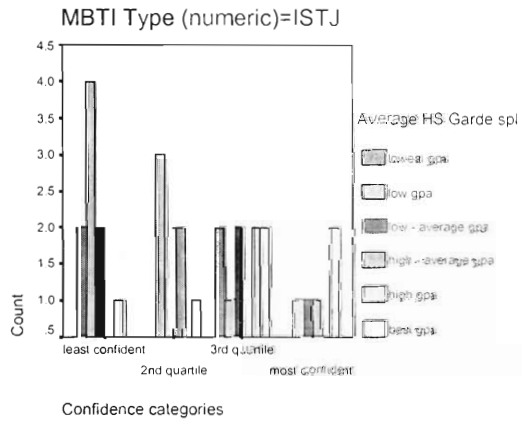


Figure 6.37: Confidence vs. Overall GPA (ISTJ)

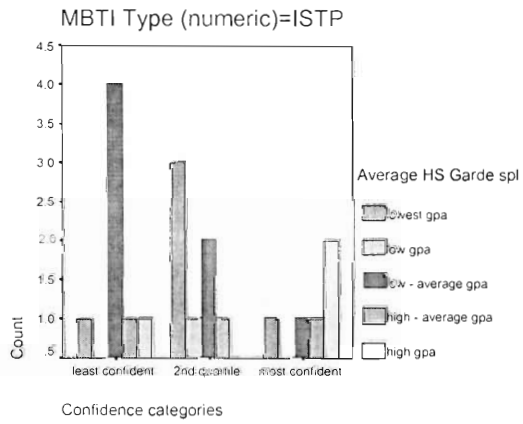


Figure 6.38: Confidence vs. Overall GPA (ISTP)

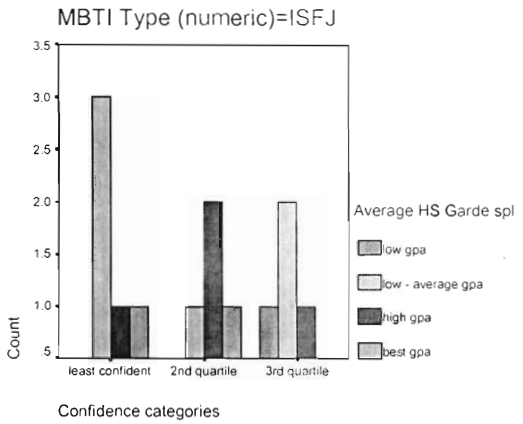


Figure 6.39: Confidence vs. Overall GPA (ISFJ)

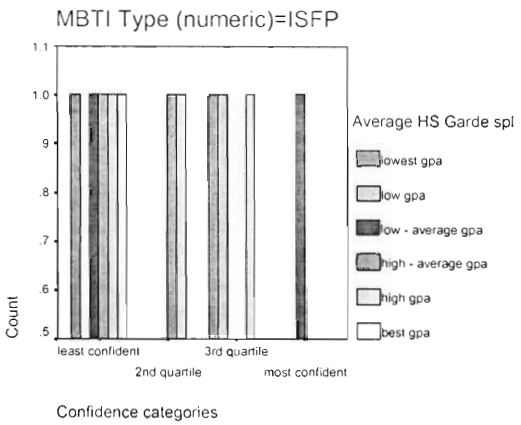


Figure 6.40: Confidence vs. Overall GPA (ISFP)

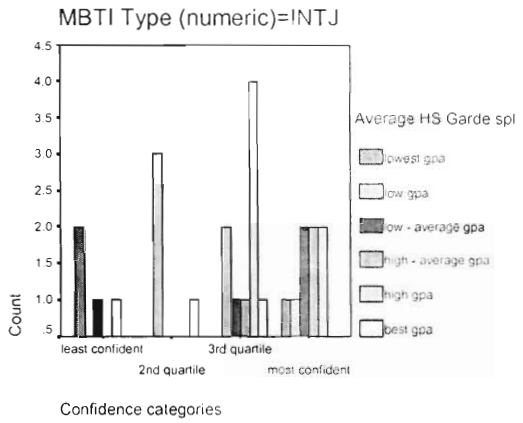


Figure 6.41: Confidence vs. Overall GPA (INTJ)

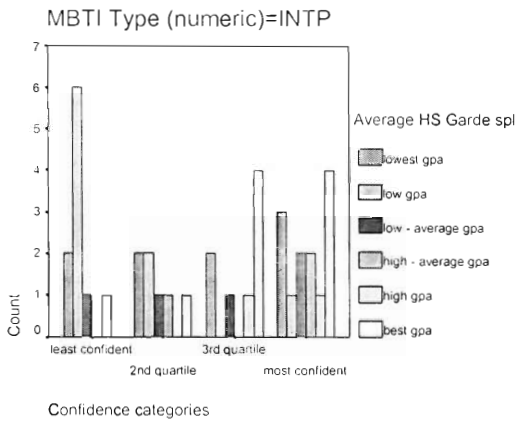


Figure 6.42: Confidence vs. Overall GPA (INTP)

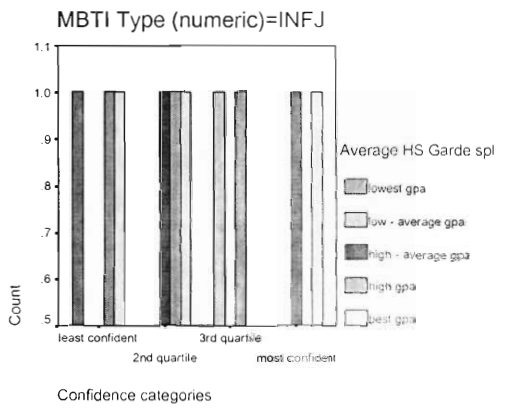


Figure 6.43: Confidence vs. Overall GPA (INFJ)

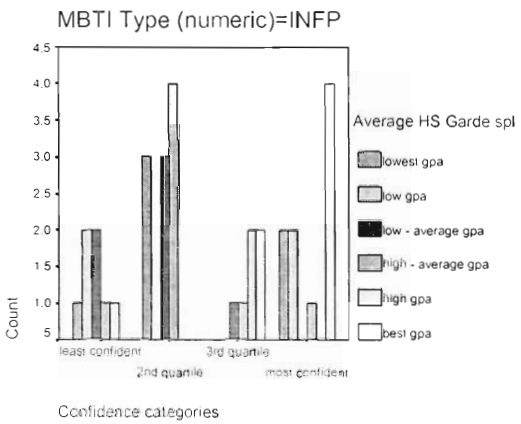


Figure 6.44: Confidence vs. Overall GPA (INFP)

The confidence variable has fairly consistently been associated with grades, at least among men. Lower levels in confidence resulted in an increase in numbers of poor grades and a decrease in the proportion with good grade point averages. The other

extreme held true as well. As confidence levels increased, so did the number of good grades, while the number of poor grade point averages decreased with a decrease in confidence.

Again, with all the factors, the question arises of whether the questions used as a foundation for the confidence factor or other factors were a solid source. The results of the confidence factor seem to follow a logical pattern, it is probable that the confidence factor answers all questions about its validity. There is another study (Jesse and Shannon) that found relations in confidence associated with MBTI types – though they did not look at the high school performance data.

IV. Findings in the Focus Factor

This factor got the rating of 0, no real trends were found linking high school performance to those who seemed to be the most focused students. Looking back on this study, the focus variable was the most troublesome. Conceptually to construct this item on the CIRP questionnaire, six questions were chosen that seemed to relate to focus. After performing a correlation of one to each of the others – and an overall score, only one question correlated with the composite, leaving us with a one question variable. There was only one we felt able to claim face validity to the concept without an analysis that proved that these items were related. Chapter 9 will bring forth questions that could be added to the CIRP to give a better indication of focus.

When looking at figures 6.45 – 6.48, one trend results. The least focused students had the lowest count of students. This could show that only focused students attend WPI, but that would be based on the one question, but if there is no variance on an item, it is

useless as a variable. WPI students are just too much alike on this item for it to be predictive.

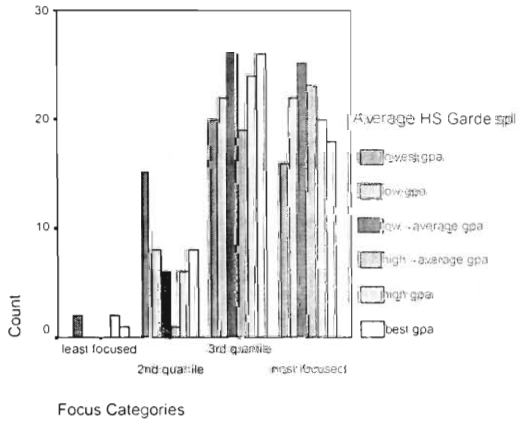


Figure 6.45: Focus vs. Overall HS GPA

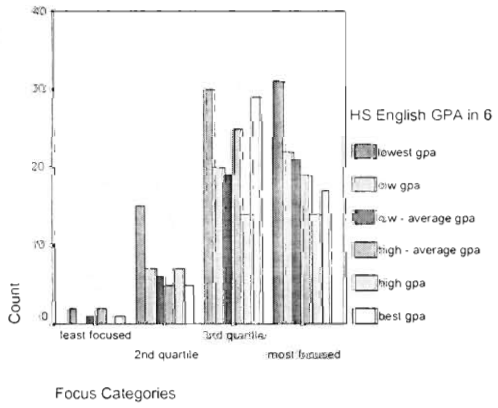


Figure 6.46: Focus vs. HS English GPA

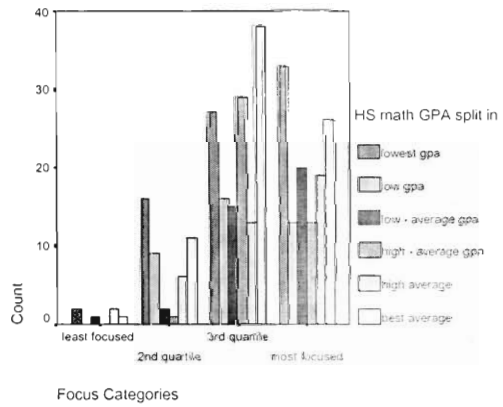


Figure 6.47: Focus vs. HS Math GPA

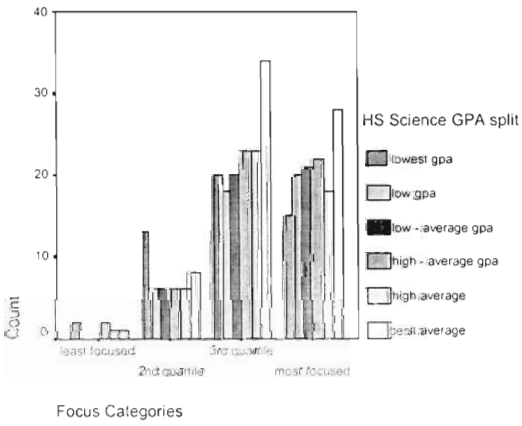
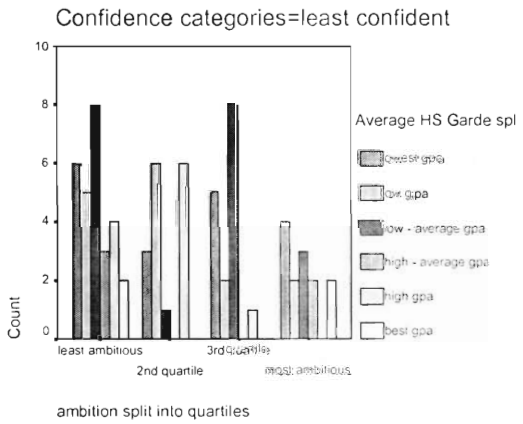


Figure 6.48: Focus vs. HS Science GPA

V. Multi-Factor Findings

The effort was made to combine two of the variables and then compare them as a unit to the overall GPA. Because the ratings of ambition and focus factors were low and the findings were not strong, the confidence factor was the only one that demonstrated fair patterns; the combination of two variables did not yield much that was different than what had already been observed.



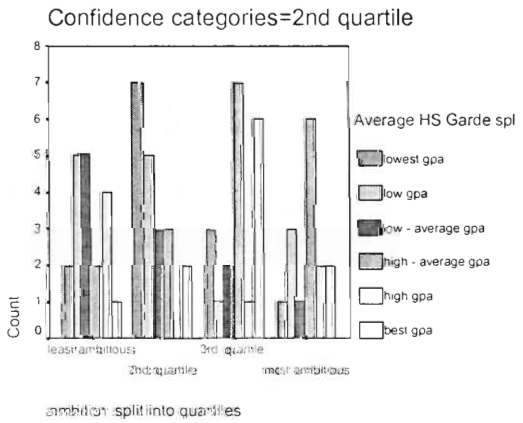
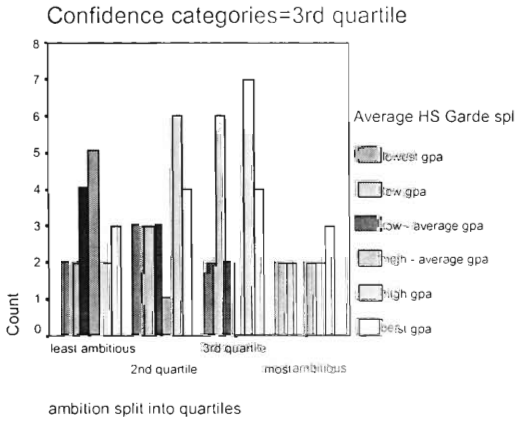


Figure 6.49: Ambit. & Conf. (least) vs. Overall GPA ***Figure 6.50: Ambit. & Conf. (2^{nd}) vs. Overall GPA***



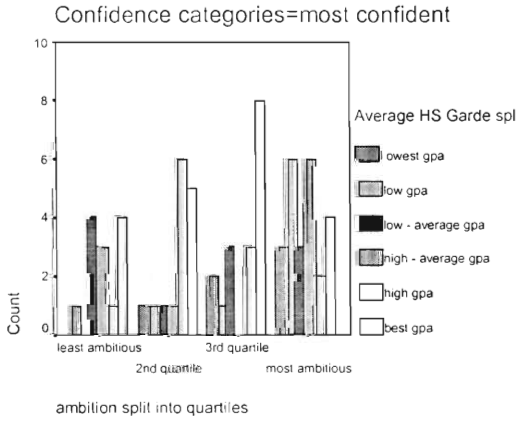


Figure 6.51: Ambit. & Conf. (3rd) vs. Overall GPA ***Figure 6.52: Ambit. & Conf.(most) vs. Overall GPA***

The graphs that are compared with focus and other factors could be overlooked. (Figures 6.53 – 6.60) The focus factor has proven to have no impact on the grades of students and can reverse a finding. If this procedure was repeated a better result could be found with an improved focus variable. Because our focus variable was so general, its interpretation is very open, and therefore, really does not serve as a reliable indicator. With more specific questions generated towards the academic focus of a student, this factor could be much better analyzed.

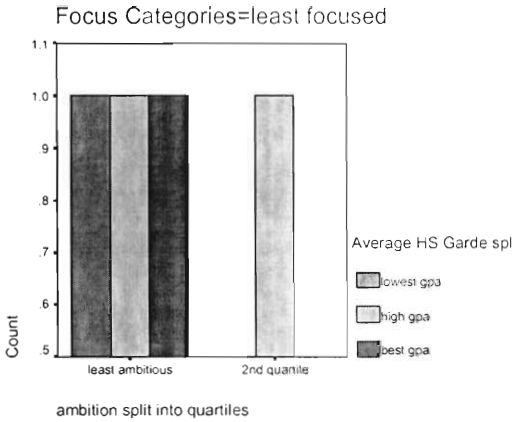


Figure 6.53: Ambit. & Foc. (Least) vs. Overall GPA

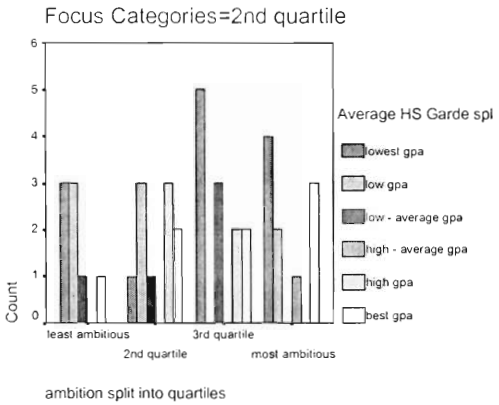


Figure 6.54: Ambit. & Foc. (2nd) vs. Overall GPA

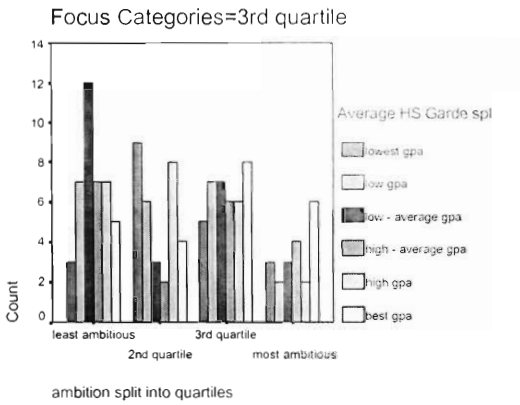


Figure 6.55: Ambit. & Foc. (3rd) vs. Overall GPA

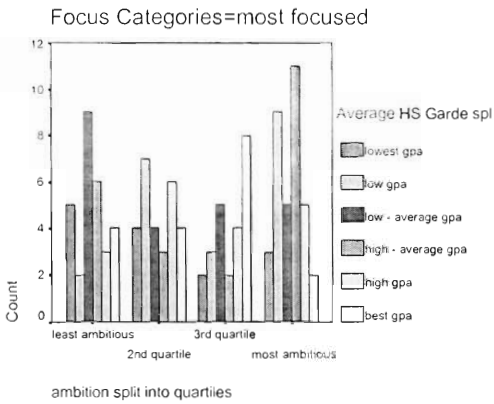


Figure 6.56: Ambit. & Foc. (Most) vs. Overall GPA

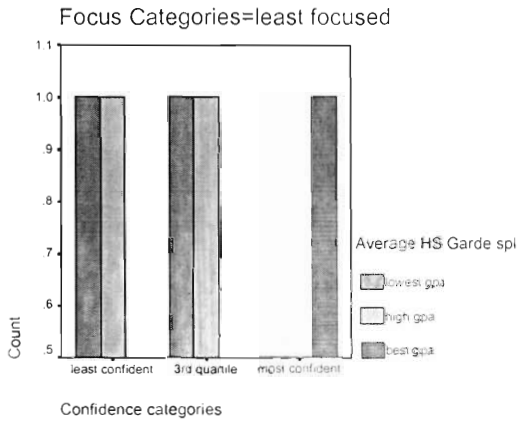


Figure 6.57: Conf. & Foc. (Least) vs. Overall GPA

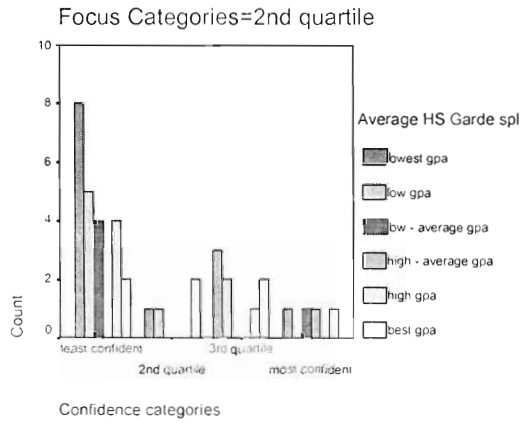


Figure 6.58: Conf. & Foc. (2nd) vs. Overall GPA

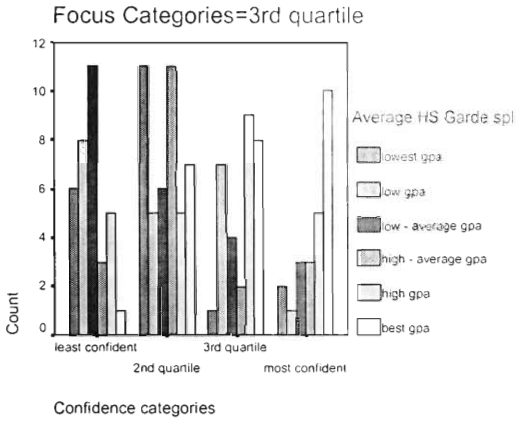


Figure 6.59: Conf. & Foc. (3rd) vs. Overall GPA

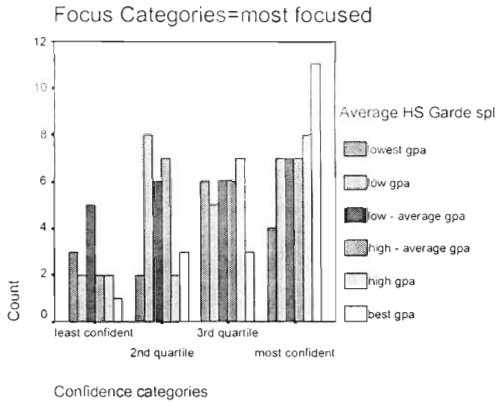


Figure 6.60: Conf. & Foc. (Most) vs. Overall GPA

VI. Summary and Conclusions

In part, the analysis of the high school grades in terms of the factors of ambition, confidence and focus was successful. We view this as a calibration effort in which we tried to see whether the new composite variables correlated with the immediate part before trying to use them to predict future performance.

There are several reasons to do this verification of the indicators to the high school grades before college grades. First, if focus had been highly related to high school grades and then went on to predict college performance in the first year; one would ask whether it was based on prior grades or on the intellect quality that mattered. From this case we know that focus did not relate to high school grades. But if the focus variable were defined better, maybe on the CIRP survey, it would have been interesting to see it related to college grades knowing that it doesn't relate to high school grades. This leaves others to look deeper into the focus variable.

Second, conceptually the ambition factor is not invalidated by a lack of relationships to past school performance. If this does not appear in the college

performance data among approximately equally prepared students, it might raise some question.

Third, the issue with confidence is that it might be a cause or effect of high school performance. However, as one turns to college grades, confidence on arrival would seem to be a promising predictor. The problem is that if it correlates with high school grades as well, which of the two is correct, prior grades or prior confidence? So, an explanation into the high school grades was done first so that one would know whether relationships with the college data "made sense" or was it questionable reliability due to the CIRP data not measuring what it seemed to.

The levels of confidence variable produced clear correlations summarizing what was actually found with academic performance. Of the three factors, confidence was the easiest to identify when dealing with the CIRP data, as it showed up in a multitude of different questions, many of which correlated well with each other. Ambition showed different results, most of which indicated that there was no real relationship between the academic success of the student and the level of ambition in which the student had at the end of high school. Focus wound up being the most questionable and least related factor in the analysis. This could be from the use of only one question that defined the variable.

The three factors may not have all led to expected results nonetheless; the credible evidence can be taken away from the analysis. The relationships revealed that there are trends in confidence and academic success. With further development of the focus and ambition factors, possibly by another group in the future, better results are sure to be found.

Chapter 7 – Analysis of the WPI First-Year Grades

I. Introduction

The first year grades of the students of the class of 2002 serve as the primary dependant variable of this entire study. From these grades we hope to establish a foundation of what will be a steady academic performance and a good indication of the level of success that the student will achieve at WPI.

One of the original study goals was to attain the sophomore grades for the class of 2002 as well and use them as a means of comparison with the first year grades. The theory under consideration was that some students take a year to adjust to the college life and the work load that comes with it, especially the kind of work load that one can expect when attending WPI. However, the registrar was backlogging with requests for data, so we were not able to get a hold of the grades. Therefore, it was not possible to do the comparison between grades from the different years. Perhaps a future research group can test our theory that sophomore grades (in the same fields) tend to be higher than freshman grades, especially for students not used to a heavy workload in high school.

As mentioned in chapter five, the analysis of the first-year grades was broken into four main sections and one minor section. The first three sections examined the relationships found between the grades on a term level and on an overall basis for the year vs. the three individual factors. The fourth section was dedicated to trends concerning a combination of two of the three factors vs. first-year grades. Finally, a fifth section looked at patterns between the factors themselves.

Figures 7a, 7b, 7c, and 7d show the frequency distribution graphs for the first four variables in this analysis with first-year "GPA" data for the class of 2002 and the various levels of ambition, confidence and focus. Please recall that this "GPA" is not an actual GPA, but rather, a calculated one based on a predefined scale, as WPI does not have an official GPA. Attention should be paid in particular to the ambition distribution and the confidence distribution. It was noted earlier that these curves do not necessarily cover the whole spectrum of possible values on these scales according to the CIRP. The WPI data at least are skewed. WPI students tended to score towards the higher end of the spectrum when looking at the factors of ambition, confidence and focus (confidence and focus in particular).

In addition to being an interesting observation, a crucial item to note before beginning the analysis. A relative comparison needed to be used in the study because most students at WPI tended to rate towards the higher end of the spectrum in the factors of focus, confidence and ambition. For example, a student may have a confidence score that tends to be on the low end of the distribution in comparison to the majority of the students at WPI and would have therefore been placed in the category of low confidence. This may have been completely different however if the student were in a different environment where students tended to cover a broader range of scores. In this instance, the student's relative confidence would have been much different, and would therefore be considered perhaps average or even above average as far as confidence is concerned for all students in the CIRP database. The same type of thing is true when looking at the other variables in the study as well.

One more thing to note before starting is that the focus category is broken down into integer scores between one and four, with most students ranking on the higher end of the focus range. This results in an uneven distribution when looking at the charts and graphs.

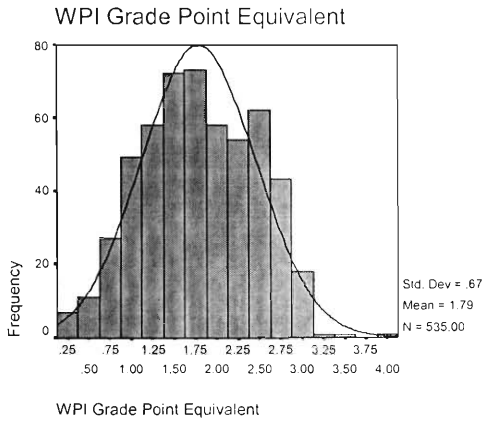


Figure 7a: WPI GPA Distribution

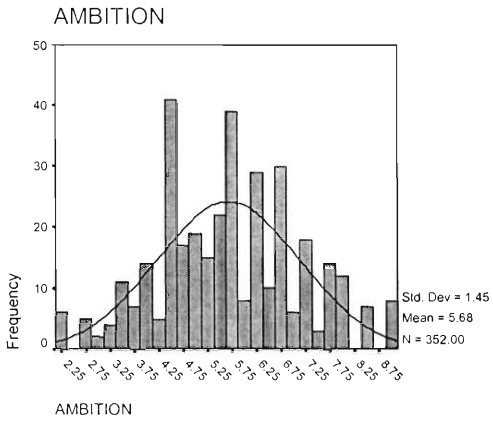


Figure 7b: Ambition Distribution

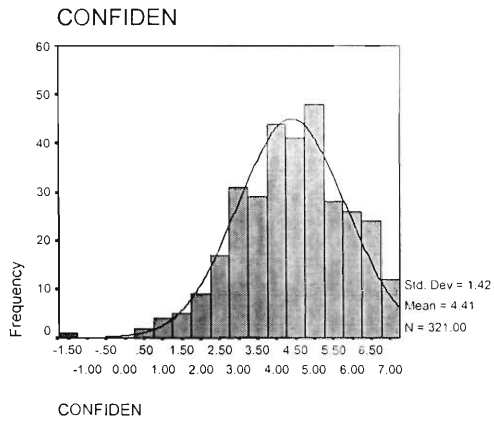


Figure 7c: Confidence Distribution

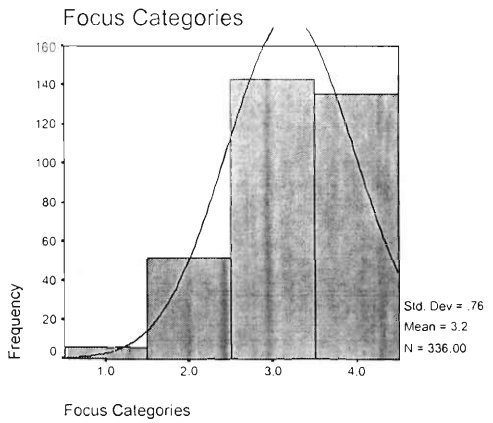


Figure 7d: Focus Distribution

II. Findings in the Ambition Factor

The results from looking at the ambition factor vs. WPI first-year grades are very unclear and seem to indicate that a student's ambition is not systematically related to his or her academic performance. As with confidence, ambition was viewed both in light of female statistics vs. male statistics and is also broken down by MBTI personality types.

Ambition was also compared to grade variable broken down over the four terms as well. Prior studies of the class of 2002 have already looked at performance and MBTI data on a term-by-term basis, so the decision was made to not repeat those efforts in this study.

Figure 7.1 shows ambition measured against the overall grades for the first year. As can be seen, there are no consistent patterns associated with ambition levels. The theory was that the higher grades would be associated with strong ambition but if anything, the reverse is true from the highest ambition groups and that theory works only for the second highest ambition groups. It was always possible that high ambition was a compensation, such that those who have to work hardest have to want it most to succeed. Even this alternative theory is not a good fit with the overall finding, especially that on the low end.

In fact, the amount of students that fell into the range of having a low or the worst GPA over the first year at WPI is almost equal in all 4 categories of ambition. Also interesting to take note of is the fact that the students that did the best during their first year fell in the middle 50% as far as ambition is concerned. The average performers tended to fall into the two extreme categories of ambition. In essence, the more or less ambitious the student was, the more likely they were to be a very average student as far as academic performance is concerned, both extremes of ambition fell into the moderate to average performance categories.

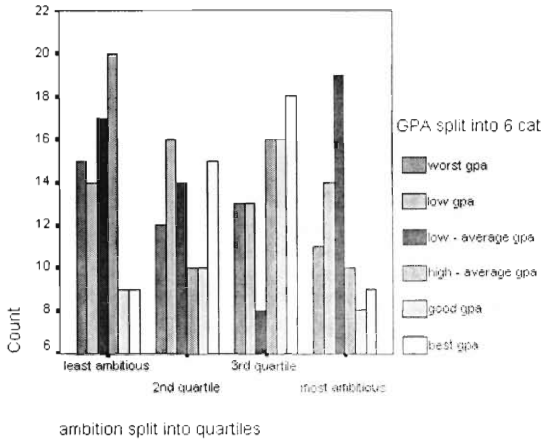


Figure 7.1: Ambition vs. Overall GPA

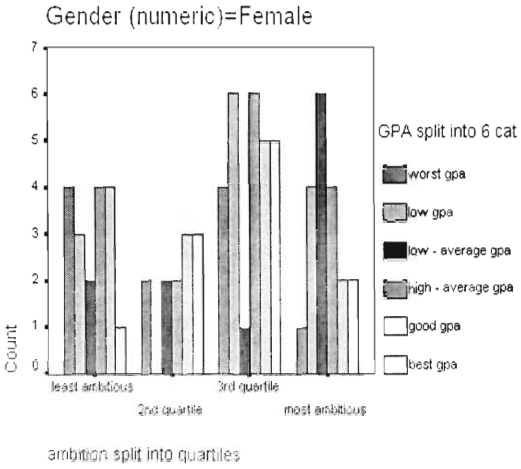
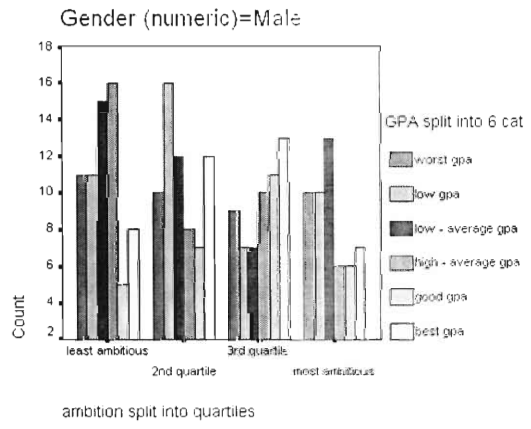


Figure 7.2: Ambition vs. Overall GPA (Females)

When comparing the performance between the males and the females, the results varied a bit by sex but are still quite similar in their nature within each group. Particularly noticeable in the males, sub par academic performance (poor GPA) was quite evenly dispersed over all four categories of ambition, while surprisingly, poor academic performance tended to increase as the levels of ambition went up. In both cases, the best academic performers tended to reside in the middle two quartiles of the ambition factor, while the two extremes tended to perform at a lower level. The women tended to be more ambitious on average and the most ambitious were not the academic stars, but tended to be average performers, GPA wise.



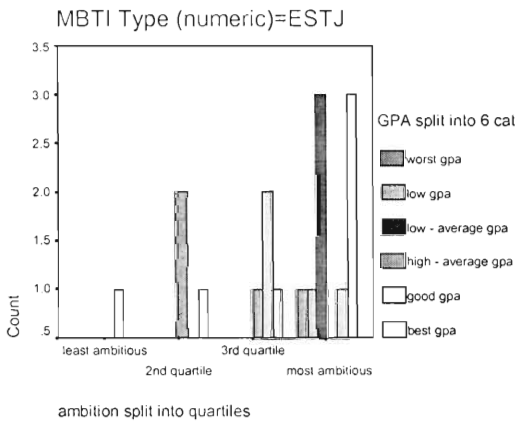


Figure 7.3: Ambition vs. Overall GPA (Males)

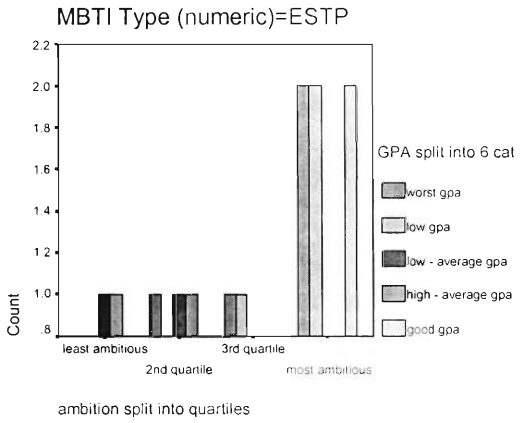


Figure 7.4: Ambition vs. Overall GPA (ESTJ)

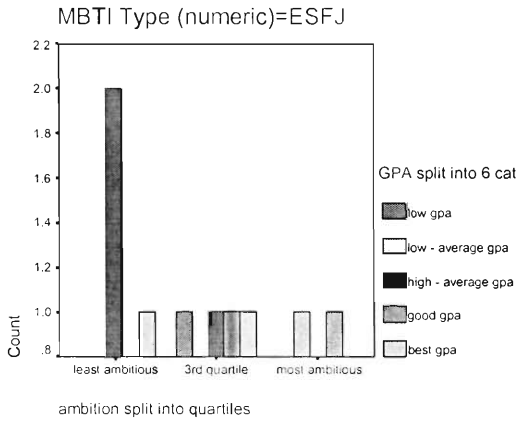


Figure 7.5: Ambition vs. Overall GPA (ESTP)

Figure 7.6: Ambition vs. Overall GPA (ESFJ)

There are two key items to pay attention to when breaking down the MBTI data. The first is to note that in some cases, the particular personality types tended to be concentrated in one or two common quartiles. Second, in some cases, all the students of a type tended to perform at essentially the same level, regardless of ambition levels.

The first type to be distinguished is the group of students categorized as type ESFP. As seen in figure 7.7, there are not many of them (six in all), but what is so evident is the poor academic performance regardless of the ambition levels. Students falling into the category of ENTJ (Figure 7.8) did not fair much better.

Another interesting case to look at is the students categorized as ISFJ (see Figure 7.14). Perhaps most representative of our study of ambition, these students tended to fall into the second highest and lowest levels of ambition yet in both quartiles, had an identical number of students that performed at both an extremely high level and that performed at a low level.

In retrospect, the study may have proven to be more conclusive, had the MBTI types been broken down into four groups, instead of the 16. The 16 variations proved to contain too small a study group for any real tendencies to be noted, and thus conclusions

on this section remain incomplete. For future tests, breaking the MBTI into four groups is recommended.

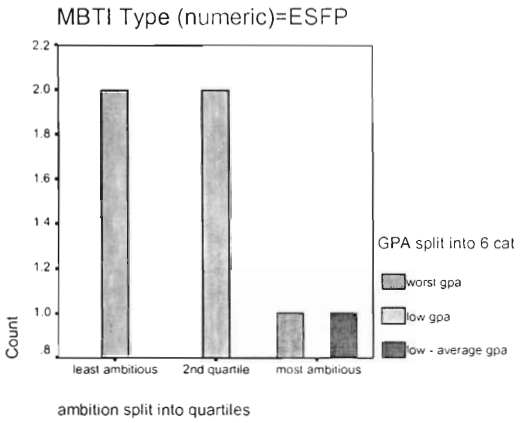


*Figure 7.7: **Ambition** vs. Overall GPA (ESFP)*

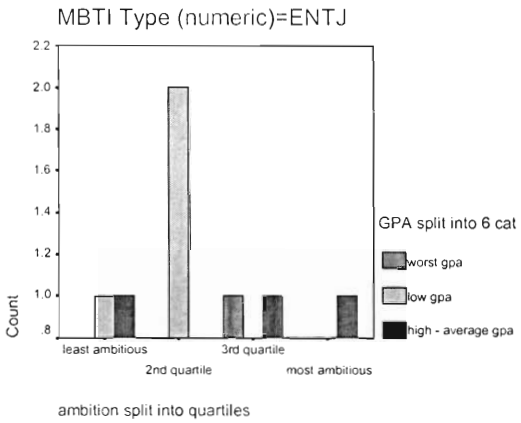


*Figure 7.8: Ambition vs. Overall **GPA (ENTJ)***

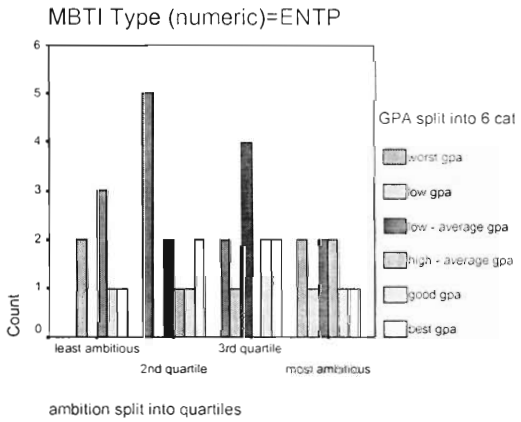


*Figure 7.9: **Ambition** vs. Overall GPA (ENTP)*

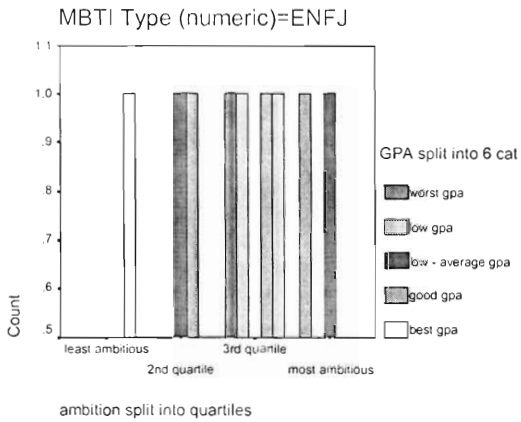


*Figure 7.10: **Ambition** vs. Overall GPA (ENFJ)*

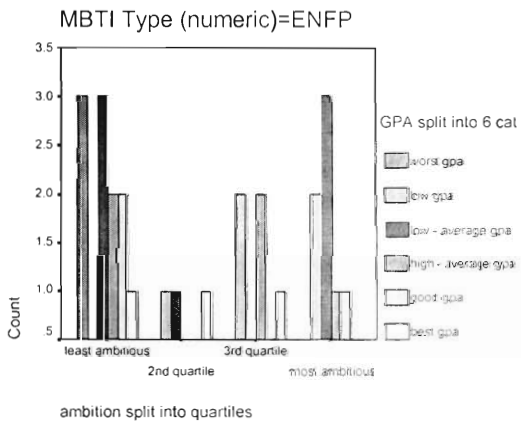


*Figure 7.11: **Ambition** vs. Overall GPA (ENFP)*

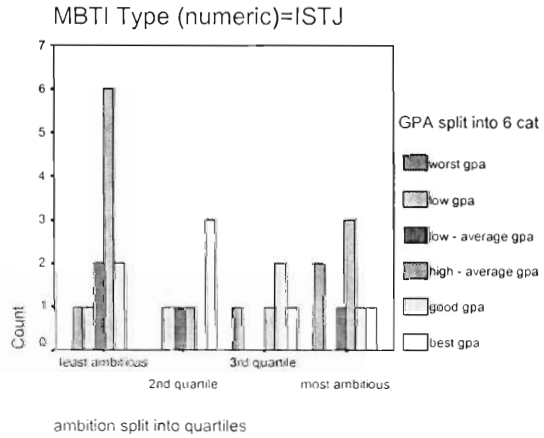


*Figure 7.12: Ambition vs. Overall **GPA (ISTJ)***

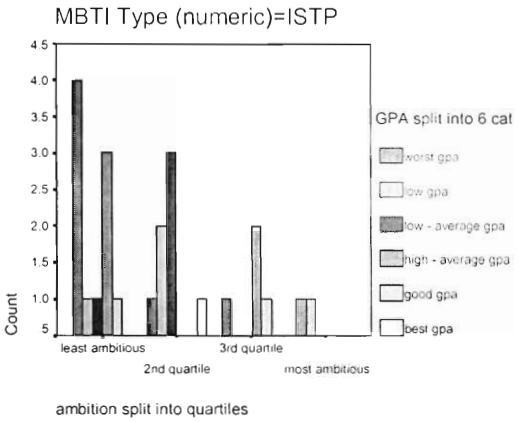


Figure 7.13: Ambition vs. Overall GPA (ISTP)

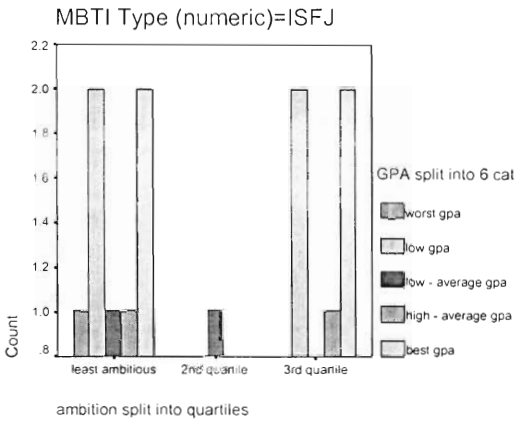


Figure 7.14: Ambition vs. Overall GPA (ISFJ)

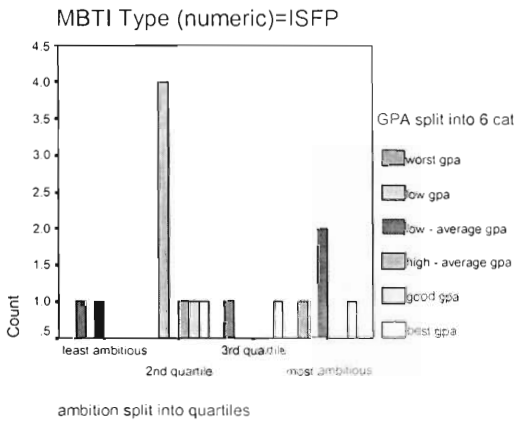


Figure 7.15: Ambition vs. Overall GPA (ISFP)

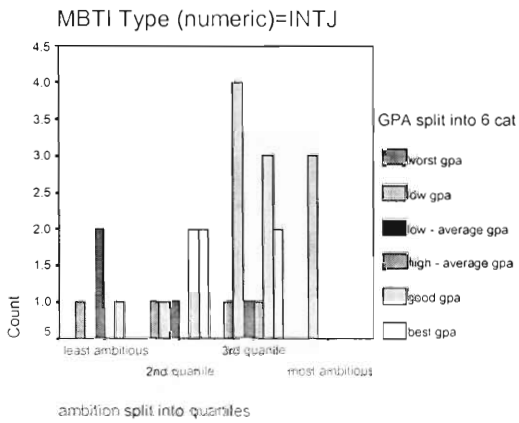


Figure 7.16: Ambition vs. Overall GPA (INTJ)

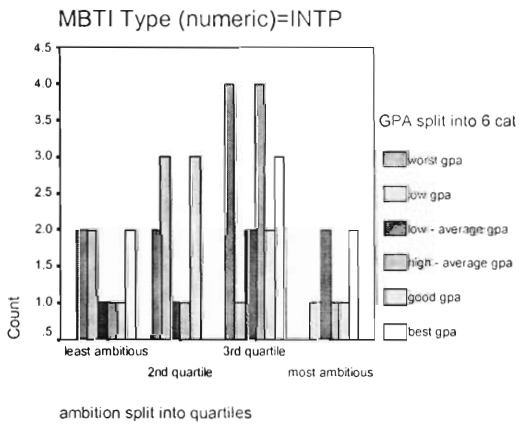


Figure 7.17: Ambition vs. Overall GPA (INTP)

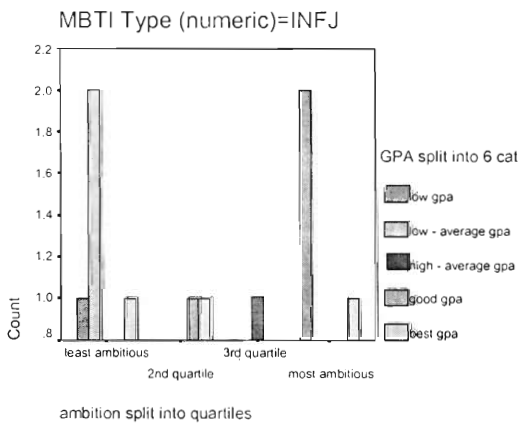


Figure 7.18: Ambition vs. Overall GPA (INFJ)

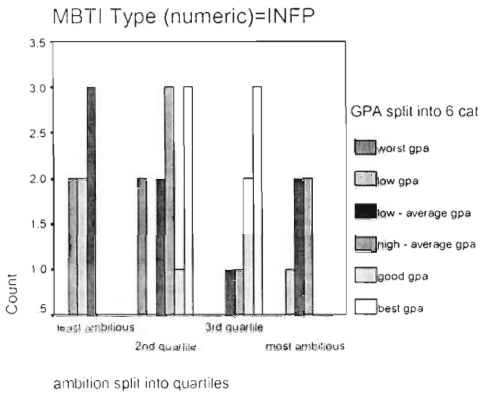


Figure 7.19: Ambition vs. Overall GPA (INFP)

Figure 7.20 shows ambition vs. the A-term GPA of students. As is the case with the overall grades, the level at which students performed seemed to be quite evenly dispersed over the four quartiles of ambition. The same is true with each of the other three terms as well.

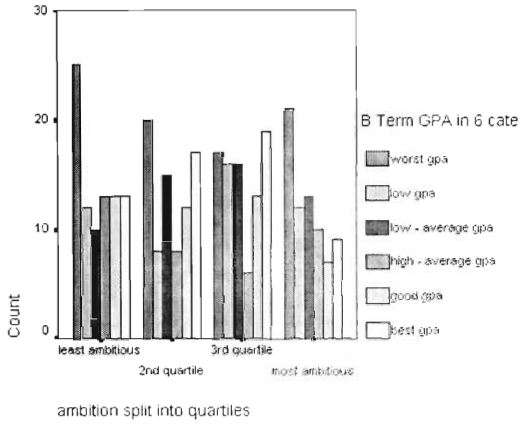


Figure 7.21: Ambition vs. B Term GPA

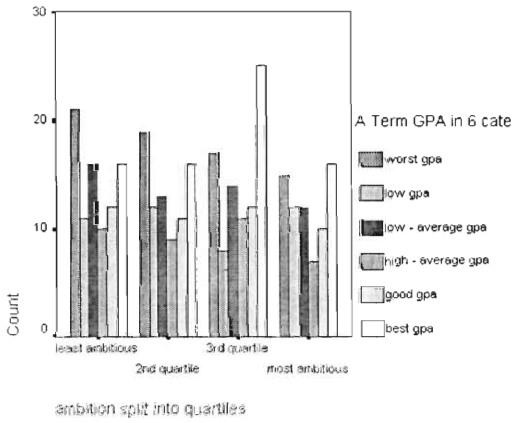


Figure 7.20: Ambition vs. A Term GPA

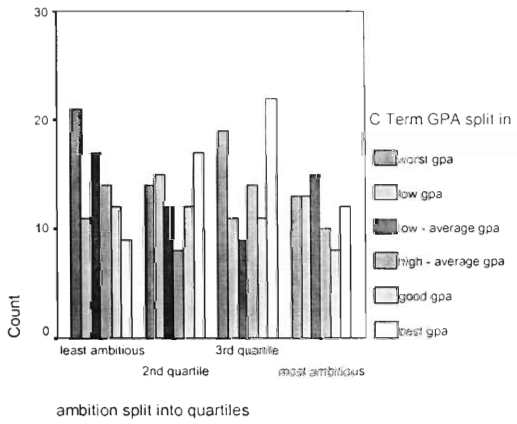


Figure 7.22: Ambition vs. C Term GPA

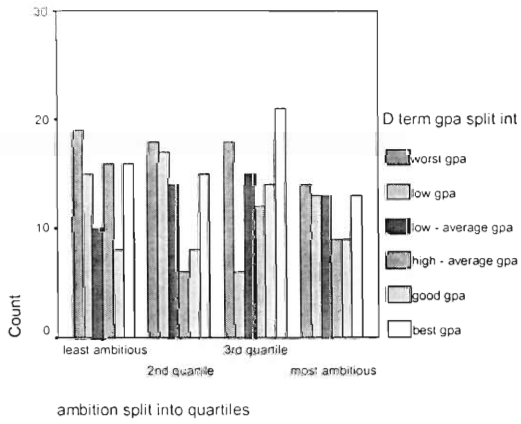


Figure 7.23: Ambition vs. D Term GPA

Overall, the ambition factor seemed to bear little by way of a linear relationship to how the student would perform at the school, at least during the first year. Although the MBTI comparisons showed trends in academic performance, at least in some of the types, these patterns had little to do with levels of ambition in the students.

There are a few possible explanations as to why the ambition factor showed little to nothing in the way of academic performance. First there is the possibility that academic performance has little to do with levels of ambition, which is what the tables would seem to indicate on their face. Second, there is the prospect that the questions gathered from the CIRP did not necessarily represent ambition in the student, but rather represented some other factor that may or may not relate to ambition. Third, because of the fact that an analysis based on relative comparisons was done, the chances that the study looked at too narrow of a spectrum is possible, and therefore does little in showing trends. This would be the result of working with a dataset like the one that could be expected at WPI or any engineering school with a strong student body. Had the study been conducted at a state college, where levels would have ranged much more greatly, it is possible that very different results would have been found, and ambition would be more of a factor – especially if it were associated with different levels of serious attention to studies in high school. This is a measure taken after high school training is complete.

III. Findings in the Confidence Factor

Confidence tended to be more related to performance patterns than did ambition. As with ambition, confidence was viewed both in light of female statistics vs. male

statistics and is also broken down by MBTI personality types. The confidence factor was also compared to the grades broken down over the four terms.

Figure 7.24 shows confidence vs. the overall GPA's of students at WPI. Perhaps the most noticeable and logical trend seen is the decline of low performance as confidence levels went up. Similarly, as confidence levels went up, so did academic performance in the students, especially for the males.

When the study was broken up between males and females, males seemed to follow this pattern much more closely than did the females. Males tended to pursue the pattern of a direct relationship between academic performance and confidence level. Females tended to have erratic results, suggesting that the top female performers have enough doubts to be in the second lowest quartile of confidence for the WPI student body as a whole. This again looked like a curvilinear relationship. Although the trend in females of poor grades decreasing as confidence levels decreased, the females did not particularly perform at higher levels as confidence went up. Neither was there a clear pattern in the middle of levels of the performance.

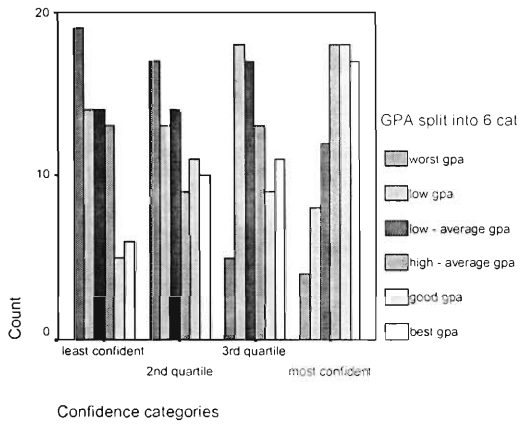


Figure 7.24: Confidence vs. Overall GPA

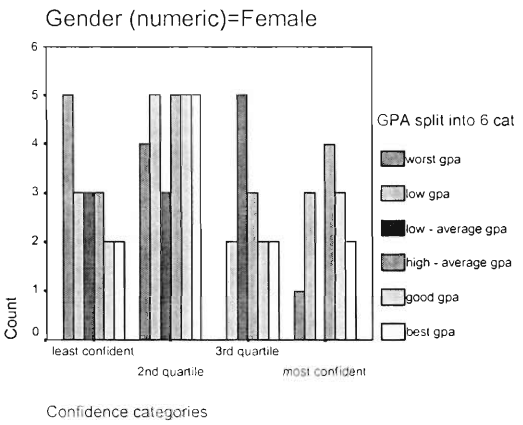


*Figure 7.25: Confidence vs. Overall **GPA (Females)***

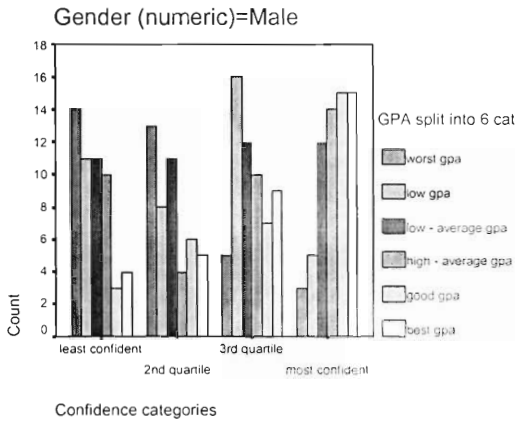


Figure 7.26: Confidence vs. Overall GPA (Males)

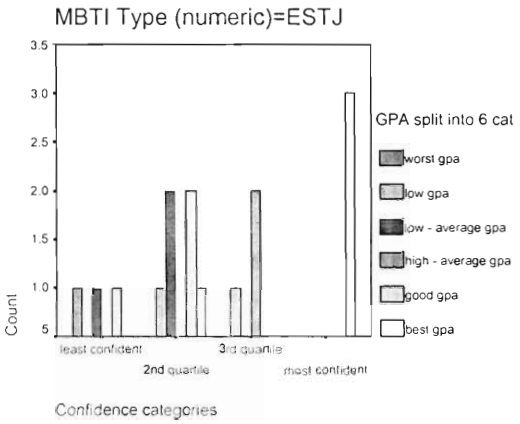


Figure 7.27: Confidence vs. Overall GPA (ESTJ)

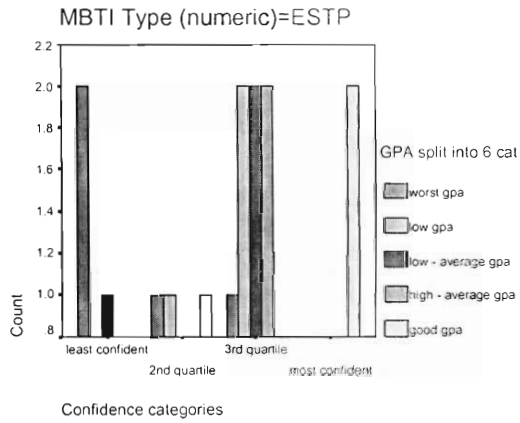


Figure 7.28: Confidence vs. Overall GPA (ESTJ)

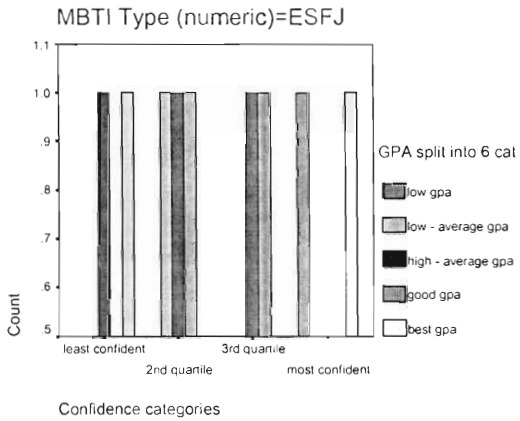


Figure 7.29: Confidence vs. Overall GPA (ESFJ)

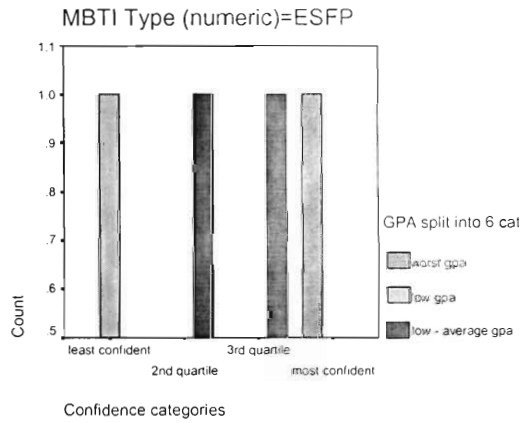


Figure 7.30: Confidence vs. Overall GPA (ESFP)

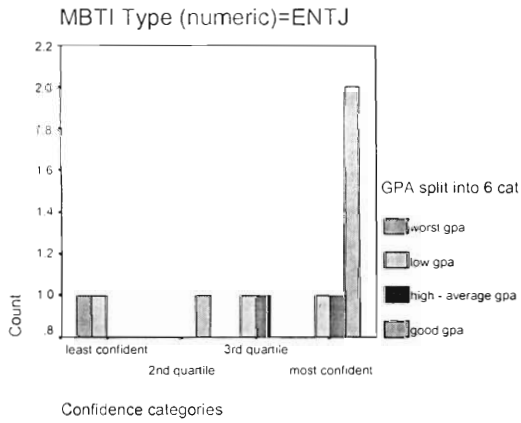


Figure 7.31: Confidence vs. Overall GPA (ENTJ)

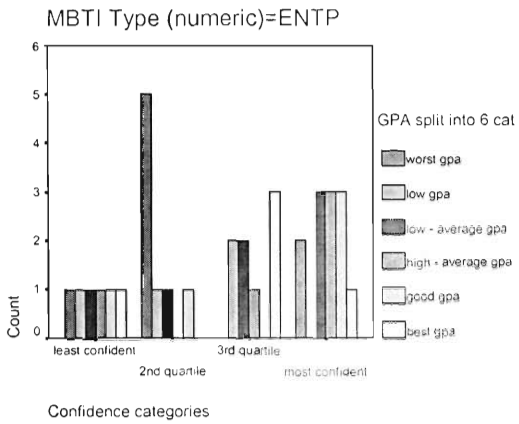


Figure 7.32: Confidence vs. Overall GPA (ENTP)

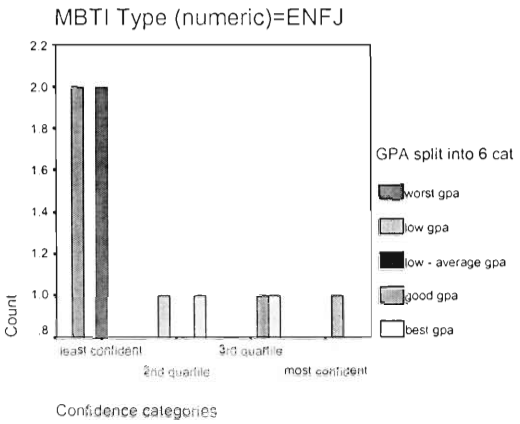


Figure 7.33: Confidence vs. Overall GPA (ENFJ)

Concerning the MBTI data in relation to confidence, only the students classified as ENFJ tended to follow the pattern of performing at an academic level that was directly related to confidence. There were only nine cases of this type, so it is difficult to draw any definitive conclusions about them. Overall it was clear that controlling on type was not producing a relationship stronger than evident between confidence and performances for the study population as a whole. It seemed more to the point that different types had different levels of confidence on average and that a performance was somewhat related to average grades.

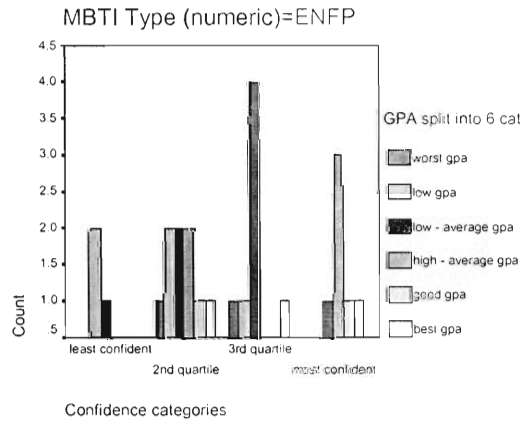


Figure 7.34: Confidence vs. Overall GPA (ENFP)

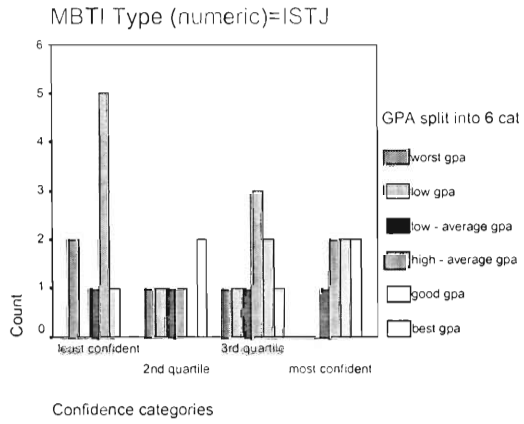


Figure 7.35: Confidence vs. Overall GPA (ISTJ)

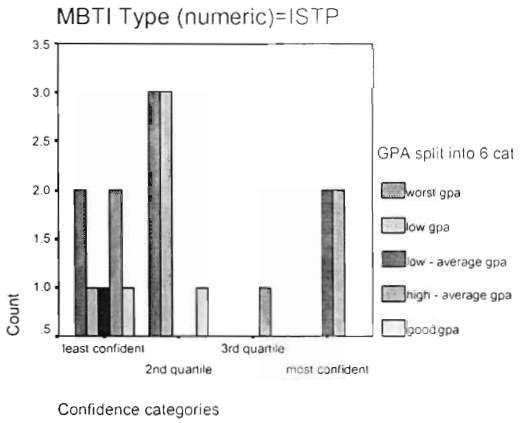


Figure 7.36: Confidence vs. Overall GPA (ISTP)

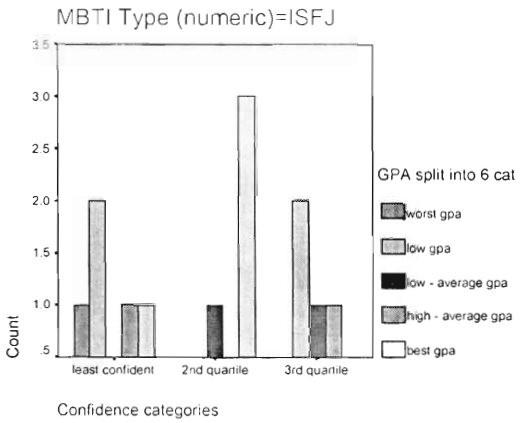


Figure 7.37: Confidence vs. Overall GPA (ISFJ)

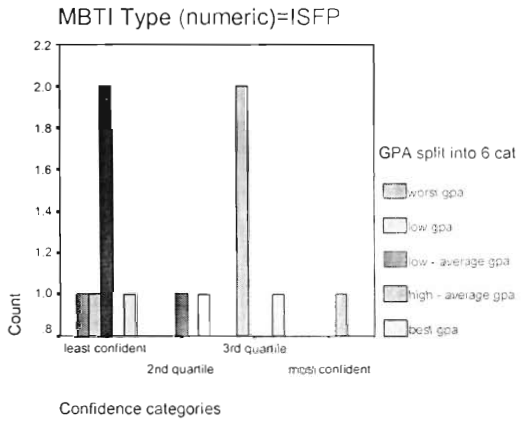


Figure 7.38: Confidence vs. Overall GPA (ISFP)

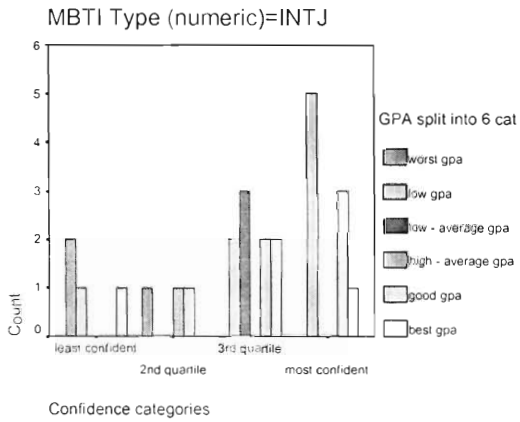


Figure 7.39: Confidence vs. Overall GPA (INTJ)

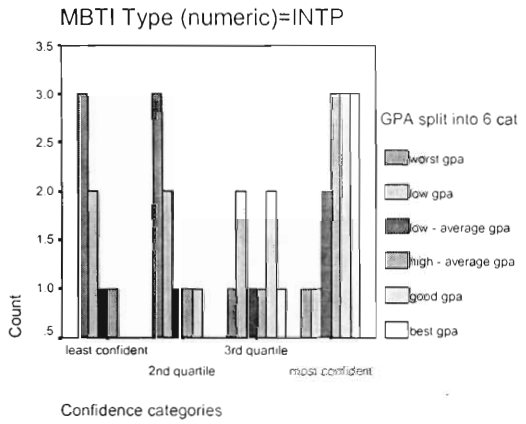


Figure 7.40: Confidence vs. Overall GPA (INTP)

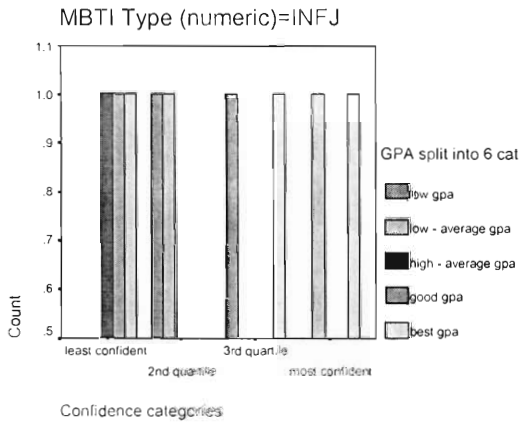


Figure 7.41: Confidence vs. Overall GPA (INFJ)

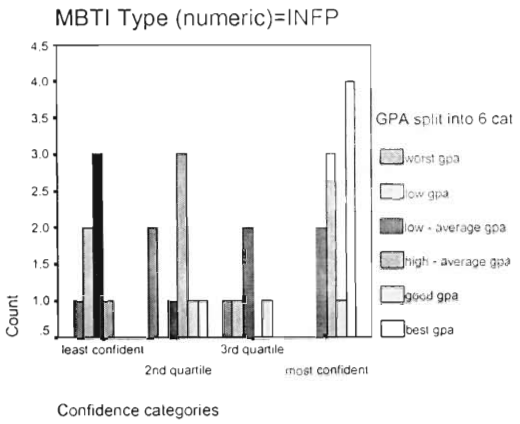


Figure 7.42: Confidence vs. Overall GPA (INFP)

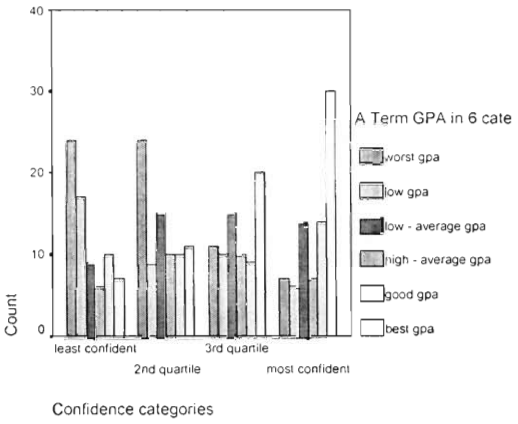


Figure 7.43: Confidence vs. A Term GPA

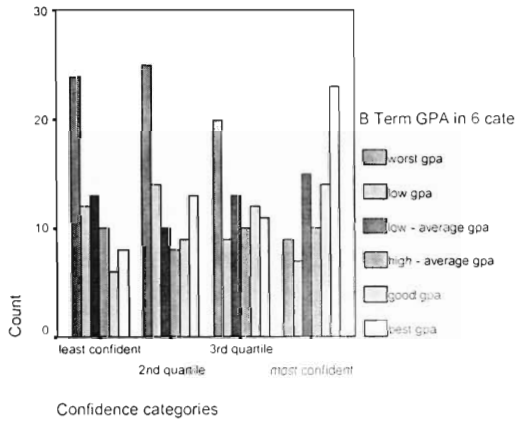


Figure 7.44: Confidence vs. B Term GPA

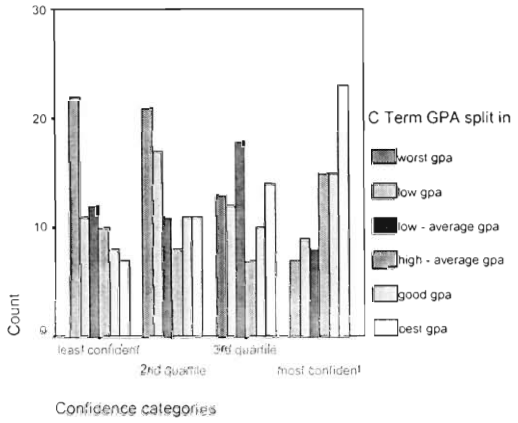


Figure 7.45: Confidence vs. C Term GPA

Perhaps the most interesting finding, which tends to agree with previous studies done of the class of 2002, show a strong academic start in A-term with an overall decline in B-term can be found in the confidence factor as well. This is especially true for one type of learners – the SP's. The SP's later recover to about the level at which they began. Other types do not recover on average, if their grades begin to decline.

When looking at academic performance vs. confidence levels in A-term (see Figure 7.43), a very noticeable pattern is seen when comparing the number of students that performed well and the confidence levels. As has been the trend in the confidence factor, academic performance increased as confidence levels increased. The trend in the

opposite direction is noticeable as well, but is not nearly as evident as is the pattern of good grades.

When looking at B-term (see Figure 7.44), the exact opposite is true. Although the trend in good grades increasing as confidence goes up remains true for the most part, the tendency that is most plain to see is the one showing the close relationship between poor academic performance low confidence levels is overwhelmingly evident and notable in all four terms. A-term and C-term show the sturdiest trends in both directions, as both the number of good grades increased with confidence while the number of poor grades increased as confidence went down. The results found in D-term are very unclear, as all levels of confidence seemed to show similar grade patterns.

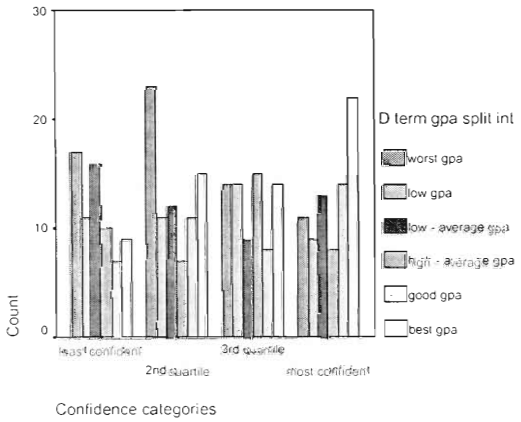


Figure 7.46: Confidence vs. D Term GPA

Confidence as a whole showed fairly consistently that lower levels in confidence directly corresponded to an increase in poor grades and a decrease in good grades. Also, it showed that the other extreme held true as well. As confidence levels increased, so did the number of good grades increase, while the number of poor grades decreased. The pattern held true as well when breaking down the year into terms. The "B-term slump," a

trend noted with the students of the class of 2002, was evident along with a revamping in C-term and followed by a jumbled array of results in D-term.

IV. Findings in the Focus Factor

Due to the difficulties encountered in generating the focus factor and also due to the questionable reliability of the results that were an outcome of analysis based on it, not as much attention will be paid to interpreting the results from the focus patterns.

Similar to ambition, the findings based on the focus factor indicate a lack of relation between the degree of focus of the student and his or her academic performance. The one finding that can be taken away from this part of the study is that most students at WPI tend to be academically focused. However, that was reported before when concern about the lack of variance in the indicator was reported. One could also say that the second most focused groups of students – roughly half of the sample – outperformed the most focused part.

When divided between males and females, the same type of random behavior is observed, where really no solid findings are evident and no real statements can be made about the data in the form it is in. Similarly, when the data is broken down for a term-by-term analysis, the same results are true. An increase in poor grades can be seen in B term, which follows the case already made about the slump found to be characteristic of this cohort, but not the next cohort – the class of 2003.

Important to note here is that any overall finding would be primarily due to the A term grades. These grades were closest to when the data were collected in new-student orientation. As seen in the figures below, the 3rd quartile seemed to have a slight

academic advantage over the most focused group in A term but saw this advantage diminish in B term and then reappear again in C and D term. This trend shows a decisively better performance by the less focused group.

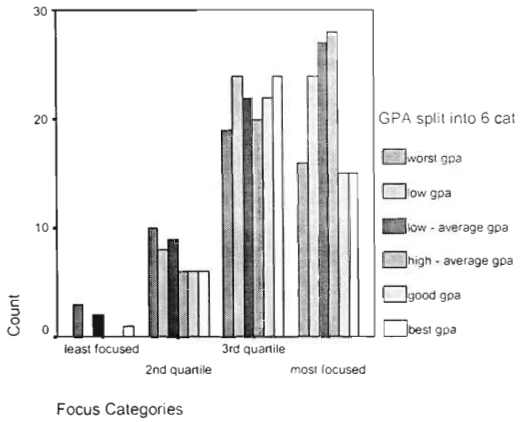


Figure 7.47: Focus vs. Overall GPA

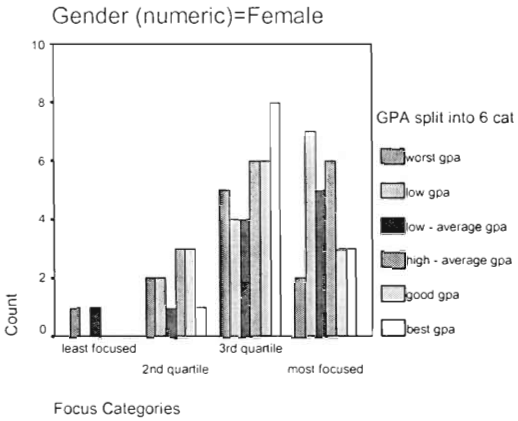


Figure 7.48: Focus vs. Overall GPA (Females)

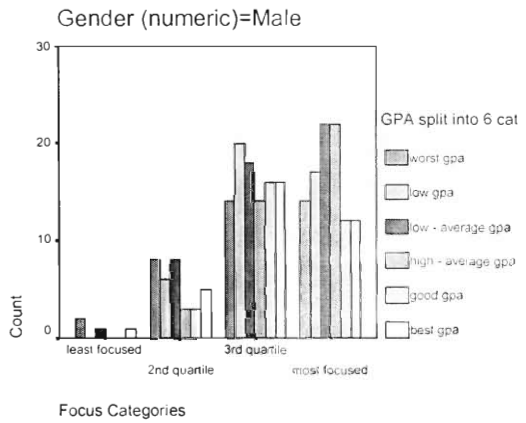


Figure 7.49: Focus vs. Overall GPA (Males)

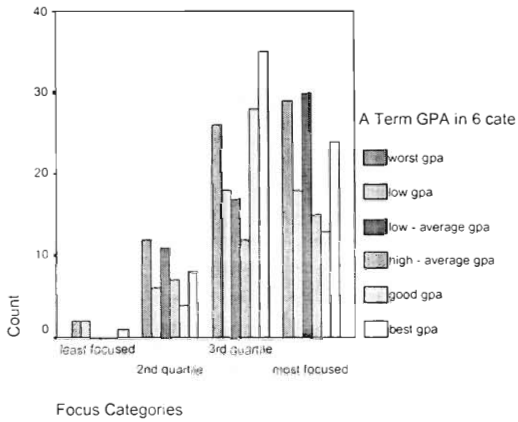


Figure 7.50: Focus vs. A Term GPA

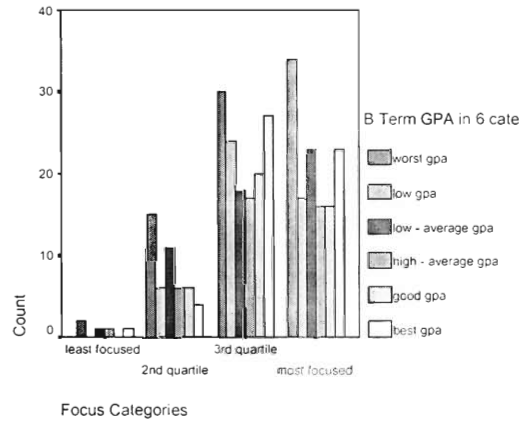


Figure 7.51: Focus vs. B Term GPA

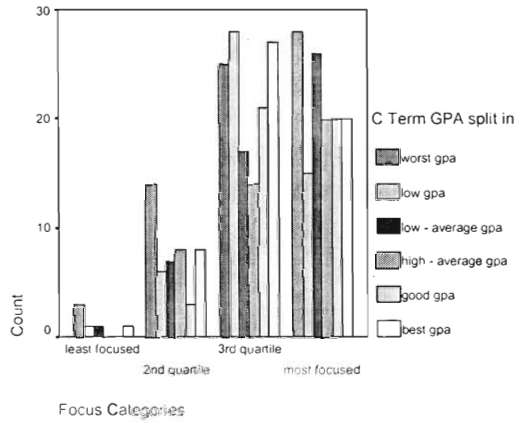


Figure 7.52: Focus vs. C Term GPA

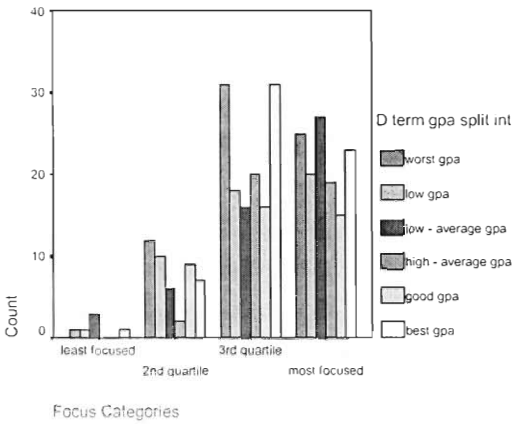


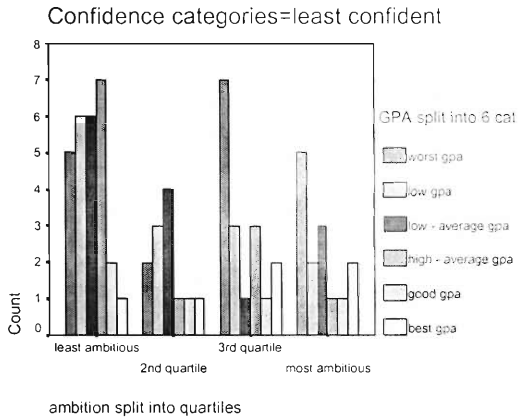
Figure 7.53: Focus vs. D Term GPA

In general, the focus factor item has been problematic -- the findings weaker than with confidence. This was primarily due to a lack of variables found in the CIRP data that both were determined to be a good representative of academic focus and also correlated well with one another. Radical adjustments were needed to get a dichotomous difference to analyze, and then the finding was the opposite of what was expected. Should this study be replicated in years to come, one major recommendation is to find an alternative source from the CIRP item that can more accurately depict the level of academic focus in the student over a broader range. Alternatively, a different variable that is measured more accurately and can be cross-validated should be the "focus" of study. This concept is not as promising as expected – at least with this operational definition.

V. Multi-Factor Findings

An effort was made to combine two of the variables and then compare them as a unit to the overall GPA. Because the ambition and focus factors were limited in their findings, and the confidence factor demonstrated fairly definitive patterns, the combination of two variables did not yield much that was different than what had already

been observed for confidence and ambition separately. Certainly, ambition and confidence are different things, not highly correlated. It is evident that the least ambitious students are disproportionately in the least confident category. The distribution shifts to the high end in steps with the most confident category having a disproportional cluster of the highly ambitious. These variables are correlated, yet ambition is nowhere nearly predictive of performance as confidence.



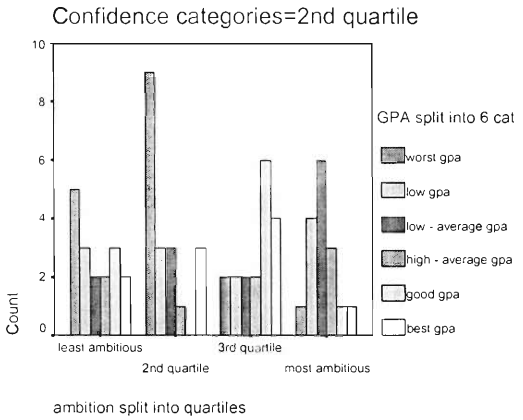
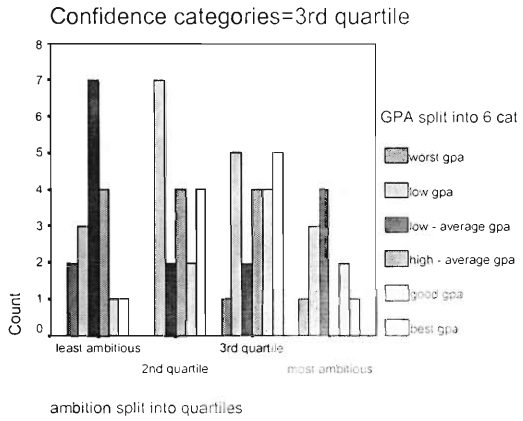


Figure 7.54: Ambit. & Conf. vs. GPA (Least Conf.) ***Figure 7.55: Ambit. & Conf. vs. GPA (2nd Quartile)***



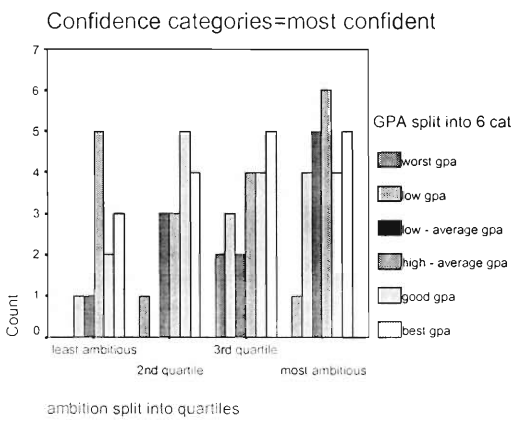


Figure 7.56: Ambit. & Conf. vs. GPA (3rd Quartile) ***Figure 7.57: Ambit. & Conf. vs. GPA (Most Conf.)***

When looking at ambition and focus vs. overall GPA, the one trend that is the most noteworthy is that as the focus levels rise, so do the number of good grades. This trend was seen when looking strictly at confidence, but when mixed with ambition, the tendencies change slightly. Also, the charts show that a combination of low confidence

and low ambition results in the greatest amount of poor academic performance. While this tendency does not hold up as well when dealing with high ambition and high confidence, the trend is still noticeable. Since WPI tends to look for predictions that work on the low end, where SAT scores are of the least use, the combined power of these CIRP variables may be of considerable practical value.

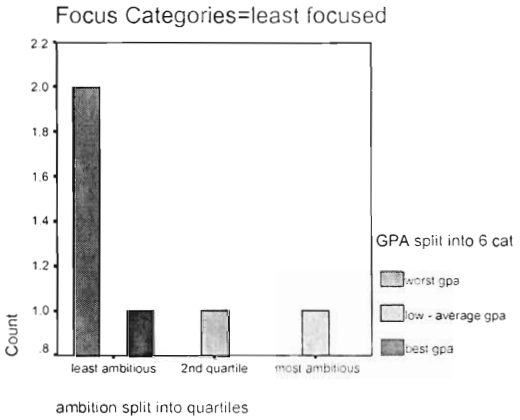


Figure 7.58: Ambit. & Focus vs. GPA (Least Focus)

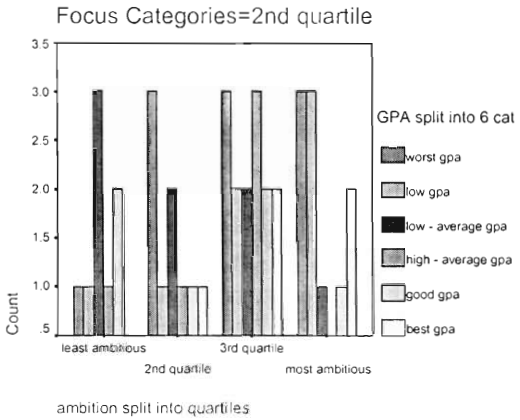


Figure 7.59: Ambit. & Focus vs. GPA (2nd Quart)

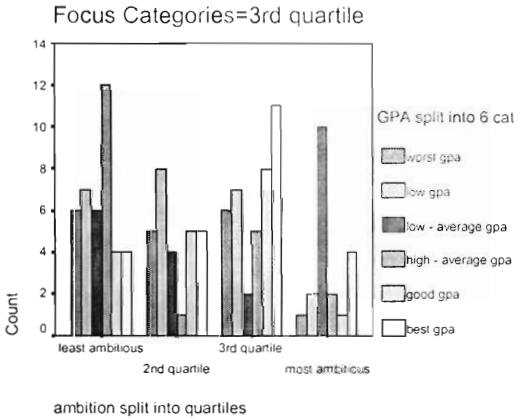


Figure 7.60: Ambit. & Focus vs. GPA(3rd Quart)

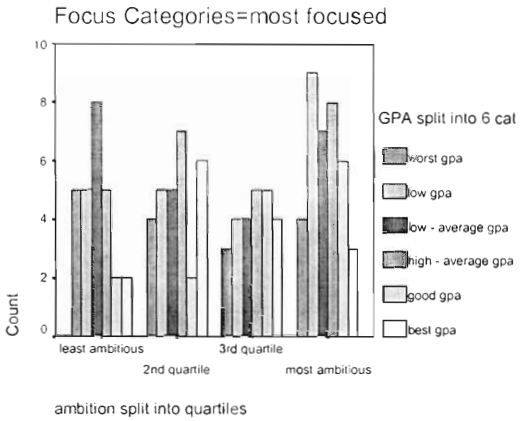


Figure 7.61: Ambit. & Focus vs. GPA (Most Focus)

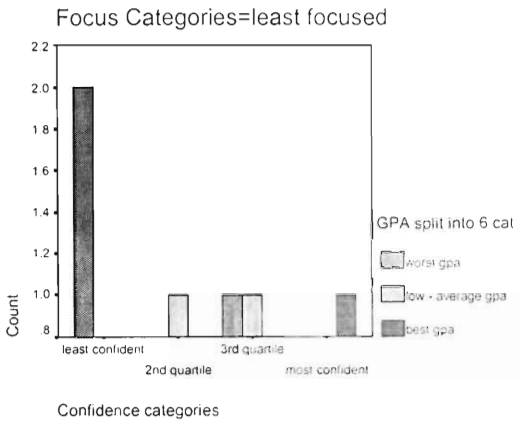


Figure 7.62: Conf. & Focus vs. GPA (Least Focus)

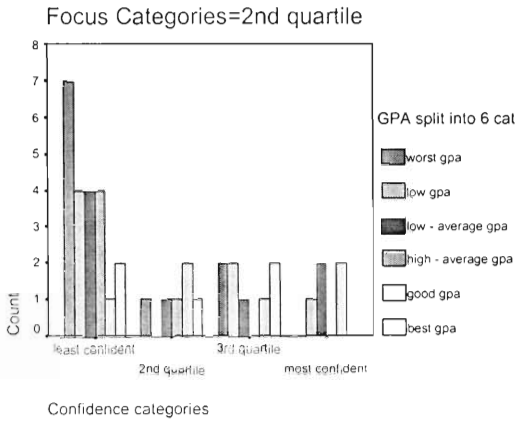


Figure 7.63: Conf. & Focus vs. GPA (2nd Quart)

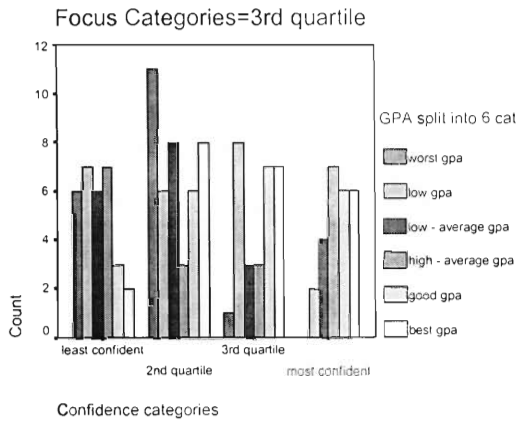


Figure 7.64: Conf. & Focus vs. GPA (3rd Quart)

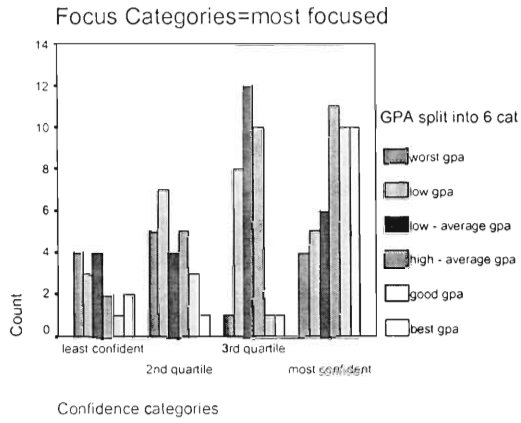


Figure 7.65: Conf. & Focus vs. GPA (Most Focus)

To conclude, the combination of two variables was not expected to show anything that had not already been observed. However, reorganization of the confidence and focus variables so that they would combine into a three-part variable would probably flag the low-end groups pretty effectively with data gathered before classes started. Despite the focus factor being vague in its indicating abilities, it needs to be recalculated. The key to a successful second study in predicting grades depends on the focus factor. This study proves that focus shows promise.

VI. Miscellaneous Comparisons

Another aspect taken to the analysis was an angle that looked at what types of students fell into the different factors. For example, tendencies for extremely confident people were sought. We expected them to be extremely ambitious as well, or perhaps there was a relationship between unfocused and non-ambitious students.

When looking at the relationship between ambition and confidence (see Figure 7.66), it was apparent that there were no overwhelmingly prominent trends between the two. The one trend that has already been mentioned previously is the relationship showing that more confident people tend to be more ambitious as well. This pattern, however, is not particularly strong.

When studying ambition vs. confidence and confidence vs. focus, the patterns are almost identical in both cases. In fact, the cases are so similar that one may think the graphs are of the same factors at a glance. One trend that appears when comparing confidence and focus is broken up between the top two quartiles and the bottom two quartiles. As confidence goes up, so does focus. The third and fourth quartiles of the focus sector correlate directly with the two halves of the confidence sector. In the top half of the confidence sector, the number of most focused students is greater than the amount of students in the third quartile of the focus sector, while in the bottom half of the confidence sector, the number of students in the third quartile of the focus sector is greater than the number of the most focused students. This is logical, as the more confident students would tend to be more focused as well.

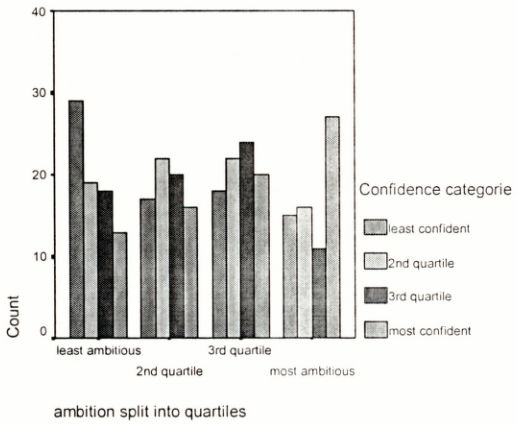


Figure 7.66: Ambition vs. Confidence

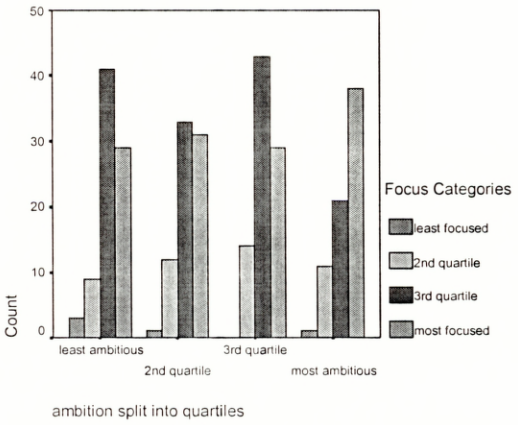


Figure 7.67: Ambition vs. Focus

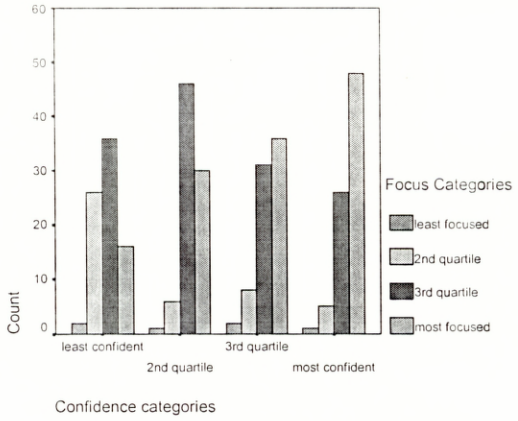


Figure 7.68: Focus vs. Confidence

VII. Summary

On the whole, the analysis of the WPI first-year grades produced some promising results. The factors of ambition, confidence and focus specifically produced uneven findings, but there is promise enough that more resources are warranted to explore the relationships and tendencies. This part of the study was a worthwhile exercise in theory testing despite methodological problems with the focus indicator.

The confidence factor easily led the pack in terms of demonstrated promise. It clearly showed correlations between levels of confidence and academic performance. Of the three factors, confidence was also the easiest to identify when dealing with the CIRP data, as it showed up in a multitude of different questions, many of which correlated well

with each other. Indeed, it would be well advised to distinguish between types of confidence in the next round of analysis.

Ambition was harder to measure and harder to interpret. Most findings indicated that there was no direct linear relationship between the academic success of the student and the level of ambition that the student demonstrated. One might be able to make a case for a curvilinear relationship. As stated earlier, this could be due to a few different factors. The possibility exists that the questions used in the CIRP data were not good indicators of the ambition of the student. There is also the possibility that thresholds and reverses in the relationship make the relationship too complex to approximate with a straight line.

Finally, focus wound up being more of a focus question, whose validity as a judge of focus could be very easily debated due to a lack of variation. However, used to divide the population simply into a relatively high and low groups even this crude indicator could be rather revealing, especially in combination with confidence.

Although the three factors may not have all lead to the expected straightforward results or even ideal results, the evidence that can be derived from the study is worthy sharing since there are definite relationships that lie between confidence and academic success. Unfortunately our analysis and display procedures make them obscure and hard to see. Sometimes their relative size and significance is also not clear since we do not know how to run the statistical tests. Clearly, there is more that can be done with this data set, but it should await the time that two data sets can be merged to produce a larger set and replicate findings. The class of 2001 and 2003 CIRP data should be acquired and added to the 2002 data set with CIRP and MBTI data.

Chapter 8 – Discussion of Results

I. Trends in the Ambition Factor

Ambition started out as one of the key variables in the project. We had a lot of "ambition" theories that led us to assume that ambition would reveal the most about the trends of the students in their academic endeavors. What was found was something completely different, however. Ambition, as defined in this study using only CIRP data, told us almost nothing about the academic fate of the student if one used linear logic in seeking relationships. Qualitatively we concluded that the relationship was either curvilinear or so random as to be non-existent. In addition to this, ambition seemed to be derived from something other than prior academic success, as the high school data so clearly indicated.

Perhaps the three most apparent examples of the trends found in ambition lie in the relationships between ambition and the high school English GPA, the overall WPI GPA, and the high school science GPA. These trends do much to display underlying relationships with this variable.

The only prediction that was supported in the entire set of ambition factors is the relationship found when comparing levels of ambition with the high school English grades. It is here that a direct correlation between lack of ambition and poor grades can be seen. Even in this depiction, the relationship is not entirely consistent, but there is a trend. This pattern does not generalize to other subjects, as is evident when one is viewing the results of ambition in comparison to high school science grades, where almost the same amount of people with the highest levels of ambition had poor grades, as

did the students with the lowest levels of ambition. The fact that the only clear finding is that the trend is found in area of the English grades, which is notorious as being a trouble area for many students at WPI, is at least curious and thought provoking and may be an important clue as to what is going on.

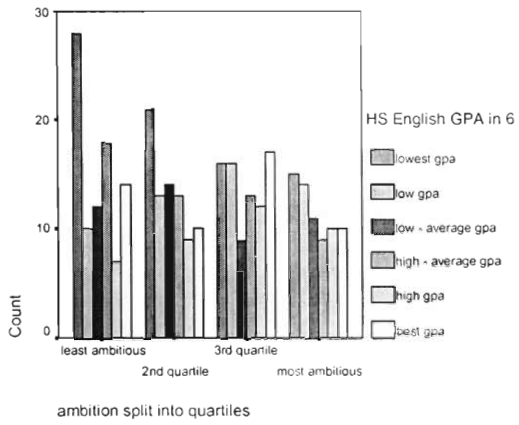


Figure 8.1: Ambition vs. HS English GPA

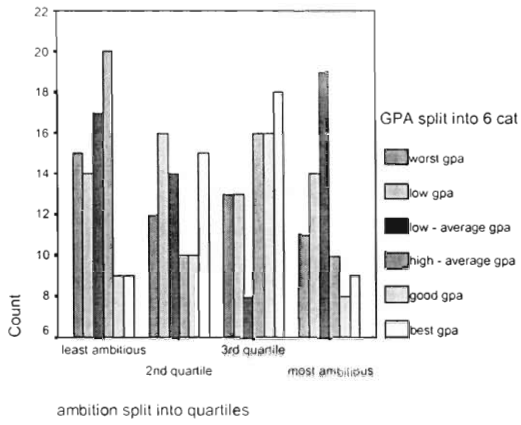


Figure 8.2: Ambition vs. Overall WPI GPA

Next, the distribution of scores in the cross tabulation of the high school science grades and levels of ambition seems to indicate something entirely different than does the previous comparison between ambition and the high school English grades. The high school science GPA layout seems to indicate that the students that demonstrated a high level of ambition did the worst of all four categories in science. In fact, the students who scored in the middle 50% in ambition seemed to perform at the highest level, with those indicating the lowest levels of ambition right behind them. This would seem to prove that there is curvilinear relationship.

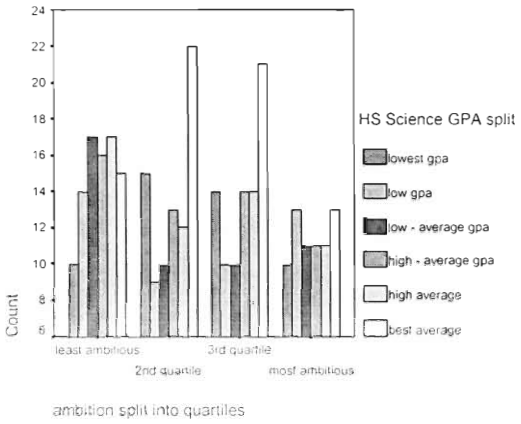


Figure 8.3: Ambition vs. HS Science GPA

In summary, the results of the ambition cross tabulations were ambiguous at best. In most cases, the conservative position is to state that there is no correlation existing between levels of ambition and both high school performance and WPI performance. We tend to think that a curvilinear relationship holds, and that this can be demonstrated statistically but we don't know how to do that at this time. Here we can make no clear statement about the origin of ambition of the student from high school data. Likewise, nothing definitive can be said in relation to the connection found between ambition and the first-year success of students at WPI, but here the evidence for a curvilinear relationship is even stronger.

II. Trends in the Confidence Factor

Of the three factors studied in the project, confidence produced the strongest and clearest relationships by far when linked to both the high school grades that may have produced this self-image and the first-year WPI grades that we theorized it as being likely to influence. In both the high school and the WPI data, direct relationships between high

levels of confidence and good grades and low levels of confidence and poor grades could be established with a good degree of certainty.

Throughout the analysis of the confidence factor, there was one reoccurring theme throughout both the WPI study and the high school study. As confidence levels decreased in the students, the number of weak grade point average increased. Likewise, as the confidence levels of the students increased, the number of good grades in increased as well. This may not be a causal factor but there is enough of a relationship to explore the possibility in future research.

The most overwhelming evidence for this pattern can be found in the four figures shown below. The trend is best demonstrated when viewing the results of the cross tabulation of confidence levels and high school math grades. A clear relationship between confidence and the number of students that did both very well and very poor can be seen. One interesting item to note is that males tended to follow the pattern much more closely than the females. The males dominate the percentage of the population at WPI so it only follows the patterns of the overall population. The female data shows no sign between levels of confidence and academic performance, which is an issue that may be worth pursuing in future projects.

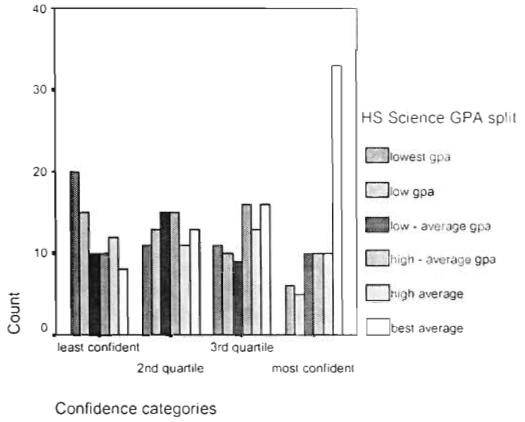


Figure 8.4: Confidence vs. HS GPA

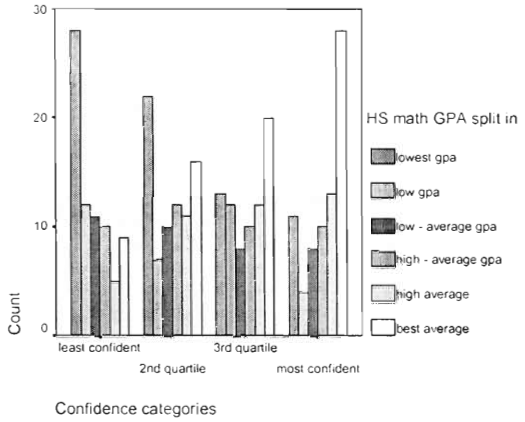


Figure 8.5: Confidence vs. HS Math GPA

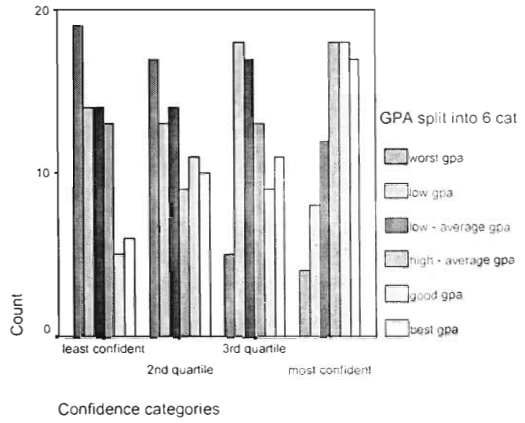


Figure 8.6: Confidence vs. WPI GPA

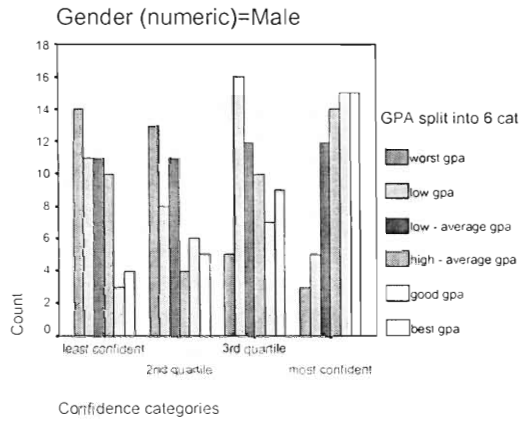


Figure 8.7: Confidence vs. WPI GPA (Males Only)

In précis, the evidence is great enough that a relationship between high school grades and the development in levels of confidence is established and should be assessed for strength and significance to specify the details. Similarly, it is obvious that there is a correlation between levels of confidence and first year performance at WPI. A case for causality might be made given when the confidence data were collected. In our findings, we have seen that high levels of confidence have influenced a manner of confidence in the students that is related to how the student will perform at WPI in the first year of the program. This degree of confidence variable corresponds directly to the percentage of students that will do well and likewise, that will not do well.

As high school grades increased, so did the confidence of the student, which led to better grades at WPI. While as the student performed at a lower level in high school, so did his or her confidence drop, which in turn led to an increasing percentage of students that performed poorly as confidence levels dipped.

III. Trends in the Focus Factor

The focus factor was problematic regarding the search for relevant indications to interpreting the results. However it was an important part of our theory so we went ahead even with only one item and limited variation on it. Academic focus of the student originally figured to be one of the key elements in speculating the academic future of a student at WPI. In the end we have a finding that suggests our theory might be wrong. Focus was associated with confidence, as we thought, but the most focused students by this measure were not getting the highest grades. It will take some future analysis of some subtlety to clarify what is going on in that pattern of relationships and develop a new theory explaining it.

Although it is still believed that academic focus is indeed a vital component to discerning the probable academic potential of the student, the means of determining the actual academic focus did not turn out to be available when conducting the study. We had hoped that the CIRP would have offered many questions through which an accurate depiction of the focus of the student could be made, but after many different assessments with many different variables, no correlations could be established. Because of this, the focus factor never turned out to be much more than speculative probe in this project.

Future efforts to both reiterate and improve this study should be advised to investigate the focus factor. It is necessary to determine a new means of establishing the academic focus of the student. We believe it heavily pertains to the issue of academic success at WPI, or any institution of higher learning in general. The relationships to confidence may not be as straightforward as it seems.

IV. Other Findings

A few trends developed where it was apparent that some personality types, regardless of levels of ambition, confidence and focus seemed to perform at a much lower level than did some other types. As mentioned in chapter 7, students of MBTI type ESFP seemed to constantly perform at a very low academic level. This happened to coincide with lower levels of confidence as well. This seems to prove that a certain MBTI type combined with high school experience in a subject and confidence can led to prediction of whether the student will do good in that subject at WPI.

Another aspect investigated was the discrepancies between males and females in these relationships with focus, ambition and confidence. Males and females were similar for the most part in the study with the one exception in the affect that confidence had on their academic performance. While males tended to perform better as confidence went up and perform worse as confidence went down, females tended to perform at a steadier rate, regardless of reported confidence levels.

One other noticeable trend that was observed was the irrelevance of any of the three factors when looking the grades as the progressed throughout the year. It was quite noticeable that A term was the strongest academic term(only for some types), with B

term following as the worst academic term. C term showed a great improvement in grades, while D term tended to dip slightly, though not anything like the drop between A term and B term. These grade tendencies seemed to be the same regardless of the factor being taken into account.

V. Summary

Although the study was not a complete success, it most certainly was not a complete failure either. Our original theory incorporated the idea that academic success was a product of a combination of academic focus, confidence and ambition to do well in school and outside of school. It was also indicated that these levels of ambition, focus and confidence came from prior success or failure at the high school level. Certainly, it seems reasonable that ambition and academic focus of a student would heavily influence the academic performance of the student. Whether or not the CIRP is the best means of deriving an equation by which the academic focus and ambition of a student is the biggest question left unanswered. In any case, the further analysis of this question would be best done with alternative data that may better indicate the degrees of ambition and focus in the student.

Chapter 9 - Conclusions

I. Findings

The most significant relationship discovered in this study was that found between confidence and both WPI first-year grades and high school grades. The relationship found between levels of confidence in a student and academic success, as measured in this study, is, in fact, so strong that much consideration should be given to continuing research on this subject. Further research may confirm these findings that a student's level of confidence when entering into college is a very strong indication of his or her academic fate.

The composite variables of ambition and focus were difficult to draw conclusions from. This was largely due to our inability to identify good questions in the CIRP that correlated well with other questions identified as possible indicators of these composite variables. This resulted in weaker variables that were not necessarily as good as indicators as were the indicators that made up the confidence variable. Also, relationships between student performance and these variables were not as easily identifiable or apparent as were the relationships found between confidence and academic performance. This could be due to either the lack of a relationship in general, or it could be due to the underdevelopment of the variables, or perhaps, the study group itself was not a big enough source for this study.

The MBTI data was not as well suited for this study as was hoped. There may be a few reasons for this. First, the study group was relatively small (less than a thousand people divided into sixteen possible MBTI categories). Second, dividing the MBTI categories into all 16 possible categories greatly dispersed the group and resulted in

groups containing only a handful of members. Stronger relationships may have been revealed had the data been divided into four categories rather than the 16. Breaking up the students according to MBTI types did not prove to be worthwhile in this study. Should the study be replicated in the future, abandoning the MBTI data is not recommended, but using only four MBTI categories instead of 16 is strongly suggested.

Breaking students up by gender was another disappointment. The females are so outnumbered at WPI that any trend that may have existed could not be seen in the dataset we were working with. Had a larger dataset been available (i.e. had the dataset been linked with other datasets from other classes), or had the percentage of girls in the study group been closer to 50%, trends that differ for the males and females would have been easier to document. We suspect that they are there.

II. Omissions

Looking back on the project, there were many times that materials were omitted because of the limited time frame of this study. Many of the items that were omitted could have greatly improved this study. One improvement that was first mentioned in Chapter 1 is the missing 2001 data set. If that set was brought together in time and could have been formatted in the same way as the 2002 data set, we would have had a choice between linking the two datasets and having a set of over 1000 cases, or running the process twice and looking for replication. This could have advanced other aspects, such as female comparisons and MBTI studies.

Another omission that could have improved the study was the failure to identify the levels of the high school courses in the high school data. When the overall and

individual study grades were made, there was no consideration of what level the course was. If the study analyzed the level (college, honors, AP, etc.) and related it to the grades, then the study would have been superior to this one, as the overall grade averages may have proven to be more reliable or indicative in their nature.

The last item omitted (perhaps the most important) was the sophomore grades. The advantage in seeing if grades changed after freshmen year would prove or disprove the theory that first year grades were a good representation of the overall success or failure of a student at college for the first time.

III. Suggestions

Knowing that this study was limited to the questions asked on the CIRP, one may ask if the questionnaire had our variables (ambition, confidence and focus) in mind. It is obvious that many of the questions identified in the CIRP were directly related to our confidence variable and the strong relationships that we identified are proof of this.

There can be something done to enhance the study if further replicated: identifying more questions that will help to further develop and refine the ambition and focus variables. Each year, the CIRP allows schools administering the test to append between 10 and 20 optional questions of its choice. Using questions that would aid in further defining levels of ambition and focus in the student would be a very good way of developing these other variables. Figures 9.1 and 9.2 identify a few questions that we believe may be helpful in this process. Although these questions may not be optimal, they are a good start for developing more robust and accurate ambition and focus variables.

Scale: 1-4 1: no chance 2: very little chance 3: some chance 4: very good chance
*Spend 28 hours studying per week for each class *Go to parties on weeknights consistently *Pass the minimal 9 courses each year *Pass the full 12 course each year *Double major *Receive a minor *Work alone on projects *Be recognized for work at WPI

Figure 9.1: Possible Future Activities

Scale: 1-4 1: not important 2: somewhat important 3: very important 4: essential
*Make an A on MQP or IQP *Receive master's degree *Work with others *Graduate with an A average *Work over seas

Figure 9.2: Goals and Values

IV. Final Thoughts

A final thought for any group interested in doing similar studies would be to incorporate an "if all else fails" plan. Our independence from other groups in this project gave us the advantage of being able to proceed without hesitation. If there was any doubt or question that another group that we were depending on would not pull through, then another direction could be taken. This point cannot be stressed enough; relying on someone else for essential material is too risky when working with such a limited time frame.

This project provided us with a good learning experience. It taught us some of the keys to successfully completing a project of this size. Although the project did not turn out exactly as we had planned, the results were still good and the time put into the project was worthwhile. We feel that this study is one that can be and should be reproduced and refined for future use. It is our fervent hope that our efforts will be reproduced in the future as the quest to identify the best students entering into the college world each autumn continues.

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Appendix