A Longitudinal Study of the Correlation Between Cognitive Development and Writing Ability

An Honors Thesis (HONRS 499)

by

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Abstract

This study replicated the case studies of Ranieri's (1989) which found significant differences in the ways the sexes approach writing and construct meaning. Three composing tasks and two I.Q. tests were used to compare two English college students and four American college and high school subjects tested in 1988. I had hypothesized that because females are holistic composers, or tend to construct meaning through their writing, while males are more analytic writers, organizing their thoughts before they write (Ranieri, 1989), females' intelligence would correlate with their writing ability, while males' writing ability would show a developmental lag behind their cognitive ability. I also expected no differences between American and British subjects. There was a significant correlation between males' performance on a picture-based I.Q. task and their writing and a negative correlation between the British subjects and composing skills.
INTRODUCTION

American elementary and secondary educators have recently been citing the construction of knowledge and the development of students' sense of self and their role in the world as a main objective. With this developing knowledge of the world and self comes the birth of students' voices, or their knowledge, experiences, feelings, and ideas organized into individual points of view and bases from which they approach new information. Although these voices can and should be fostered in every subject of every grade, students' writing skills are especially conducive to tracing this developmental process. Composing gives students the opportunity to practice what they want to say, to analyze their thoughts, to make meaning of personal experiences, and to refine their views of the world, thus allowing teachers to recognize, monitor, and encourage that growth.

Unfortunately, individual writing styles, and thus, students' larger approaches to organizing experiences and constructing knowledge, are often twisted by teachers to fit the traditional view privileging persuasion and argumentation as the highest forms of writing. This analytical style is natural for some students and is a necessary component for advanced writing, but is often mistakenly viewed as the only or best style of writing. This logical, usually masculine voice has served, and still serves, as the base from which to measure good writing, much
as males' ability has been the source for theories of intellectual, or cognitive, and moral development (Kohlberg, 1984; Perry, 1970). What is ignored or subordinated to this mode is the more holistic, or feminine voice, which incorporates logical arguments with personal perspectives under the assumption that all points, whether personal or abstract or analytical, are connected and combine to serve an integrated whole.

Although the analytic and holistic voices are not distinctly divided between male and females, male students tend to use the more point-by-point, linear method in a formal style while females, in general, write with a more personal voice, integrating order with broader themes. The problem of subjugating one style of writing to another, then, is clear; by choosing one style of composing over another, educators effectively dismiss the feminine mode of expression and leave students, usually female, struggling with an unfamiliar way of forming their ideas and the impression that their thoughts and feelings, or voice, are less worthy of expression.

The magnitude of this practice goes beyond alienating half the student population, however. Mature composing requires the development of a broad theme (holistic) supported by logical arguments (analytic). Good writing can be holistic, showing the relationships among ideas, as well as analytic, using facts to evaluate these ideas. By
discouraging the holistic mode of composition, educators hurt not only female students who rely on this style to express themselves, but also male students who must be encouraged to develop it later when rounding out their composing skills.

This thesis, then, attempts to relate the research on gender and composing as well as a study I conducted to current educational issues. By discussing the traditional male-oriented developmental models and some alternatives to them in chapter one and explaining the results of my research in chapter two, I introduce the issue of gender differences. In chapter three I discuss some current educational practices that contribute to such unhealthy differences, and use chapter four to outline some ideas of how to overcome injustices in the classroom, considering the research on how students construct knowledge. Overall I hope to demonstrate that gender differences neither are insurmountable differences nor require drastic overhauls of school systems, but instead are normal developmental differences that do require changes in attitudes about what education is and who it serves.
Chapter I

REVIEW OF SELECTED LITERATURE

I. Cognition and Composition Studies

Differences in individuals' voices and how they affect the construction of knowledge has been the focus of some research in the recent past, possibly in response to the previous emphasis on only one mode of thinking. A consistent theme in these studies is the important role school, and specifically, writing, plays in the formation of the identity of the writer (Baxter Magolda, 1992; Fowler, 1965; Mason, 1990; Piaget, 1970). The element of cognition plays perhaps the most relevant part in the study of gender differences and in the search for a way to respect and fulfill these differences in our schools. While differences in cognitive processes in general are this thesis' main concern, these differences are measured through writing ability.

Although when considering writing we tend to assume the reference is to older students, writing skills develop even in elementary, and thus do the subtle influences and opinions teachers impose. Elementary students and even pre-school children can compare, contrast, classify, and sequence events, and through combining sentences, analyzing vocabulary, and rating scales, they start to view writing holistically (Cooper & Odell, 1977). With respect to early education, all skills increase significantly over the first two years of school, a time when our dependence on teachers
is the most profound. Knowledge about the functions, purposes, and features of written language are acquired in part prior to knowledge of how to process print and are still developing when the processes of reading begin to develop (Mason, 1990).

More research in relation to writing and the development of thinking patterns and identity has been performed with older students, however. Although early theories tended to categorize development on a solely male basis (Kohlberg, 1984; Perry, 1970), researchers have since recognized gender differences at levels within cognitive structures (Colby & Kohlberg, 1987; Walker, 1984). Some have taken the other end of the spectrum and developed a solely female model of development (Belenky, Clinchy, Goldberger, & Tarule, 1986). Another approach suggests that the probability of a written message being successfully transmitted, regardless of the sex of the sender, is important in shaping identity. This "probability" controls individual's output and ability to process language and knowledge; if one does not think anyone is listening, will one speak? (Greene, 1972).

Unfortunately, schools often ignore these approaches to identification and knowledge. Britton (1975) discusses the pressure placed on students to write at what he terms an analogic level, which inhibits early expressive and more abstract, informative writing. By their seventh year of school, when given a choice in which form to write (essay,
letter, poetry, etc.), almost no students choose to write poetically while many had when younger. The writing process corresponds to certain powerful learning strategies (Emig, 1977); various writing styles provide more opportunities for analysis and revision of ideas, encouraging types of thinking students might not otherwise encounter. When students learn to write only in a certain fashion, that will undoubtedly shape the way they think and approach learning.

Besides as a tool for encouraging many cognitive processes, writing can be a means for students to discover what they want to say (Elbow, 1981; Murray, 1978a). The difficulty in teaching writing skills is that this development is more subtle and takes place over a much longer period of time than other cognitive tasks, and is thus a more powerful influence on the student's thinking of the world and themselves. The approaches to writing, and thus, approaches to other constructing other knowledge, necessitate flexibility of educators and freedom for students to encompass different ways of knowing.

II. Gender Studies

While developing certain cognitive skills is generally the main concern in the classroom, the ways students approach knowing, the knowledge they value, and the knowledge they are rewarded for having are influenced greatly by their gender. To study cognitive development without considering gender
would be inappropriate; such an important variable in developmental differences should not be ignored.
Unfortunately, this is largely what has happened with respect to research on cognitive development. A major drawback to research on both cognitive and composing development, was, and to some extent still is, its phallocentrism, considering males the basis from which to derive theoretical models and with which to measure how much females 'deviate' from these 'norms' (Mills, 1987). A prime example of this fallacious thinking is Kohlberg's model of moral development (1976), which assumes that if a female's decisions differ from a male's, they are at least subordinate, if not pathological, but never simply different (Muuss, 1988).

Similarly, Perry (1970) developed a model for intellectual and ethical development of college students that did not use the data women provided to validate his theme, and addressed women only in so far as they exhibited patterns shared with men. In his search for how students' conceptions of the nature and origins of knowledge evolve and how thinking of self as a knower changes over time, Perry established four basic epistemological perspectives. First, during the stage of Basic Dualism, students see knowledge in polarities of right and wrong; their faith in absolute authority is shaken when they see diversity of opinion. The next stage of intellectual development is Multiplicity, in which students feel that everyone's opinion is equal and
realize authorities do not always have the right answers. When pressed for evidence to support opinions, students enter the stage of Relativism Subordinate which relies on an analytic, evaluative approach to knowledge, and last, students come to exhibit the stage of Relativism, in which students see that truth is relative and meaning depends on context of all life, beyond the academic world. Relativists realize that knowledge is constructed, not given, and with this recognition of their role in making meaning, feel an affirmation of personal identity.

A rethinking of these biased, if informative, models came largely with Gilligan's *In A Different Voice*, (1982) which suggested that the sexes' develop in separate but equal and mutually supportive ways. Similarly, Belenky, Clinchy, Goldberger, and Tarules' work (1986) on female development has provided a valuable model comparable to Perry's. At the first stage of Belenky's model is the Silent knower, who is unaware of the power of words for transmitting knowledge and often describes herself as "deaf and dumb."

Next is the Received knower, who is marked by the feeling that words are central to the knowing process; she learns by listening. As with Perry's Basic Dualist, she feels that there is one right answer and has low confidence in her own voice. At the third stage is the Subjective knower, much like Perry's Multiplicity knower, who feels as if "everyone should do and say what he wants" because the
source of truth is within each person. These women reject logic and theory as unhuman and detrimental to their ability to feel, which for them is a source of right answers.

When asked to support their opinion, women in the Procedural stage feel suppressed because they are asked to use logic; they feel the voice they are developing is not their own. Women at this stage are absorbed in acquiring and applying procedures for obtaining and communicating knowledge and start to disengage the problem from the logic used to solve it. They think of knowledge as a process, interested in what they know but also how they got there. They judge opinions validity on how much they are based in the subject; they begin to balance logic and feeling.

Here Belenky et al. draw the distinction between Separate and Connected knowers because at the Procedural stage women split into thinking truth can be arrived at through impersonal procedures (separate) or through care (connected). Separate knowers wonder what techniques are used to analyze them and are critical of answers that 'feel right'; they need to doubt to prove a theory worthy. In contrast, Connected knowers seek the relationship in asking "What is what I am analyzing saying to me?". They will not judge others' opinions because opinions are based on experiences and one cannot say that these are right or wrong.

When a woman realizes that reason and intuition alone are both insufficient to know, she leaves Procedural for
Constructed knowledge. Here she realizes that all knowledge is constructed by balancing logic and feeling and integrating experience, thus making the individual an intimate part of what is known.

Understanding these modes of realization, these "ways of knowing", then, is a central part of any educational transformation. They influence how and what all students, not only females, will learn, and thus, how and what we should teach. Just as writing and cognitive patterns are related to, though not dictated by gender (Baxter Magolda, 1992; Gregg & Steinberg, 1980), sex differences play a role in differences in writing ability, as I found when replicating Ranieri's "Gender and Composing at the College Freshman Level: A Developmental Approach" (1989).
Chapter II

GENDER AND COMPOSING: A CROSS-CULTURAL STUDY
OF COGNITIVE DEVELOPMENT AND WRITING ABILITY

Much of the research on gender differences in cognition reviewed in this thesis, including studies by Piaget (1970), Gilligan (1982), and Belenky (1986), has found that the feminine, 'holistic' mode of expression has been left undeveloped and even subordinated to the male, 'analytical' voice. How writing skills develop with respect to these differences in expression was the main focus of a research study performed at Westminster College, Oxford, in the fall semester of 1992. The study was intending mostly to replicate the case section part of Ranieri's study described in "Gender and Composing at the College Freshman Level: A Developmental Approach" (1989). This initial study found a significant decalage between the development of high school and college male's cognitive and writing abilities, while high school and college females' cognitive and writing abilities seemed to develop concurrently, if not actually dependently on each other.

Beyond the simple contrasts in performance, however, I explored the differences in the styles of writing, based largely on Gilligan's findings (1982). She suggests that men see individual elements as separate, and then explore the connections between the separate parts, while women assume that the parts are connected, and then look for individual
relationships. (Figure I illustrates this idea.) In other words, "women start with the whole and turn inside to see separate relationships; men start with the pieces 'stapled' end to end, then begin to see larger interrelationships" ("Gender" 7-8).

**Figure I**

From "Gender and Composing at the College Freshman Level: A Developmental Approach" by Ranieri, 1989.

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**Figure 1**

COGNITIVE DEVELOPMENT DEPENDENT ON EITHER THE ANALYTIC (AM) OR HOLISTIC (HM) MODES

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A second difference noted by Gilligan is the audience to which the writing is addressed. Males tend to write to a "generalized other" while women write as if to a "particular other." Taken further, it is as if males prefer to write as if preparing a work for publication whereas
womens' writing is prepared for a less formal audience.

A third way in which writing differs by gender is how subjects actually organize how they will write. Ranieri explains that mature composers will often note the imbalance of their own writing and try to integrate both holistic and analytic modes. Gilligan (1982) similarly contends that before this level of development occurs, younger males will write an essay and then make alterations to keep the essential structure clear, or start with the pieces and then look at the whole, while female writers prefer to make changes as they write so as to build the structure as they go along.

Finally, Barrett (1989) suggests that the idea of females being stronger composers stems from the variance inherent in Piaget's characteristic of reflective abstraction. If, as these findings suggest, women grasp the holistic aspect of writing at an earlier age than men, it would enable them to make more meaningful revisions because they could understand better the effect of changing a process necessary for good writing; women practice understanding how a reader will interpret a work while males develop this skill later with their reasoning skills.

The base from which Ranieri (1983) and I determined the differences in the maturity of the subjects' writing and cognitive ability were five working definitions of Piaget's most advanced cognitive stage, formal operational, summarized

The first characteristic of cognitive development is the ability to recognize relational differences between wholes and parts. At this stage the student realizes that he must develop a paper which relates one completed idea and that idea must include several integrated parts.

The second characteristic involves the ability to be aware that certain combinations may be used in determining the wholes and the parts. Here the student realizes that he cannot simply state his whole idea at one time and expect the readers to grasp the whole idea. He recognizes that his idea will be better presented and received if he is able to break the main idea down for his readers into divisions or parts and deliver those parts in an organized manner.

The third characteristic is the ability to think simultaneously about certain aspects of a situation and the ability to isolate variables for future use. Here the writer understands that his paper must not only include one idea, but that he must include several sub-ideas which will help to define his main idea. He is able to present those ideas in an organized manner and then to work with one at a time, developing individual ideas while remembering that they are structured within a larger idea and that they are to be followed by other ideas to which they must relate.
The fourth characteristic involves the ability to see beyond the real to the possible. Here the writer recognizes that his essay must solve real rhetorical problems, and he is able to question what the best method is for achieving those (possible) ends. He realizes that perhaps one type of essay will work better than others and that to achieve that type of essay he must fulfill certain goals. He projects these goals, local or global, and writes toward them.

The final characteristic of cognitive development is the ability to engage in reflective abstraction. Once the writer has written his essay, he is able to look back over his work and question whether it includes those elements which fulfill the goals (possibilities) he has set. He is able to see the wholes, the parts, and the way they interact, and to understand that he has initiated the separate stages for specific reasons. He then stores this knowledge about his writing/thinking processes for use with later composing situations.

Considering the significant findings of Ranieri's and Barrett's work and the research on cognitive and gender differences, I hypothesized that the differences in constructing knowledge between genders would not vary by culture, with all male subjects demonstrating a lag between their cognitive and composing skills and all female subjects' demonstrating equal ability on their cognitive and composing tasks.
Method

Subjects

Two first year college students, Dan, a 19 year old male, and Cathy, a 21 year old female, voluntarily responded to signs requesting subjects. A 24 year-old female subject volunteered and was administered the two cognitive tests but was eliminated due to her age. I had hoped to test at least four students, two of each sex, for a more thorough replication of Ranieri's work, but with limited time and resources while abroad, I limited the subjects to the first two tested who also satisfied constants for age and gender.

Materials

In order to determine where the subjects stood developmentally, I administered two cognitive tasks. The first was the Piagetian Logical Operations Test, a standard test of 51 questions. Subjects were given the questions and asked to watch a short video with clips pertaining to each section of the test, explaining and providing clues to the questions. This test was chosen for its verbal approach; the subjects listened to the video and answered 51 written questions and were thus not totally dependent on illustrations for both tests.

The second test administered was An Inventory of Piaget's Developmental Tasks. This included 72 questions, all consisting of problems presented with pictures and multiple choice answers. To prevent a ceiling effect, 32
questions were deleted from the test. This test was chosen for its pictorial nature to balance the former largely verbal test, ensuring that if female's logic tends to be language-bound, (Ranieri, 1989) no bias in subjects' cognitive scores would result simply from the type of test used.

After the preliminary testing, subjects were given three tasks to measure their writing development. The first task asked subjects to compose a letter (see Appendix A) designed to resemble an essay used in Ranieri's "A Descriptive Study" and Barrett's "Under Construction" in which subjects were asked to write a persuasive letter about a controversial topic to a figure of authority. This test "allow(ed) subjects to exhibit their more complex mental structures, organizational patterns, and revision strategies" (Ranieri, 1983) because they had to not only write on a rather difficult topic but also be persuasive under a twenty minute time limit. This limit was used to force the subjects to use their most readily available cognitive and composing strengths, allowing me to see basic thought and writing patterns on which they rely.

The second task was an article used as a reading cue (see Appendix B) to see how already written material is comprehended and interpreted. Divided into several segments, this test asked subjects to break down their thoughts while reading, that is, to make sense of what was read and predict, if they could, the upcoming text. Subjects received
immediate feedback for their answers by reading the next page of the essay; they could read if their impressions of the whole theme or specific parts of the essay were correct, enabling them to adapt their answers as they progressed. Changing responses during their reading and again at the end, when they had read the entire piece and were allowed to change any answers within the test, allowed me to study subjects' ability to see the overall structure and relations of parts of a written work.

The third and final task (see Appendix C) involved a nine page article which subjects were asked to break down into traditional outline form. This technique revealed what subjects considered the most pertinent information in the article and how they organized parts of the essay. Overall, all three tests were directed at showing subjects' analyzing and synthesizing abilities before, during, and after composing.

**Procedure**

Subjects were tested individually and given the first two preliminary cognitive tests at one time, with a short break between them. They were allowed as much time as necessary, and testing for both subjects took around one and one-half hours.

The remaining three tests were administered to subjects separately and on three different days. The students were allowed twenty minutes to write the first essay while being
videotaped. Immediately after completing the test, subjects viewed the videotape of themselves writing and were asked questions (see relevant appendices) about what they were thinking at certain points in their composing and encouraged to make any comments they felt pertinent about their writing process. Reviewing when and where subjects paused in their writing and hearing their commentary on their writing also helped me see subjects' cognitive and composing processes.

The second task, which required students to analyze an essay, was administered separately, and subjects were given unlimited time for completion and encouraged to ask any questions during the testing.

The last test, which let subjects construct an outline of an essay, was also administered to them individually and they had as much time as needed. The subjects' comments as they reviewed the videotapes of their essay test and as they discussed both reading tests were audiotaped for future reference. Although subjects were never told the hypothesis of the study, the purpose of it and the reasons for the tests were discussed both before and after testing.

Results and Discussion

Test I

Subjects' scores on the two I.Q. tests and the first writing task are compared by gender and nationality with Ranieri's American subjects (1989) in Figures 2.1 and 2.2.
A Pearson r was conducted for all combinations of variables, with 1 and 2 indicating American and British subjects, and 1 and 2 indicating male and female subjects, respectively. The probability level was p<.05 for all scores. The IPDT and PLOT columns refer to the cognitive tasks and the Holistic column refers to the essay writing task. This category was judged by professors of English at Ball State University, all except one of whom were the original raters in Ranieri's 1989 study.

The scores can be analyzed by my two main expectations: the relationship between cognitive and writing ability for males and females, and the differences between the results for the American and English subjects. The main results of my first hypotheses are as examined (see Tables 2.1 and 2.2):

<table>
<thead>
<tr>
<th></th>
<th>Nationality</th>
<th>Sex</th>
<th>Holistic</th>
<th>IPDT</th>
<th>PLOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nationality</td>
<td>----</td>
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</tr>
<tr>
<td>Sex</td>
<td>----</td>
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<td>------</td>
</tr>
<tr>
<td>Holistic</td>
<td>-0.93*</td>
<td>-0.02</td>
<td>----------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>IPDT</td>
<td>0.37</td>
<td>-0.28</td>
<td>-0.01</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>PLOT</td>
<td>0.28</td>
<td>0.25</td>
<td>0.83*</td>
<td>------</td>
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</tr>
</tbody>
</table>

*significant at p<.05, one-tailed.
1. There was no significant correlation between subjects' sex and writing ability (r = -.02). The negative correlation indicates that the males were judged to be slightly stronger composers than the females, and while this result was a little surprising, my main interest was how males' and females' writing tasks compared to their cognitive tasks.

<table>
<thead>
<tr>
<th></th>
<th>Holistic</th>
<th>IDPT</th>
<th>PLOT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Girls</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holistic</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>IPDT</td>
<td>-0.18</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>PLOT</td>
<td>-0.09</td>
<td>0.99*</td>
<td>----</td>
</tr>
<tr>
<td><strong>Boys</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holistic</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>IPDT</td>
<td>0.86*</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>PLOT</td>
<td>0.50</td>
<td>0.86*</td>
<td>----</td>
</tr>
</tbody>
</table>

*significant at p<.05, one-tailed

2. When divided by sex, there were differences between males' and females' correlations of writing and cognitive ability. Males had a significant correlation between their writing and the IPDT (r = .86) and a weaker correlation with
the PLOT (r = .50). Females had no significant correlations between writing ability and either of the cognitive tasks (r = -.18 for IPDT, r = -.09 for PLOT). These results were the opposite of what I had hypothesized; I expected the females to have high correlations between their writing and cognitive tasks while the males were expected to have negative or no correlations.

Interestingly, though, the females' writing ability is more closely correlated to their performance on the PLOT, verbal-based test, while the male's writing ability is more closely correlated to the IPDT, picture-based test. This trend is discussed further under item four.

3. When analyzed as one group, males' and females' writing ability is strongly correlated with performance on the PLOT (r = .83) but negatively correlated with performance on the IPDT (r = -.01). This suggests that the mature composers were more comfortable with a task that included a verbal element (in this case, spoken dialogue) while weaker composers were more comfortable with a task that imposed no (what for them would be) linguistic restraints.

4. There were no significant correlations between sex and either cognitive task (r = -.28 for IPDT, r = .25 for PLOT). However, the one negative and one positive correlation supports an interesting trend. The negative correlation for subjects' performance on the IPDT, picture-
based test, means males did slightly better, and the positive
relation on the PLOT, verbal-based test, means females did
slightly better. I had anticipated this trend, considering
Ranieri's (1983) finding of the video-taped, question-
answer format of the PLOT to more indicative of female's
cognitive ability than the picture-formatted IPDT.

Concerning my second hypothesis of no significant
differences between American and British subjects, the
results were as follows:

1. There were significant differences between the
American and British subjects' performances on the writing
task (r = -0.93). The negative correlation indicates that the
American subjects were rated significantly higher than the
British subjects.

2. Nationality was more strongly correlated to the two
cognitive tasks than was sex (r = 0.37 for IPDT, r = 0.28 for
PLOT).

Because of the correlations between males' writing and
cognitive tasks, the lack of such correlations for females,
and the evident influence of nationality on subjects'
performance, I looked at subjects' composing styles and
rankings on the tasks for possible explanations of these
surprising results (see Table 2.3).

Cathy's performance on this first task compares in many
ways to Ranieri's female subjects, especially Stacie, who
ranked one step above Cathy's fifth place for this task.
Both Cathy and Stacie use 'I' to relate the situation they're writing about to themselves and give validity to their opinions through their personal experience, fulfilling what Gilligan (1982) termed the "particular other." Both females address a specific audience, using 'I' to establish a relationship with that person.

Table 2.3
Ranks of Holistic, IPDT, and PLOT Scores

<table>
<thead>
<tr>
<th></th>
<th>Holistic</th>
<th>IPDT</th>
<th>PLOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angie</td>
<td>25</td>
<td>Angie 39</td>
<td>Cathy 47</td>
</tr>
<tr>
<td>Eric</td>
<td>23</td>
<td>Cathy 37</td>
<td>Eric 44</td>
</tr>
<tr>
<td>Steve</td>
<td>23</td>
<td>Eric 37</td>
<td>Angie 44</td>
</tr>
<tr>
<td>Stacie</td>
<td>17</td>
<td>Dan 33</td>
<td>Steve 41</td>
</tr>
<tr>
<td>Cathy</td>
<td>10</td>
<td>Steve 32</td>
<td>Dan 33</td>
</tr>
<tr>
<td>Dan</td>
<td>7</td>
<td>Stacie 31</td>
<td>Stacie 26</td>
</tr>
</tbody>
</table>

Also, Cathy fell in between both American females' pauses and rereads at the verb, with 40% of hers occurring there while Stacie had 44% and Angie, the strongest writer, had 36% of her pauses and rereads at the verb in phrases. Pausing at a verb when composing is one indication of a writer's way of making meaning. Here the female subjects are taking more time in choosing the words that will decide the meaning of their sentences, the verbs, than other places where more detailed, but perhaps less decisive words, must be
written. Spending this time at the verb is an indication of their holistic approach. Despite the females' holistic tendencies, however, this composing ability did not correlate with their cognitive abilities. Considering these similarities between writing styles for all females and Ranieri's significant correlations when analyzing just the American subjects, I found further indication that the discrepancy between females' cognitive and composing skills must be due to nationality rather than gender.

Also contradicting the first half of my hypothesis were the rankings of the American males' writing tasks. While Steve (college) and Eric (high school) scored in the middle of all subjects on the cognitive tasks, they were rated as the second and third best composers, respectively. For Steve, the older male, this could be explained because he has had more time to develop a holistic writing pattern. However, this explanation does not apply to Dan, the English college male with poor writing skills, or Eric, the American high-schooler with stronger writing skills.

The only support for the idea of males' composing skills lagging behind their cognitive skills comes from Dan's scores. While his cognitive scores were either not far below or equal to the college and high school American males', his essay was the weakest of the six subjects, showing that he has not yet learned to integrate all of his intellectual skills into his writing.
Dan's performance on this first writing task is similar to the American males'. Like Eric and Steve, rated second and third, Dan does not address a specific audience or use personal experience to validate his opinions. This style of writing fits with Gilligan's idea (1982) of a "generalized other" which males tend to address when composing.

In respect to my second prediction of few or no differences existing between subjects by nationality, the only significant relationship was a negative one between nationality and the holistic measure. The British subjects were judged to be significantly less skilled composers than the American subjects. As with the first hypothesis, I compared their writing tasks and raw rankings to determine what differences between the English and American subjects could explain this discrepancy between writing and cognitive abilities.

Cathy, who scored several points higher on the PLOT and just a few points below the highest score on the IPDT was only the fourth best writer, and Dan, whose I.Q. scores were just below the middle, was judged the weakest writer. Cathy's ranking contradicts my hypothesis while Dan's supports it; I had expected Cathy's holistic and I.Q. scores to be consistent, either high or low, while Dan's writing ability did lag behind his I.Q. scores.

Compared only with each other, Cathy and Dan typify the results of Ranieri's study and the expected results. Cathy
is the better writer of the two and should be, considering her higher I.Q. scores, which show she has a strong grasp of different ways of solving problems and making meaning, while Dan's composing, but not intellectual, abilities are lower than hers.

Overall there seems to be a cultural factor that led the British subjects' composing and cognitive abilities to be significantly less related than the Americans tested. The question, then, is what factor skewed the results when all subjects were compared, causing Cathy and Dan to have less of a relationship between their writing and cognitive ability than their American peers. Perhaps, while Cathy and Dans' writing abilities and I.Q.s were sound when compared only in relation to each other, their writing styles were sufficiently different from the American students to be judged less favorably by the American raters. Simply considering differences in American and English education, I believe Cathy's writing ability lags behind what one would expect given her cognitive skills because she has not learned to integrate these skills into her writing, as with the American and English males. While Cathy has some mastery of the holistic and analytic approaches, as displayed in both of her cognitive tasks and her writing, she has not had the same educational experiences afforded the American females. As a freshman at Oxford University, Cathy was not taking any courses specifically addressing composing, while freshmen
entering Ball State, and I assume most American universities, are required to take courses in composition. While Cathy demonstrates the beginnings of applying knowledge, she may have not had the educational experience necessary to integrate these skills into her writing as the American students had.

A second explanation for the unexpected results may also be the small number of subjects tested. Individual fluctuations in Cathy's and Dan's skills could not be masked by averages of other subjects.

Despite the evident lack of relationship with cognitive ability, the British subjects continued their strong holistic and linear tendencies in the last two writing tasks.

Test II

The second task was an essay divided into several segments with questions after each segment. Subjects had to predict upcoming text and state the relationship between what they just read with information in previous paragraphs. This task was to test subjects' ability to recognize the structures of composition. If, as Gilligan contested, females assume all parts are connected and if they make meaning as they compose, I would expect Cathy to be able to predict upcoming text, see the relationships between paragraphs, identify the essay's theme, and rethink the whole work if needed. Similarly, Gilligan would expect a male composer to piece facts together and then try to see the
thesis, to have more difficulty predicting and seeing the interrelationship among sections, to possibly cite facts rather than large ideas as the main point of the essay, and be less able to revise the work because they would be less prone to see its larger context.

Here Cathy and Dan support Gilligan's ideas and the first half of my hypothesis, replicating the performance of Ranieri's American subjects. Cathy's methods of organization and construction followed the holistic pattern while Dan's followed the more linear approach. Looking at both their responses to the essay and the disparity in their expectations reveals and supports these patterns.

These differences in Cathy's and Dan's performances can be seen in every aspect of their organization, from identifying the essay's theme, to predicting and relating pieces of the work, to judging its organization. While Cathy correctly identified the essays' main point in one sentence in the first paragraph, Dan identified ten sentences throughout the essay as possible themes, one of which was the correct theme. Similarly, both American females correctly identified the thesis while both American males chose broad sentences or sections as the theme.

This disparity can be seen further when asked how they thought the essay was organized. Cathy responded that it was "not too bad" because the author provided an example for this theme but not written anything "about how he (Edison) came to
be an inventor. He hasn't told us much about the person...". Dan, on the other hand, said it was done "very well" because the author used "actual quotes" and gave "information about actual inventions." It seems Cathy is following an holistic approach in discerning the stated "whole idea" of studying the whole person described in the article while Dan looks mainly for facts to support the point of each paragraph.

When asked what they would change about the essay, Cathy said she would change nothing because the author had covered all he had mentioned in the introduction. Dan, like Steve, the American college male, provided a list of what topics he would have written about instead and in what order they should occur, further showing his trend toward linear, analytic thinking. Again, the female subject focused on overall connection of the work, making sure the author tied all facts to his beginning thesis, while the male concentrated on individual facts about which he would have liked to have read.

A particular set of Dan's responses in contrast to Cathy's furthers my belief that he was concentrating on lists of facts while she was interested in the impact of the whole essay. At the beginning and five times throughout the work subjects were asked to state what they thought would come next or what they felt still needed to be said in the essay. Dan, after reading half of the introduction, expected to read about the validity of the study being conducted in the essay
and how Edisons' abilities could be used today. Although the essay never covered either of these points, he consistently answered, up to two paragraphs before the end of the essay, that he expected to read about them. Dan should only expect to be given this information, though it was not covered in the introduction or any of the work he had read so far, if he was subordinating the consistency and wholeness of the essay to the mere inclusion of facts he latched on to in the first paragraph. His responses were much like Steve's, who, in his predictions, focused on facts about Edison's work rather than seeing the description of his work as a tool to prove a larger point about Edison's abilities. I suspect the males expected to be presented with new ideas at the end of an article, even though it would have disrupted the theme, because they tend to rely on the linear mode, writing by listing facts and providing a theme afterwards themselves.

Cathy similarly had incorrect assumptions about what the essay would cover, expecting more about Edison's personal life, but she dropped this assumption after the first eight of the essay's twenty-three paragraphs. It became clear to her as she looked for themes that her expectations were not going to be met, so she modified her assumptions, evidently reconsidering her reading of the introduction, and started to predict upcoming text correctly. Because Cathy organized and reshaped information as she read, it was clear to her that her ideas were incorrect and
she replaced them in favor of the essay making sense, rather than continuing to expect ideas to occur later in the work at the expense of the article's cohesion, as Dan and Steve did.

Although Cathy and Dan made some correct predictions (Cathy, six, and Dan, three, out of eleven questions), the type and consistency of their answers support their performance on the first essay test, as does the third and final written test.

Test III

The third test (Appendix C) was designed to see what information the subjects considered important and how they organized an already-written work. If their performances were to be consistent with the first two tests and my hypothesis, I expected Cathy to identify major themes and subsections and have no difficulty deciding which were the most important ideas. This would occur because the organization of facts would be clearer to her; she would have established the connection of facts as she read the essay needing only to decide which of the connected ideas were the most important headings and which were the supporting subsections. I expected Dan to tend to list facts, have trouble distinguishing the theme and major headings of the outline, and have trouble with which facts to put under which headings. This would occur because he focused more on the inclusion of facts, not their relation to each other, so their importance, necessary to see in order to subjugate some
ideas to other in an outline, would be less clear to him.

Again, the holistic and analytic descriptions apply to the English subjects. Cathy surprised me with some of her responses but overall both subjects fulfilled my expectations. Cathy's outline and written responses to questions about the task proved she could correctly identify the major headings, subsections, and theme of the article, but she admitted having difficulty deciding which were the important headings, which I had not expected. I had not considered that Cathy had not yet integrated the analytic ability of subjugating ideas. Considering her low Holistic score, perhaps she has not learned to integrate the analytic skills she proved she has in her cognitive tasks. Because her final outline included seven of eight correct headings and the correct theme, she was able to identify the theme of the article and the headings that would support it without being positive about her choices.

The fact that she reported finding subsections as the part of outlining she felt most confident with, I assumed that she would also be able to pick out headings relatively easily. When interviewed after her first writing task, Cathy said she was not sure what the directions were asking but she still completed the test successfully, suggesting that she did in fact understand the directions but found the idea of subordinating ideas artificial. This would help explain why Cathy scored so low on her writing task-- she has not yet
learned to integrate analytic skill of subordinating ideas necessary to mature composing.

I also find it interesting that although subjects were allowed to make notes to themselves as they read the article, Cathy did so only on the first of six pages, still writing a clear outline without needing to make corrections in it as she read. This performance also infers an ability to grasp a theme right away and have a clear sense for how a work is organized, a good idea of what would be covered in the upcoming work, and an ability to pick main points and significant supporting facts.

Dan, on the other hand, provides a good contrast for Cathy's performance, having more difficulty with this outlining task. As I expected, Dan listed facts instead of generalized themes, had difficulty deciding which points were headings and which were supporting facts, and when able to identify less important ideas, could not identify a heading for them, or see their connection. His outline resembles a list a writer would make for himself as a reminder of important facts that he wanted to include in a composition. Dan seems unsure of what these facts will show or where they are leading. Indeed, Dan did make notes to himself throughout the piece, summarizing or listing the facts within each paragraph. He summarized paragraphs accurately but did not integrate the smaller themes of the paragraphs in his outline, admitting at the end of the task
that he was sure about two of the four sections of his outline for which he did not provide headings.

These results are much like the American males', who correctly listed subordinate facts but often did not list a heading for them, having similar difficulty in seeing how they fit into the whole work. Overall, Dan's organizational abilities most resembled Eric's, the American high-schooler who tied as the second strongest composer, in his use of both holistic and analytic styles but even more so in that neither of them used either style consistently or strongly. Like Eric, Dan cannot deal with the essay as a whole but can identify the parts that compose it; both males can connect some facts but cannot use them to complete a whole.

Here Dan best displays his need to write and think holistically, or look throughout a piece for facts and ideas and build meaning from them. One of the seven sentences Dan identified as his themes was the correct one and he did include important points in his outline, so I do not doubt that he understood the article. However, Dan needs to develop his holistic skills to balance his analytic abilities, enabling him to compose at a more mature level, and perhaps complete other cognitive tasks better. By approaching a work assuming all facts within it are connected to support a theme, by remembering and revising this connection as he reads, and by using the facts and ideas in the work to build this knowledge, he would reveal a more
holistic and integrated approach to constructing knowledge, and, I suspect, would find reading and writing easier too.

In sum, the two main tenets of my hypotheses were disproven. I had expected a significant correlation between sex and writing ability for females and did not expect one to exist for males, reflecting the developmental congruence between composing and cognitive ability for females and the developmental gap in composing ability for males found by Ranieri (1983).

When correlations were run for the American and British subjects as two separate samples, though, the females did display a stronger correlation between the cognitive and composing tests than males. This result discounted my second hypothesis: that there would be no differences between the American and British subjects' performances. I concluded that there is a cultural factor that skewed the results when all subjects were compared. Because Cathy's performances were the most surprising, with high I.Q. scores but poor writing scores, I suspect differences in educational experience, her possible inability to integrate all of her cognitive abilities into her writing, and the small sample size as possible factors contributing to the unexpected results.

A interesting trend in Ranieri's research (1983) did reappear, however. Stronger composers and females had higher correlations with the PLOT, showing a preference for a verbal
medium to express their cognitive abilities, and weaker composers and males had higher correlations with the IPDT, suggesting a reliance on a picture-based medium for expression.

Because of these results, I would be interested to see if males and females express differences in their construction of knowledge through other means (skills other than composing), and to see how such differences could be integrated into the classroom.
Chapter III
RESEARCH AND OUR SCHOOLS
I. Problems of Education

Although the idea of meeting the needs of students' various modes of constructing knowledge is only rather recently coming to light, it does not require drastic changes in education. This goal is the target of research on cognition by Murray (1978a) and Elbow (1981) who conclude that this new emphasis is exactly what it should be—without adapting teaching methods to meet students' needs, we implicitly require less learning from our students. Students, therefore, need to experience the accumulation of ideas, facts, and feelings that lead to a body of knowledge. Students cannot follow a teacher's line of progression and all the steps that go into writing a lecture just as the average person cannot know exactly how Einstein produced his theory of relativity unless he told or showed us. Students cannot truly understand or learn unless the steps to the facts are made meaningful to them and unless they use their own ideas, feelings, and experiences in conjunction with the information the teacher presents.

When a diversity of experiences is joined with facts presented in class, a diversity of opinion and knowledge is bound to ensue. This is the point at which teachers must relinquish a little of their stranglehold on knowledge. The teacher's role is to help the students learn, and we can
fulfill this basic principle by learning from research on cognition and gender. Teachers are given the unreasonable task of producing learning without a definition of what learning is, and under restrictions of an outdated class and grade system (Hart, 1983) so it is not unreasonable for them to rely on methods that seem to have worked in the past. If a student is truly trying, however, it is the educational structure that is deficient, not the students who fail.

One deficiency to be guarded against is how material is covered in unconnected units, regardless of student progression. If female students construct knowledge by exploring the relationships of ideas and male students develop this ability soon after, teachers must encourage students to see the connection not only between different topics of one subject but also between all subjects.

Also, in *The Development of Writing Abilities* (1975), Britton et al. suggest that even if teachers recognize variability in writing ability, they still offer strong 'guidance' that implies there is a best way of writing, often to the detriment of those who learn differently. For example, if a teacher insists on an outline before students begin writing an essay, that process may block the student's understanding of the purpose of the task. Students need time for conception and incubation of ideas, but in these pre-writing stages, teachers often explain too much or offer too much assistance when students sometimes must explain or even
write out matters to themselves. Cathy demonstrated this need by rereading the instructions for the first essay test as she progressed instead of asking for help and by starting a new essay halfway through her testing time. She was uncertain of what to write initially until she discovered her ideas as she wrote, feeling free in the process to organize and compose as needed. Britton et al. (1975) also summarized the opposite approach of organizing knowledge and writing: "There are plenty of things we are sure we know but cannot articulate" (28). Dan illustrated this mode of thinking, composing his thoughts completely before writing but then having difficulty expressing them.

Cathy and Dan provide clear examples of students' need for seeing the connection between ideas and being able to explore these connections through their individual composing strategies. This is not intended as a criticism or suggestion for writing alone, however; this example of stepping back and giving the students control for finding their voice and developing their intellect can apply to any subject.

II. Barriers to Reform

While a recognition of some clear differences among students is developing, two barriers to providing for these differences exist: one, the irrelevance of education to students' learning styles, and two, concern for sacrificing content knowledge while attempting to provide for these
styles. The growing acknowledgment of separate ways of knowing for males and females will help provide a new approach to these problems.

Although students of both sexes sometimes fail to recognize the relevance of school to their lives, current research identifies differences between males and females, reflected by the disparity in test scores and the drop-out rate between the sexes. According to a report by the American Association of University Women (AAUW) Educational Foundation, *How Schools Shortchange Girls* (1992), even though test scores are equal when they enter, girls leave school with lower scores on tests measuring math ability and self-esteem. More attention is paid to boys in preschool because on average they lag behind girls in impulse-control and language enhancement. Early on boys receive more attention because of this need for help with verbal tasks so differences in attention become ingrained and undetectable.

Another example of how girls are set back by our schools is standardized tests, which have twice as many references to and pictures of men. The AAUW states that when women are mentioned, they are criticized one out of three times. Another link in the problem of education's irrelevance to some students is textbooks, which transmit knowledge and values, but on average do not even mention women. Although seemingly small problems, these are symptomatic of the larger, less detectable problem of
devaluing women's contribution to society and setting a precedent for the muting of female voices.

These negative influences negate girls' feelings that school is relevant and important. The AAUW reported that girls often drop out because schools becomes irrelevant to their lives. These are assertive, potentially very intelligent students who either did not learn to or chose not to follow the example the AAUW presents for being a good student:

...The 'good' urban student... learned not to raise, and indeed to help shut down, 'dangerous' conversation. The price of academic 'success' may have been the muting of one's own voice. (49)

Gilligan et al. (1990) similarly found that at a large Midwestern city school, fifteen year old females identified 'powerful learning experiences' out of school twice as often as they did when twelve years old; school is no longer the center of relevant learning for them.

The AAUW reports more prevalent barriers to gender equity, such as students with different experiences not wanting to be singled out, parental suspicion of an unfamiliar curricula, and a lack of teacher training on multicultural and gender-neutral goals and techniques. The most serious problem they pose is the different and often opposing views of what education is and whom it should serve.
This seems to be an unnecessary and almost childish problem. The latter part is clear; education is to serve students. The former is a little more complicated but by no means unsolvable, despite the different goals of education; whether for job training or preparation for further education, all students will eventually have to rely on their own knowledge and make connections to new knowledge, building stronger voices on their own.

In addition to recognizing different modes of expression, then, any educational system needs to consider more specific factors that make education a less meaningful experience for male and female students. I include males in this suggestion because although the research by the AAUW focuses on how our schools affect female students, males are implicitly included. To degrade any portion of society is to harm all of society because human potential is wasted and because the muting of any voice leads to a more simplistic, less valuable education for both genders.

Males are considered also because although the analytic and holistic modes of thought have been labeled 'masculine' and 'feminine,' these are only terms to show how the modes are usually identified. They may develop as gender-specific, but both sexes should learn to utilize both cognitive approaches. As Ranieri (1983) said, mature writers integrate both the holistic and analytic forms of writing and thinking into a higher dialectic form. If students are going to
participate in discovering and making meaning, the mature meaning they will ultimately make will hopefully be both holistic and analytic.

Emphasis thus far has been on the problems that already exist within schools, and while some hindrances to reforms may be technical, such as biased tests, textbooks, and teaching methods, a major theoretical barrier exists that impedes necessary reforms in our schools. The concern of sacrificing content knowledge in pursuit of developing students' voices is a barrier to encouraging any individualized or gender-specific aid.

Such concern is understandable; undoubtedly when students begin to ask questions of themselves and their world, their thoughts and answers may be incomplete, discussions in class unending, and learning more complex without the black and white comfort of the teacher as a giver of all-true knowledge (Baxter Magolda, 1992). I agree with Nodding's (1984) brief but accurate response to this dilemma: students will learn what they want, not necessarily what is covered. With freedom to develop their voices, students will rely on their own ability to construct knowledge, education will retain its relevance, and students will be able to respond to greater challenges. Teachers have to support students before they challenge them or they won't fight back (Baxter Magolda, 1992).
Recognition of these technical and theoretical obstacles is necessary if teachers and students are to overcome them with approaches encouraging students' ability to construct knowledge for themselves. Of course, this power is necessary in all subjects, and Cooper and Odell (1977) suggest that because writing is concerned with the formulation of ideas, composition teachers can help students increase their conscious use of intellectual processes, which will lead to more mature, persuasive, and thoughtful writing. A lesson in writing would be an ideal setting to demonstrate how to switch from teaching as a presentation of ideas to how to explore, sensitively, yet systematically, facts, feelings, values, and ideas in order to determine what it is they wish to say in their writing (107).

Baxter Magolda (1992) argues that the development of one's voice by telling one's own stories and organizing one's experiences is more vital than just for good writing; it is needed "to know." Just as the mature writer is one who integrates both the analytic and holistic modes of writing, students of any subject can and must integrate these styles for mature cognition. To know in this sense is not only to learn facts but to holistically understand how facts fit with one's experiences and ideas.

Cathy's writing clearly shows this ability—during the first composition tasks she needed to write all the arguments of one viewpoint before she realized that she did not agree