Comparison of learning styles of alternative and traditional high school students in three central Iowa communities

by

Joseph Craig DeHart

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Joseph Craig DeHart

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Dedicated to:

Alison DeHart

David De Hart

Paul DeHart

for your love, support, patience and help

Craig DeHart

Margaret DeHart

for your love, faith and guidance

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CHAPTER 1. INTRODUCTION

At 8:20am a group of 10 to 20 high school students gather outside talking, finishing their cigarettes and getting ready to begin their day of classes. They are a diverse group ranging in age from 15 to 22. Most students are caucasian; however, there are also Mexican Americans, African Americans and Native Americans. Some students are wearing $150 coats advertising their favorite football team; others shiver in the cold with just shorts and t-shirt. By 8:30am most are in their respective classrooms working on their assignments or talking with teachers. No bells rang to tell them class was to begin, and somehow they managed to begin their days. Once inside, everyone is addressed by their first names including teachers. Students begin working on various assignments. Teachers answer questions, greet incoming students and encourage those few who are convinced they cannot do advanced algebra though they do it well every day they come to school. Another day has begun at one of the growing number of alternative high schools in Iowa.

The group of students mentioned above, and hundreds more in the state of Iowa, have made the choice to attend an alternative high school instead of their community's regular high school. For many of these students they will find success, continue to attend and work hard, and eventually graduate. What makes a small percentage of a student body choose to attend an

alternative high school as part of their high school experience? Many skeptics of alternative education would say the answer is that these schools are too easy and that school officials stand at the door handing out diplomas to anyone who walks through. In reality, there are no easy or simple answers to this question. Personal, family, social, financial and other factors need to be examined to fully answer this question. This study examines only one small aspect of this question. Does learning style influence students' decisions to participate in an alternative high school?

Learning styles are the ways people prefer to take in information and make sense of it. Everyone has a learning style and/or several aspects of learning style. Do you prefer to work in the morning or later in the day? Do you do your best work while eating and drinking coffee? Do you work with music in the background, or do you prefer absolute silence? These questions, and many others, can give a person insight into how he or she learns most efficiently. Learning styles have been shown to remain fairly constant over time and are measurable (Curry, 1990).

There are many reasons for students to be considered at-risk of school failure. Differences in learning style are by no means the only or possibly even a major reason why students are at risk of dropping out, failing, and being left behind. Facilitation of individual learning styles does, however, fall under the control of schools and is more easily addressed than some of society's

other problems which cause students to become at-risk. The study of learning styles in alternative high schools is an appropriate starting point for researchers concerned with assisting education to help at-risk students.

The term "at-risk" was popularized after the 1983 report by the United States Commission on Excellence in Education entitled, *A Nation at Risk: the imperative for educational reform.* However, by this time alternative schools were already serving many students described in this report. Since the 1960's, educators in public alternative high schools have been working with students who, for many reasons, have not been able to succeed in traditional high schools. By 1974, alternative schools and programs had penetrated so far into the American system of education that the North Central Association of Colleges and Schools published "*Policies and Standards for the Accreditation of Optional Schools and Special Function Schools*" (Morley, 1991). The concerns raised in the 1980s about dropout rates, at-risk children and school reform led to identifying alternative schools and programs as potential solutions to help curb the problem (Wehlage, 1990; U.S. Department of Education, 1987).

Alternative education is not a procedure or program which can be followed; it is a genuine perspective of the role of education in this country. This perspective relies on the belief that everyone learns in different ways and deserves the opportunity to learn in a way that best ensures success.

Alternative education is about respect for students and parents, and respect for the choices they make. It is the belief that whatever needs to be done to help young people reach their educational goals and lead productive lives deserves a chance. Alternative education requires the freedom to change the structures commonly found in education (ie.-time, environment, curriculum, evaluation) while maintaining high standards for student work and effort (Morley, 1991).

Alternative education manifests itself differently in each school district and community. Metro High School in Cedar Rapids, Iowa is an example of a large, self-contained program designed to provide a different, more supportive environment for its' students. Metro serves nearly two-hundred students and is nationally recognized as an excellent alternative school model. Green Belt High School in Iowa Falls, Iowa is an example of a young (est.1994), one room, one teacher school which serves approximately 15 students from several school districts. Though these schools are very different in size and scope, their purpose and focus on student success remain similar.

Students are successful in alternative schools for many different reasons. Alternative education settings tend to have smaller class sizes with less competition. Students are evaluated continually and often work is competency-based instead of grade-based. Time is often more fluid in alternative schools. Students can either earn credits in shorter blocks or can earn credits

throughout the year based on the completion of work instead of a prescribed amount of seat time. Any student can earn a semester credit of algebra if given enough time to complete and "digest" the work. Many alternative programs are informal and try very hard to build a sense of family. Rewards and consequences for behavior and attendance are made to be more natural and less punitive. These are only a few of the differences which explain why students succeed in alternative education. Some schools may incorporate all of these strategies; others may do things completely different. Methods may vary, but purpose and beliefs remain constant (Avrich, 1980).

Statement of the Problem

With an ever increasing number of alternative high schools being created to decrease the dropout rate and increase the productivity of young people, one question still remains. Why aren't these students' needs being met in their regular high schools? Dropouts and the need for alternative schools are not localized in either urban or rural areas of Iowa. The need for alternative schools is a statewide, if not nation-wide, phenomenon.

For many in alternative education, the hope is that alternative high schools will be a vehicle for change and reform that leads to inclusion and success of all students in traditional high schools. It would be ideal for alternative high schools to

become such dynamic vehicles for change that they eventually put themselves out of business. It is the fear of many, however, that alternative high schools are being created so that districts can serve at-risk students without having to evaluate their methods and practices. It is only with research about alternative schools and the students they serve that hopes can be realized and fears put to rest.

Considering the potential duality of purpose of alternative high schools, more research is needed to determine whether alternative high schools are a result of school districts trying to help serve students and families in chaos, or whether alternative high schools are the result of a system unwilling or unable to change to meet the needs of some students and are, therefore, excluding them. This study will examine learning styles as an indicator of whether certain types of learners are more likely to choose an alternative high school.

Purpose of the Study

The main purpose of this study is to use learning styles as a way of distinguishing different types of learners within regular and alternative high schools in several small to medium-sized communities in Iowa. Are specific types of learners and learning preferences represented equally throughout programs? For example, does an alternative high school have the same percentage of global learners represented as does the regular high

school in that community? Also, when looking at all of a community's high school students combined, are there learning style differences between communities? Is there a combination of community and school type (alternative or traditional) which affects learning style?

This study will also give feedback to the individual communities about the utilization of their alternative high schools. Finally, this study should give good information and insight to participating students about their learning styles and the impact these styles have had in the past, and what impact they may have in the future. This study should be helpful to all educators in Iowa, the communities examined and the individual students participating.

Hypotheses

The hypotheses directing this study surround aspects of learning style measured by the Learning Styles Profile created by James Keefe and the National Association of Secondary School Principals (NASSP). The principal research hypothesis throughout this study is that learning styles of alternative high school students are different from learning styles of regular high school students. The following are the null hypotheses to be examined in this study:

Null hypothesis 1

There are no significant differences ($p<.05$) in the learning styles of alternative and traditional high school students as measured by the NASSP Learning Style Profile within three communities in central Iowa.

Null hypothesis 2

There are no significant differences ($p<.05$) in the learning styles of high school students between three central Iowa communities as measured by the NASSP Learning Style Profile.

Null hypothesis 3

There are no significant interactions ($p<.05$) between school type and community which affect learning style preferences as measured by the NASSP Learning Style Profile.

All three central Iowa communities mentioned in the null hypotheses range in population size from eight thousand to twenty-five thousand. Each community has a relatively new alternative high school with the oldest being six years old. The Learning Style Profile created by the NASSP will be the only instrument used throughout.

Assumptions of the Study

Several assumptions are being made in this study. It is assumed that learning styles are measurable and that certain aspects of learning style remain relatively constant for an individual. Also, it is assumed that the Learning Style Profile

created by the NASSP measures those constant aspects of learning style. Validity and reliability of the test instrument will be discussed in Chapter 3.

There are also several assumptions about the homogeneity of the communities, schools and students being examined in this study. These communities were chosen because of their close proximity to one another and their similarities as perceived by the researcher. The first community to have an alternative high school created it in 1990. The second community used the first community's model in creating its alternative high school in 1991 which served as the model for the third alternative high school created in 1994. Though modifications have been made in each community, there remain similarities between programs. All three programs: (a) work on a points system so that students may earn credit any time throughout the school year, (b) give credit for past work and do not start a class over if a student has been dropped previously, (c) use seven or eight periods in a day, (d) allow students to work at their own pace, (e) use a group time each day to address non-school student needs, and (f) maintain class sizes of between twelve and seventeen students. These are not all of the similarities that exist between programs, but they are among the most outwardly noticeable.

This study assumes that students will answer the questions on the Learning Style Profile adequately and honestly. To ensure student cooperation, complete anonymity is offered and

participation is strictly voluntary. It is further assumed that the sample obtained is a random representation of the student body in each school. Steps in data collection have been designed to ensure a random sample. Sampling techniques will be discussed in Chapter 3.

The last assumption relates to the objectivity of the researcher. It is assumed that objectivity can be maintained even though the researcher has a vested interest in the health and success of all three alternative high schools. The researcher helped create two of the three alternative school programs. The researcher also created a scholarship fund for the only school he did not help to create. Familiarity with all programs may be an important asset to insure proper testing, follow-up and honest student participation. Objectivity will be maintained by the following: (a) use of a standardized instrument, (b) proper sampling technique, (c) careful testing procedures, and (d) proper statistical analysis of the data collected.

Delimitations of the Study

Delimitations for this research project should be noted. A case could be made that many factors other than school type and community are responsible for these students' differences in learning style. Family structure, intelligence, past school histories, and many other factors will not be examined. These aspects would be interesting to study but are beyond the scope of this

research project.

Population size for alternative schools is small. The smallest of the three alternative schools has a student population of only about twenty-five students. The other two alternative schools maintain a student population between sixty and seventy students. Therefore, results of this study are only generalizable to schools participating in this study.

Also, sampling procedures were limited by some of the participating schools. In all three traditional high schools, students were not allowed to be taken out of classes. The resulting sample is made up of students taken from afternoon study halls. This sample only includes tenth and eleventh grade students since seniors have open periods and are not required to take study hall. Ninth graders were excluded from the study because the alternative schools serve only tenth through twelfth grades. Results of this study are only generalizable to tenth and eleventh grade students in the communities examined.

Definition of Terms

During the course of this research several terms related to alternative education and learning styles will be used in the following manner:

1. *Traditional/regular high school* refers to the community high school in which most students in a community are served and is the current paradigm in secondary education.

2. *Alternative high school* refers to high schools established by communities to serve dropout and/or at-risk students. These programs are usually smaller, less formal and supplement a community's regular high school programming.

3. *At-risk students* refers to those students not succeeding in regular high schools for any reason. Since alternative high schools were designed to serve students not succeeding in the regular high school, at-risk students will also be used to describe all students attending an alternative high school.

4. *Learning style* refers to the patterns by which people absorb, process and retain information (De Bello, 1990).

5. *Learning Styles Inventories ,Instruments or Profiles* are valid and reliable tests which measure one or many aspects of learning style.

6. *Field Dependence/Independence* describes whether a person is analytical or global in their attempts to understand and assimilate information. The field dependent learner tends to be more global and fuses information together into a larger scheme of how the world works. The field independent learner is more analytical and takes learning experiences for what they are with no need to fit them into "the big picture." These terms are used in learning style instruments to describe aspects of learning style.

CHAPTER 2. REVIEW OF THE LITERATURE

This study compares the learning styles of traditional high school students with alternative high school students in several small communities in Iowa. In comparison to research about learning styles of students not identified as at-risk, relatively few studies have been done with identified at-risk students. Most of the learning styles research about at-risk students was conducted on at-risk populations still attending a traditional high school program. Very few studies have been done with students attending alternative high school programs or with students no longer attending school. This chapter will provide an overview of the available research about learning styles, learning styles and at-risk students, and alternative high schools. This chapter is organized in the following sections: (a) overview of alternative education in the United States, (b) overview of alternative education in Iowa, (c) overview of learning styles research, (d) examples of learning style measurement instruments, (e) learning styles and at-risk and/or dropout students, (f) applications of learning style to benefit students, (g) learning styles-based instruction, and (h) summary.

Overview of Alternative Education in the United States

In the United States, alternatives to the traditional, government-sponsored system of education have always existed

(Young, 1990). In fact, the government did not get involved with wholesale education until the early 1900's when wrestling with the problem of how to best integrate waves of European immigrants into American society. However, parochial and private institutions have always been an option for those families choosing a specific focus of curriculum, and/or having the financial means necessary to access private schools (Deal & Nolan, 1978). Much of the success of private and parochial schools is due to their exclusive nature. Students succeed partly because families have made sacrifices in order for their children to attend a specific school. Public education is very different because it is charged with the responsibility of educating everyone independent of desire for education or means to pay for it.

During the latter half of the twentieth century, society began to realize that education could make the difference between students growing up to be productive, or struggling to be self-supporting. No longer could society permit students to grow up without an opportunity for an education. From 1900 to 1960, public education became the institution that is still in existence today. The 1960's, however, saw the beginnings of a new movement in public education. Whatever good reasons and intentions brought the current system of public education into being, it was no longer looked at as the one, best way to educate children. In the 1960s private groups, and later, public school systems began to provide alternative means of educating those

students wanting and needing to do things differently (Deal & Nolan, 1978).

The willingness of private groups and school districts to provide alternatives for students is the result of three significant social trends. During the civil rights movement of the 1950s and 1960s, community residents, teachers and college volunteers collaborated to continue the education of black children denied an education because of racial bigotry in "freedom schools" (Fantini, 1976; Young, 1990). An excerpt from a memo distributed to freedom school workers in Mississippi illustrates:

> The purpose of the freedom school is to provide an educational experience for students which will make it possible for them to challenge the myths of our society, to perceive more clearly its' realities, and to find alternatives, and ultimately, new directions for action. (Fantini,1976, p. 4)

It wasn't long until white families began sending their children to these "freedom schools". Caucasians were attracted partly to escape a frantic system of education and partly because they found out that some students could learn more and succeed better in this new environment (Fantini, 1976).

A second social trend which enhanced the alternative education movement was the counterculture movement of the 1960s (Fantini, 1976; Young, 1990). Schools began to appear repressive and authoritarian. Alternative schools were seen as a

way to "free the children". A.S. Neill's school at Summerhill, England served as a model for the "free the children" movement in American public education (Neill, 1960).

Created in 1921, A.S. Neill wanted to create a school at Summerhill, England which fit the child instead of making the child fit the school. Neill states, "My view is that a child is innately wise and realistic. If left to himself without adult suggestion of any kind, he will develop as far as he is capable of developing" (Deal & Nolan, 1978, p. 31). Summerhill served approximately 45 students annually ranging in age from 5 to 16. Neill's school was founded on the idea that the best way to guide children is to provide opportunities but offer no encouragement or punishment for participating or not participating. Classes, and school in general, are optional. Students could choose to play all day, every day instead of going to school. Though this sounds wasteful of students' time, Neill professes that the student's own curiosity and energy will make it impossible to stay away. The act of the school respecting all decisions made by students made it desirable to attend class (Neill, 1960). Focus of the school personnel was not method or style of teaching. As Neill states it:

> Whether a school has or has not a special method for teaching long division is of no significance, for long division is of no significance except to those who want to learn it. And the child who wants to learn long division will learn it no matter how it is taught. (Deal & Nolan, 1978, p.32)

Though Neill's Summerhill taught students for over five decades, it did so with controversy and little public support. Much of the public thought Summerhill students were, "a bunch of wild primitives who know no law and have no manners" (Deal & Nolan, 1978, p.31). Many alternative schools created in America during the 60s and early 70s which used Summerhill as a model failed due to lack of pubic support.

The third social trend was a resurgence in the progressive movement and the ideas of John Dewey. Like Neill, Dewey and the progressives felt that traditional school practices were ineffective and that better ways of educating children existed. Unlike Neill, Dewey believed that students needed input in the design and sequence of their education. Whereas Neill argued that the act of teaching was insignificant and children would learn regardless of instruction, Dewey believed that instruction needed to be a collaboration between teachers and students. Dewey's overall concern for education was not complete student freedom and fostering of innate curiosity. Dewey's concern was using student input to insure learning fell within the scope of ordinary-life experiences (Dewey, 1938).

Dewey saw traditional schools as a process of transmitting what has been worked out in the past to students. He believed that past learning was important as a means to understand the present, but not as an end in itself. Because Dewey's ideas stressed student input and applied learning to real-life situations

instead of total student freedom, Dewey's ideas were more acceptable to educators and to the public. Public support was maintained even though fundamental change had occurred because Dewey's schools appeared similar to traditional schools. Progressive education and alternative education share the belief that education must have meaning in students' everyday lives. Ultimately, alternative education in this country has remained and flourished because of renewed interest in Dewey and the progressives. Progressivism seemed to reach middle ground between 'freeing the students' and maintaining an educationally sound environment generally supported by the public. Free schools were thus replaced by alternative schools, a label which includes many of the approaches and practices of the progressives (Deal & Nolan, 1978).

It was these three social trends that challenged the way society looked at its schools. As a result of these movements schools which did not follow the old paradigm created at the turn of the century were created. Iowa was no different. Whether educators are struggling to reform traditional schools or creating alternative schools, these three trends still influence change in education in the state.

Overview of Alternative Education in Iowa

The alternative school movement in Iowa has lagged behind the rest of the country. Because Iowa has avoided an educational

crisis by continually supporting and believing in its schools, alternative schools were not seen as necessary. However, in the late 1970s and early 1980s, Iowa responded to many changes that were occurring in education, society, and especially with families. Though continuing to do well on standardized tests as compared to other states, Iowa's dropout rate continued to rise. By 1991, 14% of all students entering 9th grade would not be earning a diploma four years later (Wilcynski, 1991). In 1990, the Iowa Department of Employment Services determined that 21.8% of Iowa's work force had less than a high school diploma (Wilcynski, 1991). Iowa school districts responded in part to these changes by establishing approximately 50 separate alternative programs by the year 1995.

Kohlberg and Meyer (1972) identified four existing educational ideologies which identify educational organizations. These patterns of thinking influence instructional approaches, student-teacher interaction, curriculum content, organizational structure, and all other aspects of school life. These ideologies are useful in describing the differences between alternative and traditional education in Iowa. The four ideologies are:

1. *Classicists* — These are traditional schools which treat children as empty vessels into which they will impart the wisdom of the ages. Students are usually grouped according to age and students progress through a fairly regimented set of activities. Teachers make decisions and students follow them. Principals, in

turn, make decisions and teachers follow them. Most of the traditional school's internal workings are buffered from the community.

2. *Romanticists* — These schools emphasize student freedom to develop unhindered by external influence. Neill's Summerhill is a good example of this type of school. Schools are protected places in which students grow on their own. What students learn, and when, how and where they learn it are left to the desires of the students. Teachers are defined as fellow learners and facilitate what the students want.

3. *Revolutionists* — These schools emphasize the acquisition of the doctrine, tools and techniques necessary for the accomplishing of social change. Students are expected to become change agents. The teacher's role is highly autocratic with very few individuals making decisions about what students are expected to learn and believe. The freedom of the individual is deemphasized for the greater good of the group.

4. *Progressives* — These schools believe that education must have real-life meaning. Students and staff are problem solvers and together they compromise between what students want and what students need to make it in the real-world. These schools are managed with a mixture of autonomy, authority and consensus.

Though schools of all four types may be found in Iowa, it is the progressive philosophy which most closely mirrors the beliefs

of alternative educators. Two of the most commonly held beliefs of alternative educators according to Avrich (1980) are the belief that education is life itself and that the community must be involved as a platform for learning and applying meaning, and the belief that learning needs to be more natural, meaningful and pleasant. In Iowa, the further a model gets away from the classicist or traditional model, the less likely a community is to implement and support that model. Alternative schools reflect the communities in which they exist. Because Iowa is conservative in nature and has remained one of the top scorers on standardized tests, problems can exist with schools but wholesale change or revolution is not deemed necessary. Therefore, the romanticist and revolutionist models are not deemed important and would not be supported. They are too different from the traditional school model which is still largely supported in Iowa.

Alternative schools being largely progressive in nature is not only a matter of political climate. Many alternative educators would agree that a progressive model is a correct way to address the needs of at-risk students. Though educators in many traditional and alternative schools would agree that their purpose is to help students be prepared for life in the real-world, it is the methods and strategies which alternative schools incorporate which make them progressive instead of classicist. Some of the main differences which make alternative schools more progressive and successful with at-risk students are:

1. *Class size* — Traditional schools routinely have class sizes of 30 or more students. At-risk students may feel lost or unimportant and their learning needs may not be addressed in classes of this size. Alternative schools try to maintain class sizes of no more than 15 students. With this size, students are able to feel a part of the school and are more willing to support it (Gregory & Smith, 1990).

2. *Individualized attention* — With small class sizes, teachers are not only able to provide subject content, but are more able to tailor instruction to the abilities and wants of each student. Small class size also makes it easier to address affective issues facing students such as, but not limited to: basic needs, housing, prenatal care, day care, parenting skills, domestic abuse, family isolation, criminal behavior, and poor self-concept. Students also receive help in career planning and deciding what to do after high school

3. *Flexible scheduling* — Because of the many reasons students become at-risk of school failure, strict attendance policies and mandatory all-day school make success impossible. Students can be more successful when given options and allowed to build a schedule based on their needs knowing that their total time in high school is a direct result of the choices they make. Curriculum and credit earning become a matter of competency and work accomplished instead of seat time. Consequences for poor effort and attendance reflect the real-world by lengthening

the amount of time a student spends in school thus delaying gratification in the form of graduation and higher income potential.

4. *Student responsibility* — Students maintain responsibility for completing their education. Though circumstances remain where opportunities for a student must be limited due to behavior, alternative schools eliminate these barriers when possible. If students don't succeed, they do so knowing it is a consequence of their behavior and that the door is never closed on them if they choose to change the behaviors necessary to become successful. Students know that their experience in school will be only as good as they are willing to make it. This responsibility makes students feel they are contributing and necessary members of a school community (Morley, 1991).

It is important to mention that there is great variety in alternative schools in Iowa. Because an alternative school reflects the community it serves, differences having the greatest impact on student success may vary according to the strengths and weaknesses of the community. Though alternative educators from many communities may identify similar differences between alternative and traditional education, the relative importance of these differences to student success would be unique to each community.

Morley (1991) has identified seven common models for alternative schools and programs in Iowa:

1. *Continuation schools* — These schools provide an option for dropouts, potential dropouts, pregnant students and teenage parents. They are progressive in design and aim to be less competitive and offer more individualized, real-life learning environments. They are usually separate schools housed off school property. Their purpose is to provide a different path to receiving a diploma than the traditional school. Continuation schools are the types of alternative schools examined in this study.

2. *Fundamental schools* — These schools provide a back-to-basics curriculum with teacher-directed instruction and strict discipline. These schools follow the classicist model. Ability grouping is practiced. Letter grades are given and a dress code is usually enforced. The magnitude of these types of schools are not known because many times these schools are combined with home schooling. Phillips Elementary School in Des Moines, Iowa is a working example of this model and maintains a waiting list which verifies the demand for such a program.

3. *Schools within a school (SWS)* — This option was developed primarily at the secondary level to reduce class size and organize students into smaller, more personal units in larger high schools. The Caring Connection in Marshalltown, Iowa is a working example of this model.

4. *Schools without walls* — These schools offer a progressive program of community-based learning experiences and

incorporate community resource people as instructors. The Philadelphia Pennsylvania Parkway Program is the oldest and best known school without walls program.

5. *Multicultural schools* — These schools are designed to serve students from a variety of ethnic and racial backgrounds with curricula which emphasize cultural pluralism. Usually found in larger urban communities, these schools serve as a way to assimilate cultures while at the same time keeping them in tact. The High Intensity Language Training Program operated by the Dallas Independent School District is a nationally recognized program of this type.

6. *Learning centers* — These programs provide resources and programs concentrated in one location. Most centers are at the secondary level and are vocational or technical in nature. They may offer high school credit courses, GED training, career awareness and preparation, and personal enrichment courses such as speed reading or study skills. In Iowa, many community colleges provide learning center programs through their Adult Basic Education departments.

7. *Magnet schools* — These schools evolved as a response to school desegregation and were developed to provide distinctive programs of study to attract students from all racial groups within a school district. Magnets concentrate resources in one location and usually feature a theme or area of emphasis. Edmonds School in Des Moines, Iowa featuring the fine arts, and

King Elementary, also in Des moines, featuring the sciences are examples of magnet schools.

Another common type of alternative programming not mentioned by Dr. Morley is classroom alternatives (Fantini, 1976). Many times a teacher or program is identified within a school as being successful with at-risk students. Either through parent request, teacher/administrator request, or student choice, at-risk students seek out these teachers and programs. Resource programs and other special education programs may fall into this category, but this type of programming happens often outside special education. Schools are also beginning to formalize classroom alternatives by enrolling at-risk students in classes specifically designed to help failing students. The SUCCESS program in Newton, Iowa is an example of this type of programming.

Though many types of alternative schools and programs exist in the state, the scope of this research will include only two types of schools. This study is a comparison of learning styles between continuation-type alternative high schools following a progressive philosophy, and traditional high schools following a more classsicist philosophy. This dichotomy was chosen because it is the fastest growing and most common combination of regular and alternative schools in the state (Morley, 1991).

Overview of Learning Styles Research

Research about different ways people learn has been conducted since the 1890's. Early findings, however, were plagued with methodological problems and a preoccupation with determining the one "best" perceptual mode necessary to improve student performance (Keefe, 1982). Specific research on cognitive style was greatly advanced after World War II at Brooklyn College, the Menningen Foundation and the Fels Institute (Keefe, 1979).

Brooklyn College began work with the bipolar trait of field dependence-independence. The Menninger group was trying to identify specific factors which defined cognitive style such as ability to excel under flexible vs. constrained circumstances. Researchers at the Fels Institute were focusing on analytic vs. non-analytic modes of learning. For example, a non-analytic learner acts impulsively while an analytic learner analyzes the situation and acts deliberately. Many lines of research started by these three institutions have blossomed into the field of learning styles research. Similarities can be seen between the work these groups were doing and the reasoning and rationale behind some of the learning style inventories discussed later.

Until the 1970s, learning styles research was carried out primarily by psychologists. About the time psychologists lost interest in learning styles, educators began looking at the concept (Keefe & Monke, 1990). Learning styles research increased

rapidly from 1979 to 1989. During this period, over sixty universities actively researched aspects of learning style (Dunn, Beaudry & Klavas, 1989).

Because of much uncoordinated research taking place in such a short amount of time, many definitions of exactly what learning style means have emerged (DeBello, 1990). The late 1980s saw rise of the Learning Styles Task Force organized by the National Association of Secondary School Principals (NASSP). The NASSP Learning Styles Task Force defines learning style as;

> The composite of characteristic cognitive, affective and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with and responds to the learning environment. It is demonstrated in that pattern of behavior and performance by which an individual approaches educational experiences. It's basis lies in the structure of neural organization and personality which molds and is molded by human development and the learning experiences of home, school and society. (Keefe & Monk, 1990, p. 1)

Though this definition includes many aspects of learning style, a more generic definition offered by Thomas DeBello (1990) may be more succinct:"Learning style is the way people absorb, process and retain information" p.204. Though their definition includes distinct cognitive, affective and physiological categories, Keefe and Monk advise that learning style is a gestalt. It must be looked at as a whole and not broken down into parts.

Nations-Miller (1990) uses the Dunn and Dunn (1981) learning style model to summarize other's research and categorize different variables which make up learning style into the

following: (a) preferences in learner's immediate environment- noise level, lighting, temperature and overall comfort; (b) emotional needs- degree of motivation, ability to persist, degree of responsibility and need for structure; (c) physical needs- preferred sensory input (auditory, visual, tactile, kinesthetic), time of day preference, desire for food and/or drink (intake), and need for mobility; (d) sociological preferences- working alone, in small groups or in large groups, working with peers or adults; and (e) psychological inclinations- primarily globally or analytically aware.

In 1983, Lynn Curry from Dalhousie University in Halifax, Nova Scotia offered an organization of learning styles theories and constructs (Curry, 1983). Curry suggested three layers of learning style organized much like the layers of an onion. The three layers are (a) instructional preference, (b) information processing style, and (c) cognitive personality style.

Instructional preferences refer to the individual's choice of environmental conditions in which to learn. Since it is the outer most layer of Curry's model, instructional preferences are easiest to observe but hardest to quantify. Because they are less stable and change throughout a person's life, measurements for these aspects are seldom valid or reliable. Instructional preferences include those environmental aspects which most directly affect the learner in any given learning situation. Examples would include: (a) learner expectations such as desire to learn,

motivation, doubt about success, known skills and ability levels; (b) teacher expectations including attitudes towards learner, attitudes towards subject matter, motivation and confidence; and (c) external features of the learning environment including physical comfort levels, lighting and sound preferences, and general learner well-being.

The second layer of Curry's onion is information processing style. This layer is conceived as the learner's intellectual approach to assimilating information. For example, a learner may prefer to receive input through physical manipulation, or the learner may prefer to learn based on mental models and conceptualization. Because this level of the onion does not depend directly on the learning environment, it is considered more stable and less likely to change.

Cognitive processing style is similar to the information processing layer, but takes into account more permanent personality features. These personality features may include ability to decode and organize incoming information, introvertness/extrovertness, persistence, threshold for ambiguity, and ability to take risk. These aspects of learning style are considered most permanent, hardest to observe directly but easiest to quantify because of their stability.

Curry's original intent was to provide a model to direct the disjointed learning style research that was occurring during the 1970s and early 1980s. Though this model is seldom cited in the

literature in favor of the NASSP definition of learning styles, it serves as a good model for classifying learning style instruments.

The literature reviewed indicates that research about learning styles generally falls into two categories: (a) studies measuring only one or a few aspects of style, and (b) studies trying to measure all aspects of learning style. The following section highlights several commonly used instruments to measure learning style. Though both "limited scope instruments" and "all-inclusive instruments" are included, many common and useful instruments have been omitted (Hill, 1976; Grasha & Reichmann, 1982; Witkin, 1971). Those omitted were either very similar to, or were incorporated into those instruments chosen for discussion. When deciding which limited scope instruments should be used as examples, only those belonging to the inner most layer of Curry's onion were chosen. Because cognitive processing style is more stable and easier to reliably quantify, this area has drawn more attention from researchers and is more commonly found in the literature. The cognitive processing style instruments to be discussed are: Gregorc's Cognitive Style Model, McCarthy's 4Mat system, Kolb's Cognitive Style Model, and The Myers-Briggs Personality Type Indicator. All inclusive learning style instruments try to include all three layers of Curry's onion. There are two learning style inventories of this type primarily used by researchers: the NASSP Learning Style Profile and the Dunn and Dunn Learning Style Inventory, both of which are

discussed in following sections.

Examples of Learning Style Measurement Instruments

Cognitive processing style instruments

Many of the cognitive learning style instruments follow a similar dichotomy in design. These instruments assess the learner according to two different scales arranged on a X-Y coordinate plane. The first scale determines whether the learner prefers hands-on manipulation of incoming information versus being able to conceptualize information to make it fit in with what is already known. The second scale determines whether the learner needs incoming information in an orderly and sequential way or is more impulsive and prefers to create order out of a variety of non-sequential information.

This dichotomy can be illustrated with the example of a jigsaw puzzle. The first scale would determine whether the learner dumps out the pieces and starts trying combinations of pieces with little regard for how the final puzzle is to look, or first studies the picture on the box, gets a strong mental image of the finished puzzle and starts putting pieces together that fit into that mental image. The second scale would determine whether the learner starts by putting the border together and then moves to obvious features of the puzzle such as grass, sky, water, or whether the learner seems to work on several pieces of the puzzle at the same time with no preset plan for completing it. All

cognitive style models agree that no learner uses only one way of processing information and encoding/decoding. Though the learner may have a preferred style, all styles may be used according to the individual learning experience.

Gregorc's Cognitive Style Model, McCarthy's 4Mat System, and Kolb's Cognitive Style Model are good examples of instruments demonstrating this dichotomy. Though not identical, similarities between these models and the dichotomy discussed previously will become evident. A model illustrating the similarities between the jigsaw puzzle example and these cognitive style models will be given after discussing each instrument in more depth. Though the Myers-Briggs Personality Type Indicator has aspects of the scales used in creating the dichotomy, its similarities are not as pronounced.

One of the most commonly encountered cognitive learning style instruments in the literature is Gregorc's Cognitive Style Model (Gregorc & Ward, 1977). This model, though twenty years old, is still being used. This model does not take into account environmental aspects or perceptual aspects of learning style (Curry's outermost layers of onion). This model does, however, do an excellent job of explaining the dichotomy discussed earlier. By determining whether a person learns best with concrete, hands-on activities, or abstract conceptualization, and with sequential or random information, the learner is placed in a quadrant according to these preferences. Though this instrument is limited in scope,

it has proven to be a useful tool for helping individuals identify strengths and weaknesses when learning.

The four distinct learning style quadrants defined by Gregorc's model follow:

1. *Concrete Sequential* — These learners prefer hands-on activities. They need order and logical sequence to learn most efficiently.

2. *Concrete Random* — These learners also need hands-on activities. They are much more impulsive and more willing to take a leap-of-faith approach to learning.

3. *Abstract Sequential* — These learners have a greater store of images, words, sounds and impressions which help them decode information. They have less need for hands-on learning, but prefer orderly and sequential learning experiences.

4. *Abstract Random* — These learners possess the same mental constructs as abstract sequential learners, but they learn best in trial-and-error situations. They often rely on hunches and intuition.

Gregorc believes that every learner possesses all of these styles to some extent. However, he also believes that most individuals use one or two of these styles primarily.

The 4Mat system is another instrument used to explain cognitive aspects of learning. The 4Mat system describes a two-dimensional coordinate axis with how people perceive on one axis, and how people process information on the other (McCarthy,

1990). According to the 4Mat system, people perceive in primarily two ways. Some people perceive by sensing and feeling, while others respond more systematically and think things through logically. The other axis breaks down how people process information into those who process by watching and those who process by doing.

McCarthy's coordinate system breaks learning style into four major learning styles:

1. *Innovative Learners* — These learners seek meaning and need to be involved personally. They learn by listening and sharing and absorb reality. They perceive information concretely and process it reflectively. They are interested in people and culture. They are divergent thinkers who believe in their own experience, excel in viewing concrete situations from many perspectives, and model themselves on those they respect. They function through social interaction and tend to be innovative and imaginative.

2. *Analytic Learners* — These learners seek facts and need to know what the experts think. They learn by thinking through ideas. They form reality. They perceive information abstractly and process it reflectively. They are less interested in people than ideas and concepts. They critique information and are data collectors. Thorough and industrious, they will re-examine facts if situations perplex them. They enjoy traditional classrooms. Traditional schools are designed for these learners.

3. *Common Sense Learners* — These learners seek usability and need to know how things work. They learn by testing theories in ways that seem sensible. They edit reality. They perceive information abstractly and process it actively. They use factual data to build concepts, need hands-on experiences, enjoy solving problems, resent being given answers, and restrict judgement to utility and purpose. They have limited tolerance for "fuzzy" ideas. They need to know how the things they are being asked to do will affect them in the real world.

4. *Dynamic Learners* — These learners seek hidden possibilities and need to know what can be done with information. They learn by trial-and-error and self-discovery. They enrich reality. They perceive information concretely and process it actively. They are adaptable to change and relish it. They like variety, excel in situations calling for flexibility, tend to take risks, and are at ease with people but are sometimes seen as pushy. They often reach accurate conclusions in the absence of logical justification.

Like Gregorc's model, McCarthy's system stresses that no one is exclusively one type of learner. All styles are used, but one or two are relied upon primarily.

A unique aspect of McCarthy's system which distinguishes itself from other learning styles models is its application to teaching. It is McCarthy's belief that students are best taught using all styles and need to practice secondary learning styles.

Students and teachers are all informed, willing participants in identifying and using all styles.

Another "limited scope" cognitive learning style instrument in wide use today was created by Dr. David Kolb in the mid-1970s (Kolb, 1976). Kolb's instrument is described as a simple, self-description test based on experiential learning theory (Titus, Bergandi & Shryock, 1990). Kolb's inventory, based on the theories of Dewey, Lewin and Piaget, provides a framework for determining one's strengths and weaknesses in learning. The Kolb Learning Style Inventory consists of a 12 item paper and pencil instrument which can be completed in 10 to 15 minutes. Respondents are required to rank order sets of four words according to the degree to which these words characterize their learning style. As respondents score this instrument, they are determining four distinct scores which relate to the x-axis and y-axis of a coordinate plane. The first two scores, active experimentation (doing) and reflective observation (watching), are differentiated along the x-axis. Concrete experience (feeling) and abstract conceptualization (thinkers) are differentiated along the y-axis (Stice, 1987). These four learning stages are described as follows:

1. *Concrete Experience (CE)* — This stage emphasizes personal involvement. One tends to rely on feelings rather than a systematic approach to problems and on one's ability to remain open minded and adaptable to change. Learning in this stage is

related to specific experiences, relating to people, and being sensitive to feelings.

2. *Reflective Observation (RO)* — In this stage, people examine ideas from different points of view. They rely on patience, objectivity and careful judgement but do not necessarily take action. They rely on their thoughts and feelings to form opinions. Learning by watching and listening is characterized by careful observation before making a judgement.

3. *Abstract Conceptualization (AC)* — Learning in this stage involves logic and ideas, rather than feelings, to understand problems. Reliance is on systematic planning and developing of theories and ideas to solve problems. Learning is characterized by logical analysis and intellectual understanding of a situation.

4. *Active Experimentation (AE)* — In this stage learners actively experiment with influencing situations. They have a practical approach and a concern for what really works. They value getting things done and seeing the results. This learner is characterized by an ability to get things done, a willingness to take risk, and can influence people and events through action.

By subtracting the scores which define each axis and plotting the resulting point on a coordinate plane, the responder identifies his or her preferred learning style. The four learning styles defined by the four quadrants of a coordinate plane are described as follows:

1. *Divergers* — This type of learner prefers to learn through concrete experience and reflective observation. They are creative, good at generating alternatives, recognize problems, and understand people. If they are too divergent, they can be paralyzed by alternatives and find it hard to make decisions. If they are not divergent enough, they find it hard to generate ideas and can't recognize problems and alternatives. Divergers often find careers in the arts and in service-oriented professions.

2. *Assimilators* — These learners prefer reflective observation and abstract conceptualization. They are best at understanding a wide range of information and putting it into logical form. They are more interested in the logical soundness of an idea than its practical value. If they are too strongly assimilative, they may build castles in the air without being able to apply what they know. If they are weak assimilators, they fail to learn from their mistakes, have no sound basis for their work, and do not approach things systematically. Assimilators often build careers around information handling and the sciences.

3. *Convergers* — This type of learner prefers abstract conceptualization and active experimentation. They like the practical application of ideas, do well on standardized tests, use deductive reasoning, and are good problem solvers and decision makers. If they are too convergent they may solve the wrong problem and make hasty decisions. If they lack enough convergence they lack focus and may have scattered thoughts.

Career choices might include a variety of specialized or technical fields.

4. *Accomodators* — These learners prefer active experimentation and concrete experience. They adapt well to immediate circumstances, learn primarily from hands-on experience, get things done, take risks, and tend to act on feelings. Those who are too accommodating can burn energy on trivial matters. Those with not enough accommodation do not complete their work on time, have impractical plans, and are not goal directed. Accomodators are often found in organizations and business.

Though the final part of this test identifies the learner as one of four types, Kolb believes that it is important to realize we must use and develop all styles to be most efficient and productive. The identified preference is just that. We tend to use one style if at all possible, but we are also able to change to a secondary style if needed. Kolb's inventory was designed for adult learners, but currently, four versions are being used with all ages of learners (DeBello, 1990).

The similarities between Kolb, McCarthy and Gregorc's cognitive style models are illustrated in Figure 1. Also included in this figure is how these models compare to the jigsaw puzzle example mentioned earlier. After examining each model independently and together, the common dichotomies differentiating learners as watchers or doers, and sensors or

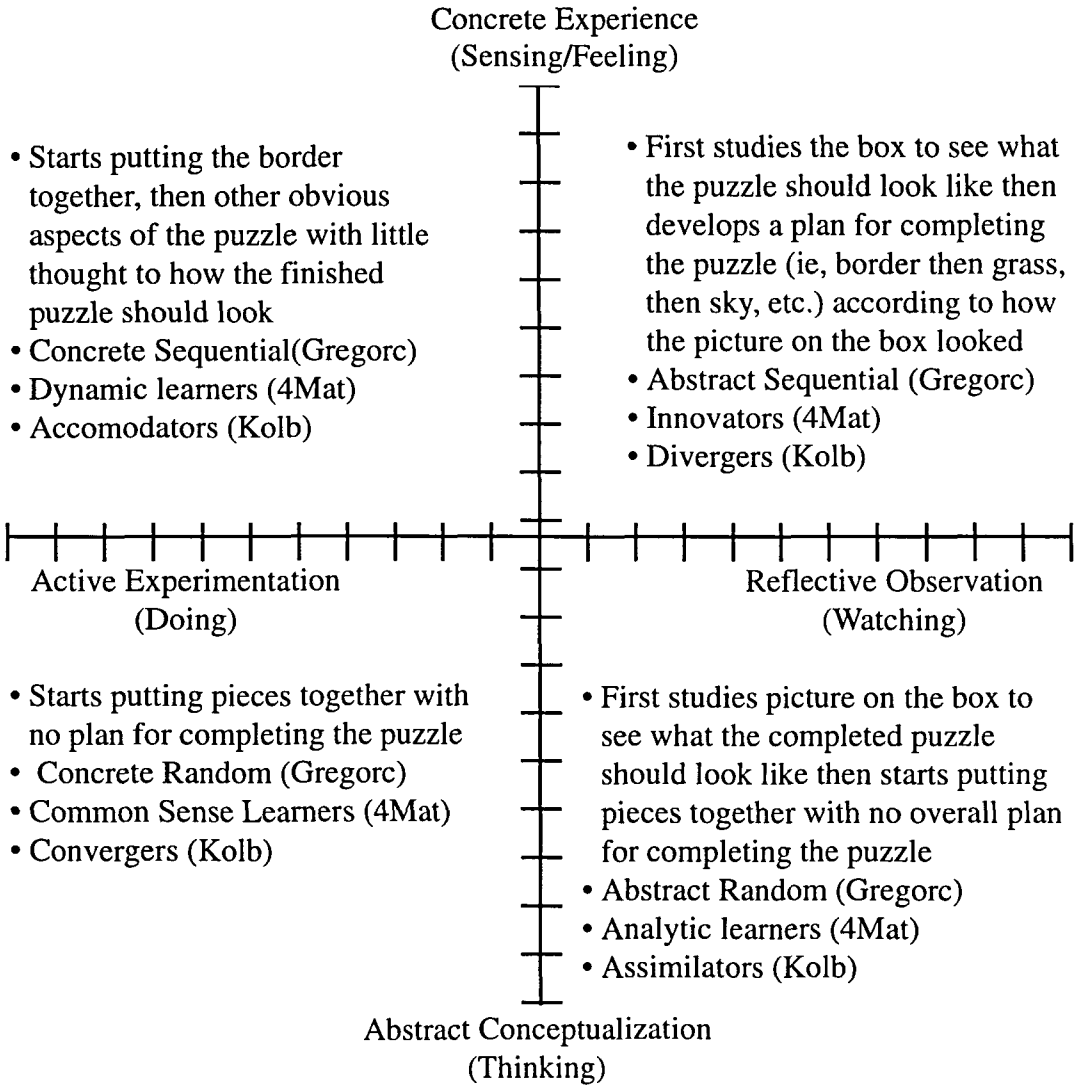

Figure 1. Relationship between puzzle example and Gregorc, Kolb and 4Mat cognitive style instruments

thinkers becomes apparent. These models also reflect the early work on learning styles done by the Fels Institute on analytic vs. non-analytic modes of learning.

The last "limited scope" learning style indicator reviewed

here is not a learning style or cognitive style indicator. The Myers-Briggs Personality Type Indicator (MBTI) is included because in an educational setting, it is hard to discern between learning style and personality type (Lawrence, 1982). The MBTI was developed by Isabel Myers and her mother Katherine Briggs from the work of Swedish psychologist Carl Jung. In his book *Psychological Types* (1923), Jung described patterns he had observed in the way people perceived information and made judgements. According to Jung's theory, all conscious mental activity can be classified into four mental processes; two perception processes- sensing and intuition, and two judgement processes- thinking and feeling (McCaulley, 1990). These processes combined with a person's preference toward introversion or extroversion, and a person's preference to live decisively (judgement) or spontaneously (perception), gives us four different categories and sixteen personality types.

Respondents are given a four letter description of their personality type (ie.-ENTP) and a one-page description of their type. One of the most useful aspects of the MBTI is that it gives a useful framework in which to build working relationships. In theory, by knowing a person's personality type and how he or she perceives the world to make decisions, a conscious effort can be made to work together in the most productive manner possible.

Inclusive learning style inventories or profiles

The preceding learning style instruments have been referred to as "limited scope" or "non-inclusive". To this point, instruments have dealt with cognition and how the brain organizes information (the center of Curry's onion). The next instruments to be discussed try to bring all of the aspects of learning style mentioned earlier into focus. These instruments recognize the importance of cognitive processes, but also reflect that environment and affective considerations affect how and what we learn. These instruments work with more tangible aspects of style and reflect the early work done at Brooklyn College and the Menningen Foundation discussed earlier in this chapter.

In 1979, officials of the National Association of Secondary School Principals (NASSP) began work with the Learning Styles Network at St. John's University in New York. In late 1982, NASSP officials decided to develop a one-best indicator of learning style by adopting Charles Letteri's "General Operations Mode" as a prototype (Keefe & Monk, 1990). The NASSP Learning Style Profile was developed to include the three domains given earlier in the definition of learning style: cognitive, affective and environmental. The Learning Style Profile is a self-answer instrument of 126 questions related to 24 identified skill, preference or orientation sub-scales within the three domains. The 24 identified sub-scales are listed in Figure 2.

1. ANALYTIC SKILL- to identify simple figures hidden in a complex field
2. SPATIAL SKILL- to identify geometric shapes and rotating objects in the imagination
3. DISCRIMINATION SKILL- to visualize the important elements of a task; to focus attention on important details and avoid distraction
4. CATEGORIZATION SKILL- to use reasonable vs. vague criteria for classifying information
5. SEQUENTIAL PROCESSING SKILL- to process information sequentially or verbally; to readily derive meaning from information presented in a linear, step-by-step fashion
6. SIMULTANEOUS PROCESSING SKILL- to grasp visio-spatial relationships; to sense overall patterns from component parts
7. MEMORY SKILL- to retain distinct vs. vague images in repeated tasks; to detect and remember subtle changes in information
8. PERCEPTUAL RESPONSE: VISUAL- initial reaction to information as visual response
9. PERCEPTUAL RESPONSE: AUDITORY- initial reaction to information as auditory response
10. PERCEPTUAL RESPONSE:EMOTIVE- initial reaction to information as emotional and/or physiological response
11. PERSISTENCE ORIENTATION- willingness to work at a task until completion
12. VERBAL RISK ORIENTATION- willingness to express opinions
13. VERBAL-SPATIAL PREFERENCE- for verbal vs. nonverbal activities
14. MANIPULATIVE PREFERENCE- for "hands-on" activities
15. STUDY TIME PREFERENCE: EARLY MORNING- for studying in the early morning
16. STUDY TIME PREFERENCE: LATE MORNING- for studying in the late morning
17. STUDY TIME PREFERENCE: AFTERNOON- for studying in the afternoon
18. STUDY TIME PREFERENCE: EVENING- for studying in the evening
19. GROUPING PREFERENCE- for whole group vs. small group vs. dyadic grouping
20. POSTURE PREFERENCE- for formal vs. informal study arrangements
21. MOBILITY PREFERENCE- for moving about and taking breaks vs. working until finished
22. SOUND PREFERENCE- for quiet study areas vs. some background sound (tv, radio, etc.)
23. LIGHTING PREFERENCE- for bright vs. dim lighted study areas
24. TEMPERATURE PREFERENCE- for studying in a cool vs. warm environment.

Figure 2. The 24 sub-scales and identifiers of learning style measured by the NASSP learning Style Profile

Unlike many of the "limited scope" assessments, the LSP is not intended to be an in-depth catalog of how a person learns. It was designed to give educators a snap-shot look at how a student is learning according to the twenty-four scales at one moment in time. Many of the scales are scored on five or fewer items. Practitioners needing more detailed information on any one sub-scale would need to use an additional assessment instrument.

Since its release in 1986, the LSP has become one of the most popular learning style assessments on the market. Though this instrument is very similar to the Dunn and Dunn Learning Style Inventory discussed in the following section, there is one important difference. The NASSP model has a more pronounced cognitive aspect than the Dunn and Dunn model (DeBello, 1990).

By far, the instrument most often used to measure learning style is the Dunn and Dunn Learning Style Inventory (Dunn, 1990). This indicator determines which elements from five basic stimuli groups affect a person's ability to perceive, interact with, and respond to the learning environment (Griggs, 1982; Dunn, 1981) The five stimuli groups are environmental, emotional, sociological, physical and psychological. Each group is broken down into the following elements: (a) environmental- sound, light, temperature and design; (b) emotional- motivation, persistance, responsibility, and structure; (c) sociological- peers, self, pair, team, adult, and varied; (d) physical- perceptual, intake, time, and mobility; and (e) psychological- analytic vs. global, cerebral

dominance, and impulsive vs. reflective.

Environmental stimuli preferences include the need for: quiet versus background noise, bright light versus dim light, relatively comfortable room temperature, and formal versus informal classroom arrangement. Though Dunn and Dunn realize some environmental preferences, such as room temperature and lighting, are difficult for the classroom teacher to match to each individual in the room, other stimuli are more adjustable. Student preference for quiet or back ground noise can be at least partially accommodated by rearranging the room, using headphones, and providing quiet and noisy times. Whether the classroom is arranged formally or informally is usually a matter of tradition and can be quickly matched with individual preferences. The key to matching environmental conditions with student preferences is to provide an appropriate amount of variety in conditions so each preference is partially accommodated (Dunn, 1982).

Emotional stimuli include: being motivated by peers, self, family and/or teacher; ability to persist when met with a challenge; ability to be responsible for self; need for structured lessons or desire to figure it out by oneself. Accommodation of emotional stimuli can easily be done in the classroom with organization and desire to do so. Arrangement of groups and use of cooperative learning can be organized to match style. Use of tutors is another way classroom teachers can provide one-on-one

time for those who want it. Persistent learners can be given assignments to challenge them while non-persistent learners can be give shorter, more directed lessons. Responsible students can be given assignments with little intervention from teachers or parents. Non-responsible students will require more communication between teachers and home. Students desiring open-ended assignments can be given more latitude to design their own assignments. Other students may need more structure and rely on the teacher to determine what work needs to be done. As with environmental stimuli, the key is to identify styles within students and add appropriate variety.

Sociological stimuli preferences indicate whether the student prefers to learn alone, with a partner, in a group, as part of a competing team, with an adult, or with a variety of people. Traditional classroom practices rely on learning alone or with a teacher or parent. Even newer trends in education such as cooperative learning ignore the preferences of some students. Each student should be given the opportunity to learn with preferred sociological stimuli and encouraged to learn in all types of group situations.

Physical stimuli include perceptual strengths, need for intake, time of day preferences, and need for mobility. These preferences are probably the least likely to be matched in a traditional school setting. School runs at the same time of day, and students are not allowed to take their hardest subjects during

the part of the day they are at their best. Mobility in a classroom, and eating and drinking in school are seen as disruptive behaviors. Perceptual strengths tend to develop in a pattern for most people. Kindergartners are highly tactual/kinesthetic. Visual strengths emerge about third or fourth grade, and finally, auditory skills are developed by about sixth grade. Curriculum is seldom presented in this order to match perceptual strengths as people develop. Perceptual differences between boys and girls are often noticed, but seldom accommodated. Girls develop language skills earlier and faster than boys, yet curriculum is presented at the same time and in the same way for both groups.

Psychological stimuli preferences include: global versus analytic style, right brain dominant versus left brain dominant, impulsive versus reflective tendencies. Traditional school organizations favor those students who are analytic, left brain dominant with reflective tendencies. Other psychological types are often seen as undesirable and in need of change. The global-oriented students who could see how the historic relationships between countries led to World War II would be handicapped because they didn't memorize certain chains of events. History has dictated that it is the student who must conform to the psychological norms of school. It is probably clear that in doing so we are ensuring that a certain group of students will do poorly due to no fault of their own.

The Dunn and Dunn model was created as part of a

diagnostic/ prescriptive process to align curriculum with desired learning style (Griggs, 1982). It is the hope of Rita and Kenneth Dunn that their instrument be used to help match teaching and learning styles (Dunn, 1990). More will be discussed about this issue later in this chapter.

Learning Style and At-Risk and/or Dropout Students

There are as many reasons for dropping out of high school as there are dropouts. No two students have exactly the same combination of family, financial, personal, social and school-related circumstances. It is impossible for the institution of public education to meet every need of every student. Schools can, however, make their instruction and interaction with students as efficient and meaningful as possible. Learning style has the potential to be an important factor for schools trying to lower dropout rates. If it can be demonstrated that dropouts or at-risk students learn in different ways than academically successful students, then school personnel should be able to change circumstances to help all students stay in school and earn a diploma. Though dozens of studies have been done measuring student learning style and the effects of matching learning style with teaching style, relatively few of these studies examine students no longer attending a traditional high school.

Gadwa and Griggs (1985) conducted a study comparing 103 dropouts, 213 traditional high school students, and 214 students

attending an alternative high school. These students were given the Dunn and Dunn Learning Style Inventory during the spring semester of 1983. Discriminant analysis was used to identify 17 of the 23 variables included in the LSI as discriminating between groups at the .001 significance level. Results from this study are shown in Table 1. This table shows distinct learning style preferences between the three groups. Alternative school students showed strong preferences for visual stimuli, need for intake while learning, and need for structure. They showed a

Table 1. Rank order of LSI discriminant variables[a] (Learning Style Inventory- Dunn, Dunn & Price, 1975)

Analysis Ranking[a]	Dropout	Alternative	Traditional[b]
1. Motivated		-	
2. Learning alone	-		+
3. Visual		+	-
4. Temperature			+
5. Mobility	+		-
6. Teacher- motivated	+		-
7. Adult- motivated			+
8. Authority figures present	+		-
9. Requires intake		+	
10. Tactile	+		-
11. Kinesthetic	+	-	
12. Late morning			-
13. Morning versus evening	+		-
14. Light		-	+
15. Learn in several ways	+		-
16. Structure	-	+	
17. Auditory	+		

[a]- All listed variables discriminated between the groups ($p<.001$).
[b]- + indicated the highest preference of the three groups
- indicated the lowest preference of the three groups
No mark indicated the group was either in the middle or the two groups were similar.

distinct dislike of strong lighting, kinesthetic involvement, and being motivated in general. Traditional high school students and dropouts had more distinct preferences with alternative high school students many times showing few strong preferences.

Allred and Holliday (1988) used the NASSP Learning Style Profile to look at all freshman classes at Fort Hill High School in Fort Hill, S. Carolina from 1989 to 1991. A total of 611 freshman took the LSP. Findings were merged with the school's information management system. This study concluded that 39% of the difference between high achieving students and academically at-risk students can be accounted for by learning style. Contrary to the Gadwa and Griggs (1985) study, Allred and Holliday found that successful students scored much higher on the visual sub-skill than did at-risk students. At-risk students had lower scores in the analytical, spatial, categorizing and memory sub-skills. There were no significant differences for any of the environmental/ physiological elements.

Nations-Miller (1992) looked at the learning styles of 10th through 12th grade at-risk, vocational and gifted students in a large suburban high school in Georgia. One-hundred students from each group were sampled from a sample frame of over 800 students. These students were given the Dunn and Dunn Learning Styles Inventory. Using discriminant analysis, this study shows twelve elements which display discriminating power between the groups. Of the twelve categories, at-risk students preferred:

being responsible, auditory input, visual input, tactile input, and working in the afternoon. At-risk students showed the least preference for: high noise level while working, being motivated in general, and being motivated by parents.

Nunn and Parish (1992) looked at 111 students in grades eleven and twelve in a large school district in Iowa. Sixty-four of the 111 were identified as at-risk, and the remaining 47 were selected at random from student attendance rosters. Nunn and Parish measured locus of control using the Nowicki-Strickland Scale (Nowicki, 1976), and learning style using the Personal Style of Learning scale (Nunn, 1985). This study found the at-risk sample to be significantly less achievement-oriented ($p<.007$) and have less self-concept as a learner ($p<.04$). The at-risk students did show a significant preference for informal types of educational settings. The following categories showed no significant differences between the two groups: anxiety in performance situations, kinesthetic style, visual-audio preferences, behavioral impulsivity and control style.

Hodges (1985) studied 32 seventh and eighth graders in a remedial math class in an alternative junior high school in New York City. Hodges looked at whether students who were matched to their environmental design preferences would have better test scores and have a better attitude toward school. Using the Dunn and Dunn LSI, she found that most students in her sample preferred an informal classroom design (ie.- no rows of desks,

open spaces, non-traditional settings). Hodge's study concluded that students who were matched with their preferred environmental design scored significantly better on test scores ($p<.001$) and showed significant improvement in attitudes towards school ($p<.001$).

Similar to Hodge's study was Lynch's (1981) study of performance indicators and time preferences. Lynch also used the Dunn and Dunn LSI as his test instrument. Lynch measured time preferences for 136 eleventh and twelfth grade students who were classified by the school district as chronically truant. He compared time preferences with academic achievement in English class. Lynch concluded that the greatest influence on the reduction of truancy in English class was the matching between when students had English class, and when students preferred to do the most work. He also showed that truancy could be reduced by changing class schedules to meet the time preferences of the student.

Lindsay (1987) compared the learning styles of community college students who had completed high school before entering college and those who dropped out of high school. Lindsay used the Kolb Learning Style Inventory II with 320 students enrolled in all areas offered by the community college. Lindsay found no significant differences in learning styles between the two groups. All sub-samples preferred to perceive information concretely and possess it reflectively.

Applications of Learning Style to Benefit Students

Being able to measure learning style in an individual or a group of individuals is meaningless unless it can be demonstrated that, used properly, this information can positively impact learning. The research supports the idea that learning style strategies can improve student learning and success in school. Lynn Curry (1990) determines that even though improvements in learning styles research are needed, the following can be concluded: (a) matching aspects of the instructional situation to a student's cognitive learning style will result in improved attitudes and achievement at least in initial stages of learning, and (b) matching testing conditions and learning style improves test scores. The following studies, and the previous studies by Hodges (1985) and Lynch (1981) support Curry's conclusions.

Tannenbaum (1982) used the Witkin Group Embedded Figures Test with 248 high school students to determine one aspect of cognitive style: field dependence or field independence. One hundred students of each cognitive style were randomly placed in two classrooms teaching the same lesson in nutrition. One classroom was designed to support field dependent learners. In this classroom, information was given logically, orderly and when possible in chronological order. The other classroom was designed for the field independent learner. The same information was given, but randomly and inductively. At the end of the lesson a test was given to both classes. Using a two-way ANCOVA

procedure, a significant interaction effect of .045 was evidenced. Those students matched to their cognitive style preference did better than those students mismatched with their preferred cognitive style.

DeBello (1985) used the Dunn and Dunn LSI with 236 suburban intermediate school students. Those students showing a preference for peer learning, learning with an adult, or learning alone were selected and randomly placed in a English class performing an activity which either matched or mismatched their preferred style. DeBello's data also showed significantly better test scores ($p<.05$) over the material when students were matched with their preferred learning styles.

Kroon (1985) measured 65 industrial arts students to determine whether they preferred auditory, visual, or tactile input when learning. He then taught a six lesson unit with two lessons stressing each of the preferences. His conclusions showed that the interaction between individual student's perceptual preferences and instructional method was significant at the .001 level. Again, matching student learning style with conditions in the classroom yields positive results.

Several studies targeted aspects of learning style and test performance. Murrain (1983) assessed the temperature preferences for 268 seventh grade students in a suburban junior high school. These students were given comparable tests on two separate occasions. One test was conducted in congruence with

their styles, and the other conducted was not congruent with their styles. Murrain showed an ordinal interaction of temperature and test performance at the .10 significance level. Students did better in their preferred environment.

Shea (1983) used the Dunn and Dunn LSI with a sample of 32 ninth grade students who had a preference for either formal or informal instructional design. The sample was randomly assigned to two groups. Group A was tested over current material in a formal setting of rows of desks with hard chairs. Group B was tested in a relaxed, randomly arranged space with soft chairs and couches. The analysis evidenced a significant interaction between preference and design at the .001 level.

Though the preceding studies show support for the idea that teaching to preferred learning styles helps students achieve, some researchers believe that matching teaching and learning styles is not the best thing for students. Kirby (1988) and Pask (1988) argue that teachers cannot match every lesson to every student's style. They argue that teachers should use all styles and preferences with kids. Kirby and Pask believe students should be able to identify and adjust to all learning styles. Both Kirby and Pask believe that part of the reason why some students are bored and/or at-risk is because teachers consistently teach using one style and ignore the needs of different types of learners in the classroom. Teachers need to demonstrate flexibility of style. Kirk calls this "synthetic style": Pask calls it "versatile style". Dunn and

Dunn (1979) would agree that teachers limit themselves in the styles they use. Teachers tend to teach the way they learned. New and experienced teachers alike need to be more aware of style and vary their teaching methods accordingly.

In addition to interactions between learning style and teaching style, there may be another interaction going on which is especially important to at-risk students. Increases in student attitude and performance may also be a result of the Hawthorne Effect (O'Neil, 1990). Many students may, in part, be rewarding a teacher who is trying something different with them with extra effort and praise. Teachers showing respect for non-traditional ways of doing things are powerful images to some students. More research is clearly needed about this issue.

Learning Styles-Based Instruction

Research supports the idea that classroom teachers can use learning styles research and instruments to positively affect the success of all students in school. At-risk students have the most to benefit from learning styles if they can give students an opportunity to succeed that they didn't have before. In the literature, there are several articles which address classroom teachers who are beginning to use learning styles to reach at-risk students.

Before a teacher begins basing instruction on learning styles, Lynn Curry (1990) advises educators to proceed

cautiously. The literature does support learning style-based education, but not conclusively (Kavale & Forness, 1987). Curry recommends proceeding as long as it is benefiting students. Teachers should be continually evaluating effectiveness of a learning styles-based curriculum and should be continually looking for adaptations which may work as well or better.

Carbo and Hodges (1988) identified eleven strategies that teachers can use to make their classrooms more learning style friendly for all students, but especially at-risk students. These strategies, which have been used in classrooms and are synthesized from several studies, follow:

1. Identify and match students' learning styles with curriculum when possible, especially perceptual and global/analytical preferences.

2. Share learning styles information with students. Make them aware of all aspects of style, and let them know that the world will expect them to use all styles.

3. Deemphasize skills work requiring a strongly analytical learning style. Many students find these drills demeaning and unmotivating.

4. Begin lessons globally. Many times global learners are turned off right at the beginning.

5. Use a variety of methods of reading.

6. Involve kinesthetic and tactile modalities. Include many visuals.

7. Provide enough structure. At-risk students may thrive when given enough structure.

8. Allow students to work alone, in pairs, in groups, or with an adult. Let students choose.

9. Establish quiet working stations away from noisier areas.

10. Create study cubicles which cut down on distractions.

11. Experiment with scheduling.

These strategies can, at least, start classroom teachers thinking about how to use learning styles information in classes to affect all learners.

Dunn and Dunn (1979) attribute some of the frustration teachers feel about basing instruction on learning styles to how teachers are evaluated. It could be disastrous for a teacher accommodating learning styles in his/her classroom to be evaluated by an administrator using narrow criteria identifying acceptable teacher behaviors. Dunn and Dunn point out the following weaknesses of evaluation practices which inhibit learning styles-based teaching: (a) difficulties in accurately identifying common, positive characteristics of teacher personality and style; (b) difficulties in obtaining objective interpretations of what is observed; (c) incorrect assumptions about what ought to be measured when observing classroom instruction; (d) the use of instruments that are designed to measure inappropriate aspects of the teacher/learner process; (e) a lack of understanding that likeable teachers are not necessarily

effective teachers.

Teachers need to talk to their administrators about these issues before beginning to base instruction on learning style. A teacher will do a much better job with reassurance that what is being done will not jeopardize his/her career. After reaching an understanding with supervisors, teachers can begin using learning styles by expanding current modes of teaching to include more and more aspects of learning style. Teachers need to eventually include all types of styles in the curriculum but at a pace which will not overwhelm the students or the teacher.

One of the best models for basing instruction on learning styles to help at-risk students is the music department (Hanson, Silver & Strong, 1991). Music instruction varies between analytic skills (reading music) to global skills (learning by ear, improvising). Music rooms tend to involve a mixture of auditory and visual instruction and provide ample opportunities for kinesthetic involvement. The great thing about the use of learning styles in music departments, is that it has been happening for decades. Teachers wishing to utilize learning style can use many music departments as a sound model with which to begin.

Summary

Alternative high schools continue to grow, multiply and become part of the mainstream educational system in the nation

and in Iowa. Though these schools effectively serve a portion of the at-risk student population, their presence may be best described as a stop-gap measure designed to keep students in school. Alternative schools should be unnecessary. As school districts continue their efforts in school reform and focus on inclusion of all students, there should come a time when traditional schools reflect the strategies and methods effective in alternative schools. It is to this end that this study is conducted. Studies (including this one) need to be done to illustrate and identify what alternative schools do differently which allow students to be successful who otherwise would not be; teaching to students' learning preferences may be an important strength of alternative schools. The application of knowledge about learning styles continues to be an evolving, ever improving method for not only helping students be more successful, but helping schools be more successful (Dunn, 1995). By looking at the way alternative school students learn as compared to how traditional school students learn, this study will examine one possible answer to the question,"why aren't alternative school students being served in traditional high schools?"

CHAPTER 3. METHOD OF PROCEDURE

The purpose of this study was to determine if learning style, as measured by the NASSP Learning Style Profile, could differentiate between students attending an alternative high school and students attending a traditional high school. This study examined whether certain learning style preferences made students more likely to attend an alternative high school. It evaluated learning styles of both alternative and traditional high school students in three central Iowa communities.

Objectives

The objectives for this study were as follows:

1. To determine if significant differences exist in the ways alternative high school students and traditional high school students prefer to learn.

2. To determine if there are significant differences in learning styles of high school students between three communities in central Iowa.

3. To determine if there are significant interactions between school type and community which affect learning style preferences.

4. To provide individual students participating in the study with the opportunity to receive feedback about how they prefer to learn and how this information may be beneficial to them.

5. To provide schools participating in the study with the opportunity to receive feedback regarding learning styles of their students and how this information may assist them in meeting the needs of students.

Hypotheses

The following null hypotheses were examined during this study:

1. There are no significant differences ($p<.05$) in the learning styles of alternative and traditional high school students as measured by the NASSP Learning Style Profile within three communities in central Iowa.

2. There are no significant differences ($p<.05$) in the learning styles of high school students between three central Iowa communities as measured by the NASSP Learning Style Profile.

3. There are no significant interactions ($p<.05$) between school type and community which affects student learning style preferences as measured by the NASSP Learning Style Profile.

Selection of the Sample

The three communities studied were chosen for a variety of reasons. All three communities are no more than thirty miles from each other and are small to medium-sized communities in Iowa. Populations range from around nine thousand to about twenty-five thousand people. These communities have a strong

agricultural base but, as with much of Iowa, are becoming increasingly dependent on industry and manufacturing. All three alternative high schools follow a similar model of operation and rely on their community's traditional high school for students. None actively recruit students into their programs. The traditional high schools participating in this study follow a seven period day and have similar curricula emphasizing college preparatory and/or general studies.

Thirty students were randomly identified from each of the six participating schools. Randomness of the sample was affected by constraints placed on the study by some of the schools. Because some schools requested students not be pulled out of classes to participate in the study, sample students were identified out of afternoon study halls. Afternoon study halls were chosen because of time constraints on the part of the researcher. This sampling limitation applied only to the three traditional high schools. All alternative high schools participating in the study allowed students to be pulled out of class to participate and thus provide a more random sample. The target sample from each school was fifteen students from each tenth and eleventh grade classes. Ninth grade students were not included because they are not served by the alternative schools. Seniors were not be included because in some of the traditional schools they have open periods and not study halls.

In each of the traditional high schools, sample selection

began with a list of all tenth and eleventh grade students who had a study hall during periods five, six, or seven. Again because of time constraints, only students with study halls everyday or every even day were chosen for the sample frame. Students with more than one study hall were only included once in the sample frame. The principals of all three traditional high schools saw no reason why either odd or even day study halls would skew the sample. Most of the students had study hall opposite days they were in physical education except those students with study hall everyday . Once appropriate names were obtained, they were cut apart and placed either into a tenth grade "hat", or an eleventh grade "hat". The final sample was obtained by pulling fifteen names from each hat.

Sample selection at the alternative high schools began with a list of all tenth and eleventh grade students. Names were cut apart and placed into respective hats with fifteen names drawn from each hat determining the final sample.

Once all samples were obtained, parental consent forms and testing dates were sent home to parents or guardians of each sample student in compliance with the Iowa State University Human Subjects Committee rules (see Appendix A). A waiting period of seven school days was observed to facilitate parental participation. Any student whose parents or guardians did not give permission to participate in the study was dropped from the sample group.

Thirty students, fifteen form each tenth and eleventh grade classes, was the target sample size for each school. However, the final sample size was smaller due to absences, students withdrawing from the study, and small school size. One of the alternative high schools had served thirty students during the school year, but due to graduations and withdrawals, class size was smaller. Obtaining a sample of fifteen tenth and eleventh grade students was not possible. A more realistic sample size of twenty students from each school was aimed for with an actual sample size of 18 students from each school. Students needing to be omitted from the study to ensure a matching sample size between schools were chosen at random. Whether students were included in the final study or not, each was given the opportunity for feedback regarding his or her learning style.

Description of the NASSP Learning Style Profile

In 1979, the National Association of Secondary School Principals undertook the co-sponsorship of the Learning Styles Network with St. John's University in New York. As a result of this association, the NASSP established a task force dedicated to creating a single learning style instrument that would assess a broad spectrum of research-based style elements, be easily administered in the school setting, and be valid and reliable (Keefe & Monke, 1990). In the fall of 1986, a 126 item instrument measuring 24 aspects of learning style was created.

The 24 aspects of this instrument are listed in figure 2 in Chapter 2.

The NASSP Learning Style Profile (LSP) was chosen for this study because of its ability to measure a variety of learning style components. These components can be beneficial to students in learning how to learn and beneficial to schools wishing to use learning style to improve student performance. The LSP was also chosen because of its significant use in the literature and its ease of use and ability to be hand scored.

The following information regarding reliability and validity was taken from the NASSP Learning Style Profile Examiner's Manual (Keefe & Monke, 1990).

Reliability of the Learning Style Profile was evaluated in two ways. First, internal consistency coefficients (Cronbach's Alpha) were established for each subscale. Also, test-retest reliabilities were calculated for each subscale from a smaller separate sample for 10-day and 30-day periods of time. The average internal consistency reliability for subscales is .63, with a range from .47 to .86. The average 10-day test-retest reliability was .62 with a range of .36 to .78. The average 30-day test-retest reliability was .47 with a range of .21 to .76. Though the reliability of this instrument is not as high as the Dunn and Dunn Learning style Inventory, it is considered a satisfactory instrument. This instrument was chosen over the Dunn and Dunn Instrument because of its more pronounced cognitive aspects.

Instrument validity is the determination of whether an instrument actually measures what it is supposed to measure for it's target group. The LSP Examiner's Manual explains the instrument's validity through face, content, construct and concurrent validity.

Face validity only means that a test appears to measure the right things. This is the least important indicator of validity. The Learning Style Task Force carefully screened the instrument and in their judgement it measures exactly what it appears to measure.

Content validity assesses the match between the content of the test and the knowledge or skills it attempts to measure. The Learning Styles Task Force asked a panel of experts to review the literature of the field, compile an initial development list, prepare operational definitions, and approve the final content of each scale.

Construct validity is assured through the use of three initial forms of the LSP given to thousands of students across the United States. Extensive use was made of exploratory and confirmatory factor analysis in the field testing of this instrument to ensure the inclusion of concepts and items that exhibited strong factor loading and the exclusion of those that did not. Results of the factor analyses conducted during instrument development can be found in the LSP Technical Manual available through the NASSP, Reston, VA.

Concurrent validity is a measure of comparison of students' scores on two or more comparable tests. Several separate studies were done to demonstrate the concurrent validity of the LSP. The two strongest examples of concurrent validity occur when the LSP is correlated with the Edmond's Learning Style Identification Exercises (ELSIE) scales, and the Dunn and Dunn Learning Styles Inventory subscales. The ELSIE Activity Scale measures four aspects of learning style. Three of these are also found on the LSP. A study consisting of ninety students showed a significant correlation ($p<.002$) between the visualization, listening and activity ELSIE scales, and the visual, auditory and emotive subscales of the LSP. Another study of 95 students showed significant correlation ($p<.002$) between all areas of the Dunn and Dunn LSI and the LSP except two: preference for background noise and ability to persist.

For the purpose of this study, both reliability and validity of the NASSP Learning Style Profile are acceptable.

The NASSP Learning Style Profile is a paper and pencil instrument that students can complete in a fifty-minute class period. Students need no prior preparation other than informed consent and test instructions. Students will mark their answers on a self-scoring answer sheet available through the NASSP. Data will be collected and hand scored by the researcher.

Statistical Design

This study utilized a fixed-effects, 2 x 3 factorial analysis of variance to test the null hypotheses. This was a fixed-effects model because the two independent variables, (a) school type (alternative vs. traditional), and (b) community are both fixed at preset levels. This study is only generalizable to the communities and groups of students included in it. There were 24 dependent variables measured for each participant. The 24 dependent variables coincide with the 24 subscale scores identified by the NASSP Learning Styles Profile.

According to Hinkle, Wiersma and Jurs (1994), there are several advantages to this type of study and several assumptions which need to be addressed. The advantages to this statistical design are: (a) efficiency, (b) ability to include additional variables into the statistical design, and (c) ability to investigate not only the main effects, but also interaction effects between independent variables. This design was chosen primarily for its ability to examine interaction effects on learning style between school type and community.

Using an analysis of variance design requires the researcher to make three primary assumptions. First, the observations need to come from random and independent samples. Though some restrictions were placed on obtaining samples by some participating schools, officials in each school saw no reasons why these restrictions would affect the randomness of the sample.

Each sample is independent because grade level and school geography will prevent mixing of samples. The second and third assumptions concern whether the distributions of the populations are normal and whether the variances of the distributions are equal. These assumptions are supported by the fact that all schools involved are public organizations and serve almost all high school aged students in each community. The only existing option for students not involved in either the traditional or alternative high schools in each community is home schooling.

Even if one or more of these assumptions was not met, the statistical procedure would be minimally affected. Analysis of variance is robust with respect to violations of the assumptions except in the case of unequal variances with unequal sample sizes. To minimalize the affect of any unforeseen assumption violations, sample sizes were kept equal for each cell in the design.

After the analysis of variance was computed and the null hypotheses were rejected, post hoc comparisons were conducted to find out between which cells significant differences occur. Because the number of observations in each cell was equal and the importance of maintaining the type I error rate at .05 was paramount to the researcher, the Tukey Post hoc comparison was used. A plot of the means of the independent variables was conducted to explain the one significant interaction effect.

CHAPTER 4. RESULTS

This chapter will explain data collected between May 15 and June 6, 1996 from a relatively random sample of alternative and traditional high school students in three central Iowa communities. This chapter will address both descriptive and inferential statistics of the sample and relate these findings to the hypotheses stated in Chapters 1 and 3.

Sample Description

The final tested sample consisted of 108 alternative and traditional high school students from three central Iowa communities. Though the expected sample size from each community was 40 students with 20 from each community's alternative and traditional high schools, the actual sample size achieved was 36 students from each community with 18 from each alternative and traditional high school. This reduction in sample size was necessary to maintain equal sample sizes from each school. Community two's alternative high school was the determiner of sample size due to the fact that at the time of sample collection the school was only serving 18 students. This reduction in sample size will not significantly detract from the usefulness of this study.

Though gender differences are not being examined in this study, a matched sample of males and females was obtained to

get a more similar sample from each school. The only exception to this was the alternative high school in community two. Of the 18 students being served in that school, 10 were female and 8 were male. Table 2 summarizes the sample demographics.

Table 2. Demographics of learning style study sample

	Total # Participants	# (%) Males	# (%) Females	Consistency Score Mean[1]
Alternative High Schools	**54**	**26 (48.1)**	**28 (51.9)**	**3.93**
Town 1	18	9 (50)	9 (50)	2.94
Town 2	18	8 (44.4)	10 (55.6)	3.11
Town 3	18	9 (50)	9 (50)	5.72
Traditional High Schools	**54**	**27 (50)**	**27 (50)**	**3.28**
Town 1	18	9 (50)	9 (50)	3.06
Town 2	18	9 (50)	9 (50)	3.72
Town 3	18	9 (50)	9 (50)	3.06

[1] According to the NASSP, a consistency score is an estimate of the uniformity and/or responsibility students take when answering the questions. A score of 7 or below is considered good.

Included in Table 2 is a mean consistency score for each school. Consistency scores were created as part of the Learning Style Profile scoring process provided by the NASSP. Differences between five pairs of similar questions on the LSP were totaled to give an individual consistency score for each participant. According to the NASSP, a consistency score is an estimate of the uniformity and/or responsibility students take when answering questions. A score of seven or below is considered good (Keefe &

Monke, 1990). Mean consistency scores for each school are considered good according to the standards of the NASSP. No student had a consistency score above 14 which is considered questionable by the NASSP. This corroborates observations made by the researcher during testing that students were attentive and answering questions to the best of their abilities.

Table 3 shows the means and standard deviations for each of the 24 LSP subscales by school type. All of the scores used in this study are standardized T-scores with a linear standard score of 50 and a standard deviation of 10. Twenty-two of the twenty-four subscales were normed on a national random sample of 5,154 students representing all grades from 6 through 12. The sample was drawn from the NASSP data bank of American schools and stratified by public schools (90%) and private schools (10 %), senior high schools (60%) and middle level schools (40%). The normative sample was drawn by ZIP codes to ensure adequate representation for each region of the country by state with greater representation from more populous areas. Schools in the normative sample ranged from fewer than 250 students to more than 2,000 students with a mean size of 780 students. Eighteen percent of the sample represented urban areas with the remainder from suburban, small town, and rural communities. Sampling was conducted with a concern for adequate representation by race, sex and socioeconomic background, but no deliberate stratification was attempted for these variables (Keefe

Table 3. Means and standard deviations of each LSP sub-scale by school type[1]

	Alternative High Schools (all communities)		Traditional High Schools (all communities)	
LSP subscales	Mean	St. Dev	Mean	St. Dev
Analytic Skill	50.30	10.08	51.17	9.66
Spatial Skill	51.61	9.05	55.41	8.22
Discrimination Skill	49.15	7.69	44.65	11.45
Categorization Skill	55.96	8.90	55.96	8.66
Sequential Processing Skill	49.41	11.09	51.89	8.09
Memory Skill	47.94	9.61	49.13	9.07
Simultaneous Processing Skill	47.20	10.69	49.65	11.24
Visual Response	49.67	11.68	50.93	11.92
Auditory Response	51.13	12.24	46.39	9.67
Emotive Response	48.89	9.56	52.31	13.99
Persistance Orientation	43.83	9.28	47.35	10.11
Verbal Risk Orientation	52.89	11.74	56.69	10.65
Manipulative Preference	51.19	10.65	51.19	9.82
Study Time: Early Morning	46.98	8.53	49.76	8.33
Study Time: Late Morning	51.72	9.04	50.59	10.87
Study Time: Afternoon	48.87	8.37	49.13	10.56
Study Time: Evening	46.39	8.02	51.24	10.81
Verbal-Spatial Preference	48.70	7.94	48.19	8.31
Grouping Preference	39.07	6.96	40.33	5.39
Posture Preference	47.24	7.49	47.72	9.51
Mobility Preference	50.48	8.35	49.15	8.69
Sound Preference	50.65	9.73	48.91	8.95
Lighting Preference	49.80	9.94	48.91	9.64
Temperature Preference	49.56	8.32	49.89	9.35

[1] All scores are standard scores

& Monke, 1990). The remaining two subscales were normed on a similar, but different sample. More detailed information on the normative study can be found in the *Learning Style Profile: Technical Manual* available from the NASSP.

Tables 4, 5 and 6 show standard deviations for each LSP subscale by community. In these tables, all means are within one standard deviation of the standardized mean except for Grouping Preferences (preferences for working in small or large groups). When all alternative high schools are grouped together, and when communities two and three are grouped as communities, the grouping preference means are not within one standard deviation of the national mean.

Though grouping preferences are different from the national normative sample, it appears all six schools have a preference for learning in small groups. This is supported by the fact that the ANOVA did not find any significant differences between any of the schools tested.

Inferential Statistics

A fixed-effects, 2x3 factorial analysis of variance was conducted to find significant main effect and interaction effect differences between participating schools. Table 7 displays the resulting p-values for both main and interaction effects. Three of the 24 LSP subscales varied significantly by community, and four varied significantly according to school type. One significant

Table 4. Means and standard deviations of each LSP sub-scale for community one

	Community 1 (combined)		Alternative High School		Traditional High School	
LSP subscales	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Analytic Skill	51.11	1.72	49.72	11.37	52.50	7.54
Spatial Skill	55.06	8.28	54.33	7.11	55.78	9.46
Discrimination Skill	45.17	10.82	46.67	9.87	43.67	11.79
Categorization Skill	57.28	8.95	57.00	9.33	57.56	8.81
Sequential Processing Skill	51.81	8.28	48.72	9.80	54.89	5.02
Memory Skill	45.78	9.87	47.78	10.46	43.78	9.08
Simultaneous Proces. Skill	51.64	7.33	51.00	7.06	52.28	7.74
Visual Response	54.11	12.72	55.28	14.94	52.94	10.34
Auditory Response	46.19	11.04	46.00	13.26	46.39	8.67
Emotive Response	48.42	11.17	47.06	11.73	49.78	10.74
Persistence Orientation	46.83	10.67	44.94	10.55	48.72	10.74
Verbal Risk Orientation	54.56	11.47	52.06	12.00	57.06	10.67
Manipulative Preference	53.00	8.78	53.39	9.14	52.61	8.66
Study Time: Early Morning	48.94	9.22	46.22	9.61	51.67	8.18
Study Time: Late Morning	50.86	8.76	51.28	7.41	50.44	10.14
Study Time: Afternoon	50.56	9.46	50.28	9.34	50.83	9.84
Study Time: Evening	50.44	8.14	48.83	6.74	52.06	9.25
Verbal-Spatial Preference	49.56	8.18	52.61	6.78	46.50	8.49
Grouping Preference	40.39	4.72	40.67	4.01	40.11	5.44
Posture Preference	49.03	8.94	46.61	8.47	51.44	8.97
Mobility Preference	49.14	9.06	48.44	9.13	49.83	9.19
Sound Preference	48.39	9.39	47.28	9.52	49.50	9.40
Lighting Preference	50.03	9.69	49.83	10.37	50.22	9.26
Temperature Preference	47.17	8.29	49.67	7.78	44.67	8.22

Table 5. Means and standard deviations of each LSP sub-scale for community two

	Community 2 (Combined)		Alternative High School		Traditional High School	
LSP subscales	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Analytic Skill	50.44	9.95	51.11	9.77	49.78	10.37
Spatial Skill	53.03	8.90	49.17	9.18	56.89	6.88
Discrimination Skill	46.06	9.48	50.44	4.76	41.67	11.03
Categorization Skill	55.67	9.20	56.89	9.09	54.44	9.40
Sequential Processing Skill	50.42	9.04	49.06	10.89	51.78	6.75
Memory Skill	51.17	8.58	50.33	9.25	52.00	8.03
Simultaneous Proces. Skill	49.06	9.94	46.67	11.17	51.44	8.16
Visual Response	48.83	11.30	47.94	10.77	49.72	12.05
Auditory Response	49.92	11.30	53.11	11.77	46.72	10.14
Emotive Response	51.25	11.87	49.06	8.99	53.44	14.11
Persistence Orientation	45.50	6.38	45.44	6.78	45.56	6.15
Verbal Risk Orientation	57.06	11.49	56.00	12.30	58.11	10.88
Manipulative Preference	50.22	9.88	51.06	11.83	49.39	7.70
Study Time: Early Morning	49.17	8.56	47.89	8.46	50.44	8.71
Study Time: Late Morning	52.03	9.75	51.06	9.46	53.00	10.22
Study Time: Afternoon	48.36	8.12	50.11	7.87	46.61	8.20
Study Time: Evening	46.94	10.44	44.06	7.74	49.83	12.12
Verbal-Spatial Preference	48.25	8.94	47.17	9.54	49.33	8.44
Grouping Preference	39.75	6.69	38.39	7.62	41.11	5.49
Posture Preference	48.81	8.73	49.06	8.55	48.56	9.15
Mobility Preference	49.64	8.29	51.50	8.31	47.78	8.06
Sound Preference	50.61	8.02	53.11	6.94	48.11	8.43
Lighting Preference	48.56	10.06	47.89	11.67	49.22	8.44
Temperature Preference	51.42	8.64	50.67	9.65	52.17	7.71

Table 6. Means and standard deviations of each LSP sub-scale for community three

	Community 3 (combined)		Alternative High School		Traditional High School	
LSP subscales	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Analytic Skill	50.64	10.19	50.06	9.52	51.22	11.06
Spatial Skill	52.44	9.27	51.33	10.32	53.56	8.23
Discrimination Skill	49.47	9.26	50.33	7.37	48.61	10.98
Categorization Skill	54.94	8.12	54.00	8.44	55.89	7.92
Sequential Processing Skill	49.72	11.72	50.44	12.92	49.00	10.73
Memory Skill	48.67	8.93	45.72	9.03	51.61	8.01
Simultaneous Proces. Skill	44.58	13.79	43.94	12.44	45.22	15.36
Visual Response	47.94	10.53	45.78	5.82	50.11	13.58
Auditory Response	50.17	11.21	54.28	10.50	46.06	10.62
Emotive Response	52.14	13.05	50.56	7.75	53.72	16.90
Persistence Orientation	44.44	11.71	41.11	9.96	47.78	12.64
Verbal Risk Orientation	52.75	10.87	50.61	10.86	54.89	10.75
Manipulative Preference	50.33	11.74	49.11	10.96	51.56	12.66
Study Time: Early Morning	47.00	7.74	46.83	7.83	47.17	7.88
Study Time: Late Morning	50.58	11.43	52.83	10.41	48.33	12.25
Study Time: Afternoon	48.08	10.76	46.22	7.62	49.94	13.16
Study Time: Evening	49.06	10.52	46.28	9.13	51.83	11.33
Verbal-Spatial Preference	47.53	7.15	46.33	5.91	48.72	8.21
Grouping Preference	38.97	7.11	38.17	8.54	39.78	5.47
Posture Preference	44.61	7.30	46.06	4.99	43.17	8.97
Mobility Preference	50.67	8.32	51.50	7.63	49.83	9.10
Sound Preference	50.33	10.56	51.56	11.72	49.11	9.45
Lighting Preference	49.47	9.73	51.67	7.55	47.28	11.31
Temperature Preference	50.58	9.13	48.33	7.69	52.83	10.09

Table 7. ANOVA P values[1]

LSP subscales	Town	School Type	Interaction
Analytic Skill	.9587	.6526	.6816
Spatial Skill	.4059	**.0242**	.2469
Discrimination Skill	.1395	**.0169**	.2579
Categorization Skill	.5208	1.000	.5692
Sequential Processing Skill	.6527	.1878	.2556
Memory Skill	**.0440**	.4961	.0702
Simultaneous Processing Skill	**.0217**	.2396	.7278
Visual Response	.0560	.5745	.4728
Auditory Response	.2294	**.0262**	.2167
Emotive Response	.3981	.1443	.9553
Persistence Orientation	.5823	.0634	.3692
Verbal Risk Orientation	.2698	.0828	.8520
Manipulative Preference	.4360	1.000	.6742
Study Time: Early Morning	.4924	.0913	.4413
Study Time: Late Morning	.8125	.5617	.3997
Study Time: Afternoon	.4856	.8878	.2771
Study Time: Evening	.2992	**.0097**	.8215
Verbal-Spatial Preference	.5527	.7365	**.0404**
Grouping Preference	.6331	.3001	.5327
Posture Preference	**.0437**	.7640	.1357
Mobility Preference	.7445	.4219	.4493
Sound Preference	.5489	.3358	.2562
Lighting Preference	.8159	.6411	.4230
Temperature Preference	.0888	.8404	.0605

[1] Bold face type indicates significant difference ($p < .05$)

interaction effect was noticed, and none of the LSP subscales varied significantly in more than one effect.

To understand these significant differences, it is useful to understand an important aspect of the LSP and learning styles. The first seven subscales listed in Table 6 are skill areas. These skill areas are the most stable parts of the LSP and are different than the rest of the LSP subscales. Unlike many of the subscales where one subscale can be preferred to the exclusion of others, each skill subscale is a unique way of processing information and is just as important as all the other skill subscales. For example, it is possible to have a strong preference for evening study time and a strong dislike for studying at any other time without making direct conclusions about educational performance. Academic performance cannot be predicted by whether a student studies in the evening, morning or afternoon. However, students who are deficient in one of the skill subscales loses a way of interpreting and making sense of new knowledge. Being strong in one skill area does not assure academic success simply because that skill area may not be used or valued in an educational setting. To be most successful, students must be competent in all areas. Problems may arise for students when all skill subscales are low, when only weak skill areas are reinforced in school without enough opportunities for students to use strong skill areas, or when an individual's strongest skill areas are not valued. A student with even one deficient skill subscale may be

academically at-risk if that area is used exclusively or highly valued in an educational setting. This researcher believes that the skill subscales of the LSP identify those areas of learning style with the most predictive power of student success.

Table 8 shows the means and resulting significant p-values for those subscales differing by school type. Of the seven skill areas, two differed significantly. The NASSP defines spatial skill as the ability to identify geometric shapes, rotate objects in the imagination, and recognize and construct objects in mental space (Keefe & Monke, 1990). Discrimination skill is defined as the ability to visualize important elements of a task, focus attention on required detail and avoid distraction. According to this data, alternative school students are not as competent as traditional high school students at recognizing, constructing and rotating objects in their minds, but are stronger at identifying important elements of a task while avoiding distraction.

Table 8. Means and P values of significant school type differences

LSP subscales	Alternative	Traditional	P value
Spatial Skill	51.61	55.41	.0242
Discrimination Skill	49.15	44.65	.0169
Auditory Response	51.13	46.39	.0262
Study Time: Evening	46.39	51.24	.0097

Also according to the data, alternative school students are more likely to associate written words with sounds than with sights or emotional responses. For example, if the word "bird" is presented to someone with a strong auditory response score on the LSP, this person is more likely to associate the word "bird" with the sound of a bird singing or chirping. This study suggests that alternative school students are more likely to associate written words with remembered sounds.

Alternative school students also showed a high significant ($p < .05$) dislike for studying in the evening when compared to traditional school students. Implications that these school type differences may have for education will be discussed in chapter 5.

Table 9 shows the means and resulting significant p-values for those subscales differing by community. Tables 10 through 12 show between which communities these significant differences occur using a Tukey Post-hoc. Significant difference in memory skill occur between communities one and two only. Significant differences in simultaneous processing skill occur between communities one and three only. Significant differences in posture preference probably occurred between communities one and three, and communities two and three. Though the ANOVA was powerful enough to detect significant differences in posture preferences, the Tukey was not powerful enough to detect significant differences between any communities.

Table 9. Means and P values of significant town differences

LSP subscales	Town 1	Town 2	Town 3	P value
Memory Skill	45.78	51.17	48.67	.0440
Simultaneous Processing Skill	51.64	49.06	44.58	.0217
Posture Preference	49.03	48.81	44.61	.0437

Table 10. Tukey post hoc for community memory processing skill means[1]

Community	Mean	Mean differences	
Town 1	45.78		
Town 3	48.67	2.89	
Town 2	51.17	5.39	2.50

Calculated Q-values	
1.92	
3.59[2]	1.66

1 $p<.05$ ($Q_{cv}= 3.372$ for df=102)

2 Bold $Q_{calc.}$ indicates a significant contribution to the total mean difference

Memory skill, according to the NASSP, is the ability to retain distinct versus vague images in repeated tasks, and to remember subtle changes in information. Simultaneous processing skill is the ability to sense an overall pattern from component parts. Posture preference refers to a preference for a formal or informal

Table 11. Tukey Post hoc for community simultaneous processing skill means[1]

Community	Mean	Mean differences	
Town 3	44.58		
Town 2	49.06	4.48	
Town 1	51.64	7.06	2.58

Calculated Q-values

2.50	
3.95[2]	1.44

[1] $p<.05$ (Q_{cv}= 3.372 for df=102)

[2] Bold $Q_{calc.}$ indicates a significant contribution to the total mean difference

Table 12. Tukey post hoc for community posture preference means[1]

Community	Mean	Mean differences	
Town 3	44.61		
Town 2	48.81	4.20	
Town 1	49.03	4.42	.22

Calculated Q-values[2]

3.03	
3.19	.16

[1] $p<.05$ (Q_{cv}= 3.372 for df=102)

[2] The Tukey was not powerful enough to detect significant contributions to the mean difference

learning environment. The higher the mean, the stronger the preference for a formal learning environment.

Figure 3 is a plot for the significant interaction effect for the verbal-spatial preference subscale. The verbal-spatial preference subscale is the desire for verbal versus non-verbal learning situations. The higher the mean, the stronger the preference for verbal situations. This interaction plot indicates that the combination of school type and residing in community one has a significant impact on verbal-spatial preferences. Unlike the other two communities, community one's alternative high school students had a stronger preference for verbal learning situations than did that community's traditional high school students.

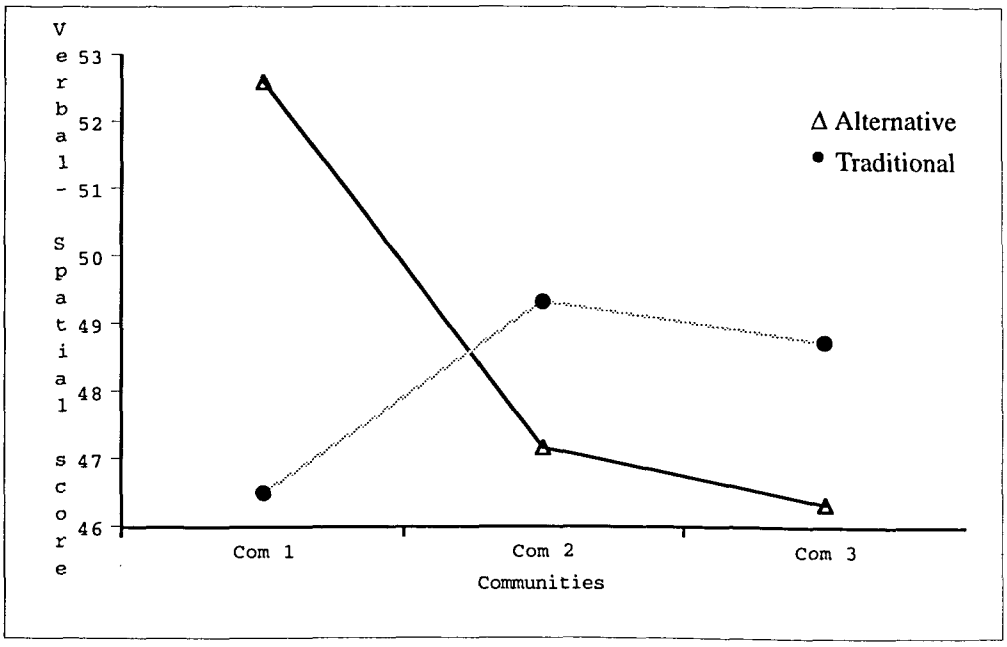

Figure 3. Plot for verbal-spatial ANOVA interaction

General Research Statement and Hypotheses

The general research statement driving this study was that alternative and traditional high school students have significantly different learning styles. The research presented in this chapter generally supports this statement by rejecting the following null hypotheses.

Null hypothesis #1

There are no significant differences ($p<.05$) in the learning styles of alternative and traditional high school students as measured by the NASSP Learning Style Profile within three communities in central Iowa.

The ANOVA of the data rejects this hypothesis by finding significant differences between school type in the following subscales of the LSP: spatial skill, discrimination skill, auditory response to written words, and preferences for evening study time. These differences have been detailed earlier in this chapter.

Null hypothesis #2

There are no significant differences ($p<.05$) in the learning styles of high school students between three central Iowa communities as measured by the NASSP Learning Style Profile.

The ANOVA of the data rejects this hypothesis by finding significant differences between communities in the following LSP subscales; memory skill, simultaneous processing skill, and posture preference. These differences have been detailed earlier in this chapter.

Null hypothesis #3

There are no significant interactions ($p<.05$) between school type and community which affects student learning style preferences as measured by the NASSP Learning Style Profile.

The ANOVA of the data rejects this hypothesis by finding a significant interaction effect between school type and community one for the verbal-spatial preference subscale of the LSP. This interaction has been detailed earlier in this chapter.

Summary

A 2x3 factorial analysis of variance was used to explore differences between similar sets of data collected from alternative and traditional high schools in three central Iowa communities. Significant differences were found which led to rejecting all three null hypotheses examined in this study. This chapter was designed to report the results of this study with minimal speculation as to cause, or impact that these results may have for traditional education, alternative education, the students participating in the study, or the communities involved. Chapter 5 will address these areas.

CHAPTER 5. CONCLUSIONS

The purpose of this chapter is to look at the data presented in Chapter 4 and suggest ways the schools and communities involved in this study may better promote the success of all students. This chapter may also be of interest to other schools, communities and individuals interested in alternative education and/or learning styles. Specific ideas regarding how learning styles may be better utilized to meet the needs of at-risk students, and suggestions for further research will be discussed.

School Type Differences

Alternative and traditional high school students differed significantly in several subscales of the LSP. Educators may be able to use these differences to make learning more efficient for some, if not all students.

Spatial and discrimination skills

As was discussed in Chapter 4, the skill subscales of the LSP are the most stable and reliable aspects of learning style that the LSP measures. There is a balance between a student's aptitude in each of these skill areas, and the school's use and value of each skill. A good match exists when the skills a student excels in are used and valued by his or her school. Problems occur when a student either excels in skills not used or valued by his or her school, or when the student does not excel in any skill area. The

results of this study indicate that part of the problem at-risk and/or alternative school students face, may stem from these students excelling in skill areas that are not used or valued by the school. Though students from both types of schools excelled in many of the same skill areas, the differences which did occur are interesting and useful. Spatial skill and discrimination skill varied significantly between alternative and traditional high school students.

Spatial skill is defined by the NASSP as the ability to identify geometric shapes, rotate them in the imagination, and recognize and construct objects in mental space. For example, if given a simple drawing, could a person answer questions regarding what its mirror image would look like, or be able to draw sides which are not shown? Could a person determine what set of smaller shapes would be needed to build a given bigger shape?

Discrimination skill is defined by the NASSP as the ability to visualize the important elements of a task, focus on detail, and be able to avoid distractions. For example, when given a manual to find out how to program a VCR, a person with high discrimination skill can find the correct procedures quickly without having to read a lot of superfluous information. He or she would be able to use what is already known to make good guesses as to what is not known.

Traditional high school students showed significantly better

spatial skills than did alternative high school students. Spatial skill is a primarily academic pursuit with many applications in a school setting. Spelling uses spatial skill to visualize letters in the correct order to give the word the correct look and sound. Reading expands the use of spatial skill by being able to visualize a correct order of words to convey an entire thought or idea. Mathematics and the sciences clearly have strong spatial skill elements. It makes sense that students deficient in this skill might have trouble being successful in many academic situations. Being deficient does not mean that these students cannot use this skill successfully, but it may mean that it will take them longer, or they may need more help or structure to visualize objects, numbers and words correctly. Perhaps any student can achieve a semester's worth of geometry credit if allowed to work on it as long as it takes to learn the material. Time may be a crucial and often overlooked variable necessary for the success of students with low spatial skill levels.

Alternative high school students showed significantly better discrimination skill than did traditional school students. Discrimination skill is a more practical skill with applications in and out of the school environment. Discrimination skill is the ability to focus on important aspects of a project or assignment without being distracted. Many times in school this skill is not as valued as other skills. Teachers are the ones to decide what is important about an assignment. Students have very little input

into the decision about what skills or information are important for them to know. Without this input, students with high discrimination skill levels view much of the work required of them as unimportant, or busy work. What to the student is evaluating important aspects of the work they do, may be perceived by the teacher as disrespect for the work he or she has chosen, or laziness on the part of the student.

Auditory response

Alternative students also showed a significantly higher auditory response to written words than traditional high school students. Students with high auditory response scores are more likely to identify a written word with a sound. This does not mean they prefer entirely auditory input like lectures. Lectures are auditory input without written words to associate with what is being said. These students need to be able to associate the words they see on paper with the words being read aloud, or with other auditory clues which will aid in recall of the material. Textbooks with bright, colorful pictures and clever graphics may be lost on these types of students. They probably do not help, and may even distract strong auditory responders.

Study time:evening

Alternative school students showed a significantly lower preference for studying in the evening. Perhaps this is a function

of the home situations many at-risk and alternative school students find themselves in. Many at-risk students have legitimate reasons why studying evenings is not practical or desirable. Some at-risk students: (a) are young parents and have no help during the evenings, (b) must work to support themselves and their families, (c) live in such terrible conditions that studying in the evenings would be impossible, (d) are dealing with family problems which take priority over school work. For whatever reasons, students who do not study in the evenings will not do well with homework. Homework assumes that all students have the time and resources to study and learn at home. This data supports the idea that at-risk students have neither time nor resources and are unduly punished with homework for reasons many times beyond their control.

Community Differences

Though there were significant community differences identified in Chapter 4, determining or speculating cause for these differences is not the intent of this study. It is the responsibility of the participating school districts to determine the importance of these differences and the underlying causes. To assist the communities involved in this study, there is one repeating trend worth discussing in this chapter.

The data presented in Chapter 4 showed significant community differences in the memory skill, simultaneous

processing skill, and posture preference subscales of the LSP. The Tukey post-hocs showed which communities accounted for the significant differences indicated by the ANOVA. In both the memory skill and simultaneous processing skill subscales, community one was a significant contributor to the difference. Table 12 in Chapter 4 shows the interaction effect plot for the verbal-spatial preference subscale. This table shows that community one has a different relationship between its traditional and alternative schools regarding preference for verbal-spatial learning situations.

Community one appears to be most consistently unlike the other two communities. Its subscale scores are both higher and lower than the other communities on various subscales of the LSP. The data does not support any conclusions about which community may have stronger or more preferable learning style profiles. Community one's apparent differences may be a factor of community size or other demographic factors. All communities involved in this study need to look at these differences and their relationship to community one to determine what meaning these factors may have for their schools and communities.

School Type Similarities

Though the general research statement examined in this study focuses on differences between school types and communities, and the null hypotheses were rejected, similarities

between all of the schools involved are an important aspect of this study. As was discussed in Chapter 1, alternative education may eventually serve one of two roles in secondary education. It will either become a significant force for change and inclusion in public education, or it will become a shunt used to drain off students who do not fit current educational practices. Learning style was presented in Chapter 1 as a logical starting point from which to amass information about students participating in alternative education and to advance the usefulness of alternative education in school change and reform. This study shows significant differences between schools, but also shows that the schools and communities examined in this study are more similar than different according to their learning style profiles.

This last statement has significant meaning for the schools and communities participating in this study. Because of the groups' learning style similarities, improving the learning environment through the use of learning styles should be equally beneficial to both at-risk and non-at-risk students. With the exceptions discussed earlier in this chapter, a separate, different and complete learning style does not exist for at-risk or alternative school students. Learning style may be an important factor, but is not the sum-total cause for students not succeeding in traditional high schools and choosing to attend alternative schools. Schools and communities need to look at additional areas of study to continue to identify significant reasons why

alternative schools are needed to serve a portion of the student population.

Recommendations for Practice

The data collected in this study suggests ways educators may use learning style to help at-risk students be successful. These suggestions are broken down into three categories corresponding to the subscales of the LSP which differed significantly. They are not listed in a prioritized order.

Spatial/discrimination skill difference recommendations

1. Make time a variable in schools. Students with low spatial and/or discrimination skill as indicated in this study, will benefit from having more time in those classes which stress these weak skill areas. This would benefit all students, not only at-risk and dropout students.

2. Get rid of required courses which stress spatial skills. If, as this study suggests, at-risk students are more likely to be weak in this skill area, these students would benefit from having more opportunities to use stronger skill areas to fulfill requirements for a high school diploma.

3. Give at-risk students more input into what they want and need to learn. Also, let them have input about how they will demonstrate what they know. At-risk students with high discrimination skill will benefit from assisting in planning an efficient curriculum which stresses those aspects of the material which are most important. This does not mean that they need

open-ended, non-directed learning. Though they will benefit from input, they will still need the teacher to organize and structure their learning.

4. Let at-risk students know up front what they need to know and do. At-risk students with high discrimination skill will focus on these important aspects without distraction. Stress outcomes to compliment important aspects of what they are learning.

5. Look for ways to give meaning to everything we want students to learn. Students with high discrimination skill may deem aspects of the curriculum important if they can see how it effects them in everyday life.

Auditory response

6. Put books on tape and/or read aloud. Because at-risk students are more likely to associate printed words with sounds (auditory responders), books read aloud or on tape may provide auditory clues necessary to assist them in reading comprehension.

Study time: evening

7. Do away with homework. At-risk students showed a low preference for studying in the evening. Homework may handicap those students who are unable to study in the evenings for a variety of reasons discussed earlier.

8. Provide evening programming. At-risk students low preference for studying in the evening may not be a matter of desire, but rather a matter of opportunity. Evening programming

may compensate for those factors beyond a student's control.

Recommendations for Research

As was mentioned earlier, further research is needed to completely determine why alternative schools are successful with some students who were not successful at their traditional high school. As a result of the research conducted during this study and the personal experiences of the researcher, the following recommendations for further research are suggested to help answer this question:

1. Are these results repeatable?

2. Are there differences in learning styles between male and female alternative and traditional high school students?

3. Are there differences in learning style between alternative high school teachers and traditional high school teachers?

4. Is there a relationship between teacher learning style and their effectiveness teaching at-risk students?

5. Do alternative high school curriculums stress elements which make success easier for low spatial/high discrimination skill students?

6. Are there correlates between familiar factors and different aspects of learning style for at-risk students?

7. Do the rules, policies and practices of alternative schools help students succeed academically and socially in school?

8. Does the lack of competition between students in an alternative school contribute to student success?

9. Do students seek alternative schools as a way to avoid special education labels and services?

10. Does allowing students to pace themselves in completing work contribute to student success?

Summary

Alternative high school students and traditional high school students in the communities examined have similar but not identical learning styles. The results of this studied showed significant differences between the two groups in the areas or spatial skill, discrimination skill, auditory response preferences, and time of day studying preferences. These differences have implications regarding how and what materials are presented to students. These differences indicate that alternative schools may be a useful model for traditional schools trying to serve at-risk students better. Recommendations for practice were given to direct classroom teachers towards changes they could make to accommodate at-risk students.

Learning style differences are not a complete answer to the question, "Why do some students succeed in an alternative school when they could not succeed in a traditional school?" Learning styles between the two groups were more similar than different. Because of this, other suggestions for research were discussed.

APPENDIX A. HUMAN SUBJECTS MATERIALS

Information for Review of Research Involving Human Subjects

Iowa State University

(Please type and use the attached instructions for completing this form)

1. Title of Project Comparison of learning styles of alternative and traditional high school students

2. I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are protected. I will report any adverse reactions to the committee. Additions to or changes in research procedures after the project has been approved will be submitted to the committee for review. I agree to request renewal of approval f t continuing more than one year.

Joseph C. DeHart — Typed Name of Principal Investigator
4/18/96 — Date
Signature of Principal Investigator

Prof. Studies- Educational Admin. — Department
N229D Lagomarcino — Campus Address

294-1276 — Phone Number to Report Results

3. Signature of other investigator — Date — Relationship to Principal Investigator

4/24/96 — Major Professor

RECEIVED APR ISU GRADUATE COLLEGE

4. Principal Investigator(s) (check all that apply)
☐ Faculty ☐ Staff ☒ Graduate Student ☐ Undergraduate Student

5. Project (check all that apply)
☐ Research ☒ Thesis or dissertation ☐ Class project ☐ Independent Study (490, 590, Honors project)

6. Number of subjects (complete all that apply)
___ # Adults, non-students ___ # ISU student ___ # minors under 14 ___ other (explain)
120 # minors 14 - 17

7. Brief description of proposed research involving human subjects: (See instructions, Item 7. Use an additional page if needed.)

This study is a comparison of the learning style differences present between 63 alternative high school students and 63 traditional high school students drawn from three central Iowa school districts. Forty students will be tested in each of the three school districts: twenty students from each community's alternative high school and twenty from each community's traditional high school. From each school tested, ten students will be randomly selected from each of the tenth and eleventh grade classes. The instrument used to measure learning styles in this study is the Learning Style Profile published by the National Association of Secondary School Principals. This instrument is a paper and pencil instrument which takes students approximately fifty minutes to complete and measures 24 separate aspects of learning style. Students will either be excused from regular classes to participate, or will be excused from study halls to participate according to the wishes of each school participating. A sample copy of the NASSP Learning Style Profile is attached.

(Please do not send research, thesis, or dissertation proposals.)

8. Informed Consent:
☒ Signed informed consent will be obtained. (Attach a copy of your form.)
☒ Modified informed consent will be obtained. (See instructions, item 8.)
☐ Not applicable to this project.

Last Name of Principal Investigator DeHart

Checklist for Attachments and Time Schedule

The following are attached (please check):

12. ☒ Letter or written statement to subjects indicating clearly:
    a) purpose of the research
    b) the use of any identifier codes (names, #'s), how they will be used, and when they will be removed (see Item 17)
    c) an estimate of time needed for participation in the research and the place
    d) if applicable, location of the research activity
    e) how you will ensure confidentiality
    f) in a longitudinal study, note when and how you will contact subjects later
    g) participation is voluntary; nonparticipation will not affect evaluations of the subject

13. ☒ Consent form (if applicable)

14. ☒ Letter of approval for research from cooperating organizations or institutions (if applicable)

15. ☒ Data-gathering instruments

16. Anticipated dates for contact with subjects:

First Contact	Last Contact
May 1, 1996	June 6, 1996
Month / Day / Year	Month / Day / Year

17. If applicable: anticipated date that identifiers will be removed from completed survey instruments and/or audio or visual tapes will be erased:

August 31, 1996
Month / Day / Year

18. Signature of Departmental Executive Officer | Date | Department or Administrative Unit

4/25/96

19. Decision of the University Human Subjects Review Committee:

X Project Approved ___ Project Not Approved ___ No Action Required

Patricia M. Keith — Name of Committee Chairperson

5-28-96 — Date

Signature of Committee Chairperson

March 1996

Dear Parent or Guardian,

My name is Joe DeHart and I am currently an instructor with EXCEL Alternative High School in Marshalltown, Iowa. I am a lifelong resident of Newton, IA, and I am working on my thesis to complete my Master of Science degree at Iowa State University. As part of this thesis, I am conducting a study that I would like your daughter to participate in. I am working in cooperation with your daughter's high school and would like to take this opportunity to inform you about this study and gain your consent for your daughter's participation.

This study will compare the learning styles of alternative high school students and traditional high school students in three central Iowa communities. I am using a learning style profile to measure ways students like to learn. It will take your daughter about fifty minutes to complete this profile and will be done during school time.

Questions on this profile only relate to how your daughter prefers to learn and study. Examples of areas which are covered by the profile are: time of day study preferences, room temperature preferences, verbal or visual information preferences, inductive/deductive preferences, etc. This profile has been used with thousands of students across the country and was developed by the National Association of Secondary School Principals.

Your daughter was selected at random and may remain anonymous throughout this study. Your daughter does not have to include her name on the test. However, if you and/or your daughter would like to see the results and have them explained to you, she will need to include her name. This information may be helpful to your daughter by describing ways to improve learning and explaining situations in which she may learn best. Also, information gathered for this study is considered confidential. I will be administering this exam, and I will be the only one seeing the results. The written study will only be concerned with differences between schools, not individuals. At no time will this study refer to an individual student. After the study is completed and all students wanting to see their results have done so, the answer sheets with the students' names will be destroyed. Until their destruction, all materials are kept under lock and key.

This study is strictly voluntary! You may request that your daughter not participate in this study by completing the bottom of this form and returning it to the school office. At the time of testing your daughter will be given another consent form to sign. She may withdraw from this study at any time with no consequences. Thank you for your time and your assistance! If you have any questions please call be at: office) 515-752-4645 or home) 515-792-5085.

Sincerely,

Joseph C. DeHart

I do not wish my daughter to participate in the learning styles comparison study.

Student Name:_____ Parent Signature:_____

(please print)

Learning Styles Comparison Study

Student Consent Form

The purpose of this form is to provide you with enough information about the Learning Style Profile you are being asked to complete and how this information will be used so that you can make an informed decision whether or not to participate in this study.

The Learning Style Profile is a fifty minute paper and pencil instrument that will measure how you like to learn. Questions are all multiple choice, and answers will be marked on an answer sheet provided. This test will not measure anything other than how you prefer to learn and is not graded or used to rank you against other students. This is not a test you can do poorly on.

You do not have to put your names on this test. However, if you would like to see this information and have it explained to you, you will need to include your name. The information gathered on this form may be beneficial to you by describing ways you can improve your learning, and explaining in which situations you may learn best. Also, information gathered with this test is considered confidential. The person administering the exam will be the only one to see your individual score. The end result of this study will only focus on comparisons between schools and not individuals. After the study is completed, and all students wanting to see their individual results have done so, the answer sheets with your names on them will be destroyed. Until their destruction, all materials will be kept under lock and key with access only by the person administering this exam.

Those individuals requesting to know the results of this study by using their names will be contacted by the person administering this profile and given the results and an explanation of their meaning.

If you sign this form and wish to take part in this study, you may withdraw at any time with no consequences. If you have any questions or concerns, please ask now before signing this form.

I understand what has been described in this letter and am willing to participate. I understand that I may withdraw at any time.

_____	_____
Printed name	Signature
_____	_____
School	Date

Circle one: Sophomore Junior Senior

Learning Styles Comparison

School Consent Form

After having discussed this research project with the principal investigator I hereby give permission for this school and its' students to participate in this study. I understand the following:

- •The time committment needed.
- • Student information will be kept confidential and that individual students will not be included or identified in any form in this study.
- • Group information will be shared with the school as requested by the school.
- • Sharing information with individual students about their learning style profile will be done during non-class times.
- • Parents and students are given the opportunity for informed consent and may withdraw from this study at any time.
- • This school reserves the right to withdraw from this study at any time.
- • This research will be conducted at the convenience of this school.

New Horizons High School, Grinnell, IA
School

Principal or Director's Signature

3-11-96
Date

I also hereby give the principal researcher permission to identify this school by name in the study mentioned above.

Principal or Director's Signature

Learning Styles Comparison

School Consent Form

After having discussed this research project with the principal investigator I hereby give permission for this school and its' students to participate in this study. I understand the following:

- •The time committment needed.
- • Student information will be kept confidential and that individual students will not be included or identified in any form in this study.
- • Group information will be shared with the school as requested by the school.
- • Sharing information with individual students about their learning style profile will be done during non-class times.
- • Parents and students are given the opportunity for informed consent and may withdraw from this study at any time.
- • This school reserves the right to withdraw from this study at any time.
- • This research will be conducted at the convenience of this school.

Marshalltown High School
School

Principal's Signature

3-14-96
Date

I also hereby give the principal researcher permission to identify this school by name in the study mentioned above.

Principal's Signature

Learning Styles Comparison

School Consent Form

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- This school reserves the right to withdraw from this study at any time.
- This research will be conducted at the convenience of this school.

EXCEL High School, Marshalltown, IA
School

_____ 3-11-96
Principal or Director's Signature Date

I also hereby give the principal researcher permission to identify this school by name in the study mentioned above.

_____
Principal or Director's Signature

Learning Styles Comparison

School Consent Form

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- This research will be conducted at the convenience of this school.

Newton High School

School

Principal's Signature

3/13/96

Date

I also hereby give the principal researcher permission to identify this school by name in the study mentioned above.

Principal's Signature

Learning Styles Comparison

School Consent Form

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- The time committment needed.
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- This school reserves the right to withdraw from this study at any time.
- This research will be conducted at the convenience of this school.

Basics and Beyond
School

Principal's Signature

3/12/96
Date

I also hereby give the principal researcher permission to identify this school by name in the study mentioned above.

Principal's Signature

Learning Styles Comparison

School Consent Form

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- • This school reserves the right to withdraw from this study at any time.
- • This research will be conducted at the convenience of this school.

Grinnell High School
School

Principal's Signature

3/17/96
Date

I also hereby give the principal researcher permission to identify this school by name in the study mentioned above.

Principal's Signature

APPENDIX B. LEARNING STYLE PROFILE

Joseph C. DeHart
Associate Director of Alternative Education
Iowa Valley Continuing Education
3702 S. Center St.
Marshalltown, IA 50158

Mr. Robert Mahaffey
National Association of Secondary School Principals
Reston, VA

Dear Mr. Mahaffey,

Earlier this year I purchased sixty copies of the Learning Style Profile and accompanying hand scoring sheets to gather data for my master's thesis. I am currently preparing for my final thesis defense and would like to include a photocopy of the Learning Style Profile as part of my thesis. I need a formal letter of permission to do this. No money will be made off of my thesis and it will not be published outside of traditional thesis procedures. Please fax back either the letter of permission or a request for more information. My fax number is 515-752-1692. You may also phone me at 1-800-284-4823 ext. 271. I would appreciate a reply ASAP. Thank you for your assistance.

Sincerely,

Joseph C. DeHart

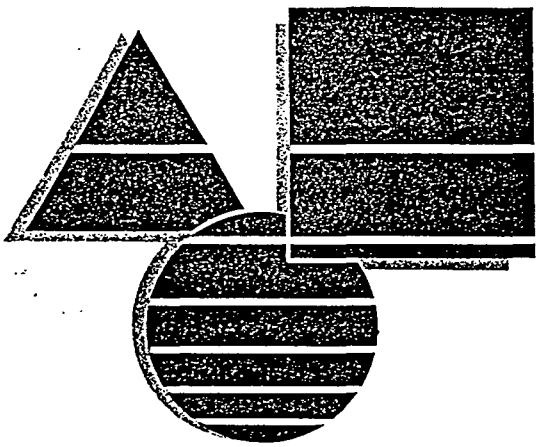
Permission is granted for your use of NASSP materials as specified above. This is a one-time only permission. Future requests must be repeated. Please credit material appropriately. Please add to credit line: "For more information concerning NASSP services and/or programs, please call (703) 860-0200."

Robert Mahaffey, Publisher
NASSP

NATIONAL ASSOCIATION OF SECONDARY SCHOOL PRINCIPALS

LEARNING STYLE PROFILE

James W. Keefe and John S. Monk
with
Charles A. Letteri, Marlin Languis, Rita Dunn



EVERY STUDENT HAS A PERSONAL LEARNING STYLE.

The questions in this booklet will show you *your* learning style—how you learn and how you like to learn. They will help you know yourself better and aid your teachers in their teaching.

Read each question carefully. When you decide on the answer you like best, mark the letter for that answer on your answer sheet. Be sure that the answer number is the same as the question in the booklet.

Use only a #2 pencil to mark the answer sheet. Please do not mark in the booklet. Mark only one answer for each question. Answer marks should be clean and clear. If you make a mistake or want to change an answer, erase your first answer neatly.

This *Profile* is not timed. You should be able to finish it in one class period. You need not hurry but do not waste time.

YOU WILL NOTICE THAT SOME QUESTIONS ARE PRINTED UPSIDE DOWN ON THE BACKS OF THE PAGES. DO ALL THE ITEMS ON THE FRONTS OF THE PAGES FIRST. WHEN YOU REACH THE BACK OF THE BOOKLET, TURN IT AROUND AND BEGIN THE ITEMS ON THE BACKS OF THE PAGES.

nassp Published by The National Association of Secondary School Principals, 1904 Association Drive, Reston, Va. 22091.

LEARNING STYLE PROFILE

FILLING IN THE ANSWER SHEET

USE A #2 PENCIL. *DO NOT* USE MARKERS OR BALLPOINT PENS.

If you are not certain about any of the following directions,
please ask your teacher for help!

NAME:

The first part of the answer sheet asks for your NAME

Print your FULL LAST NAME
Leave a SPACE
Print your FULL FIRST NAME
Leave a SPACE
Print your MIDDLE INITIAL

Beneath each letter of your name, darken the circle for that letter. Be sure to darken a circle where you leave spaces in your name.

SEX:

Find the box marked SEX next to your name. Darken the circle for your sex (M for male, F for female).

GRADE:

The box marked GRADE is below the box marked sex. Darken the circle for your grade.

RACE:

The box marked RACE (below your grade) is for your racial/ethnic background. Choose the proper code number from the list below and darken the circle for your number on the answer sheet.

1. Asian
2. Black
3. Hispanic
4. Native American (Indian, Eskimo, Aleut)
5. White
6. Other

BIRTH DATE:

The section for your BIRTH DATE is at the bottom left corner of the answer sheet. Darken the circle for the MONTH you were born. Write in and darken the circles for the DAY and YEAR you were born.

FILLING IN THE ANSWER SHEET — continued

IDENTIFICATION NUMBER:

The section marked IDENTIFICATION NO. is for your personal ID number. Start with box A and write your number in boxes A to H, using as many boxes as you need. Then darken the circle for each of the numbers.

SCHOOL:

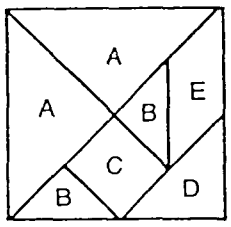
Boxes I to M are for your SCHOOL code. Your teacher will tell you the number for your school. Write this number in boxes I to M and darken the circles for each number.

CLASS:

Boxes N to P are for your CLASS code. Your teacher will also give you the number for your class. Write this number in boxes N to P and darken the circles for each number.

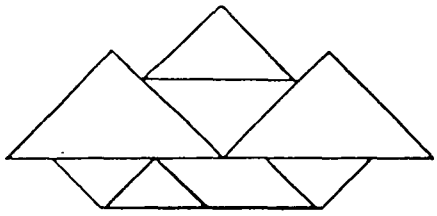
NOW TURN THE PAGE AND BEGIN WITH QUESTION 1. PLEASE DO NOT MARK IN THE BOOKLET.

Look at the *sample* puzzle below. The shapes used in this sample are marked A, B, C, D, and E. Some of these shapes are not used in the other puzzles on this page. Only one shape is missing from each puzzle. Mark the letter of the missing shape on your answer sheet.



SAMPLE

1.



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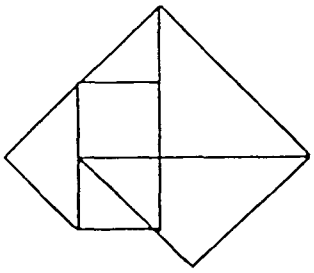
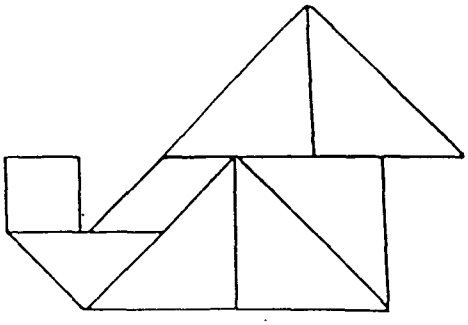
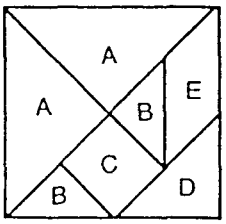


3.

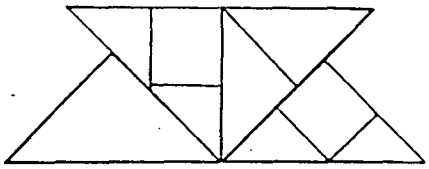


Look at the *sample* puzzle below. The shapes used in this sample are marked A, B, C, D, and E. Some of these shapes are not used in the other puzzles on this page. Only one shape is missing from each puzzle. Mark the letter of the missing shape on your answer sheet.

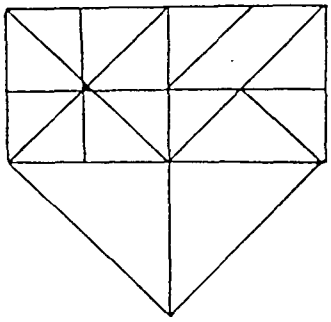


SAMPLE

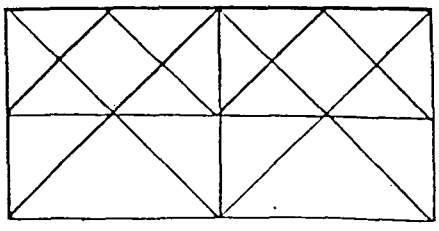
4.



5.



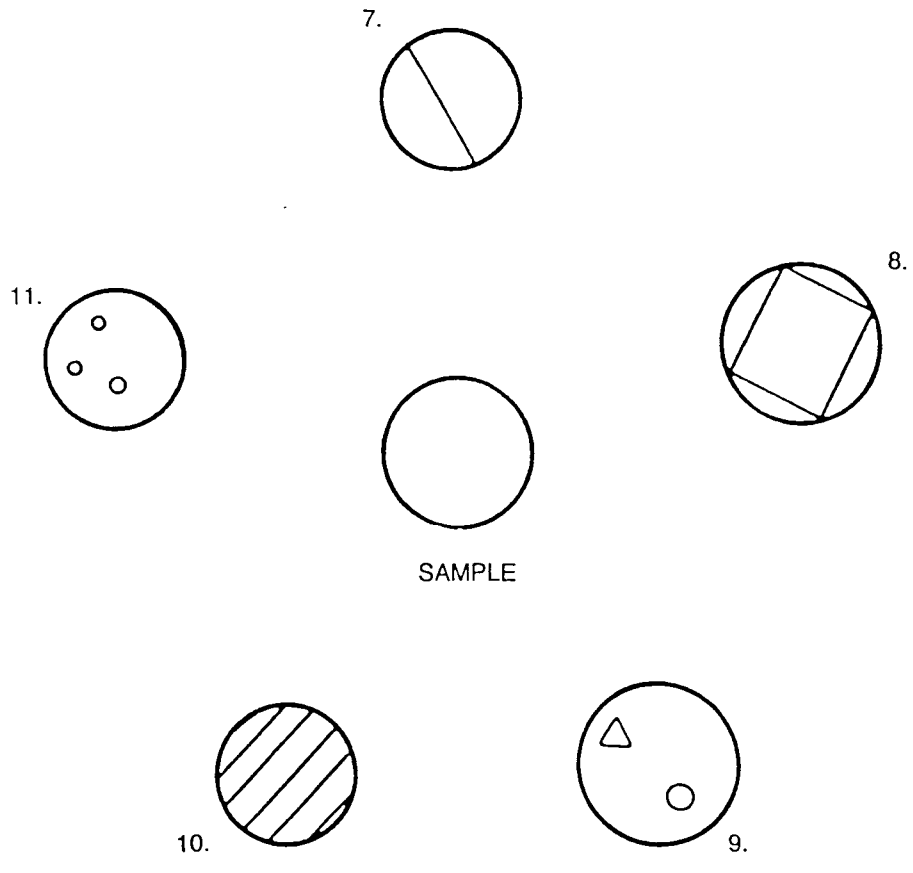
6.



In the center of this page is a *sample* circle. Compare the SIZE of the *sample* with the SIZE of each of the five circles around it. Do not measure the circles. Mark either *A*, *B*, or *C* on your answer sheet for each circle:

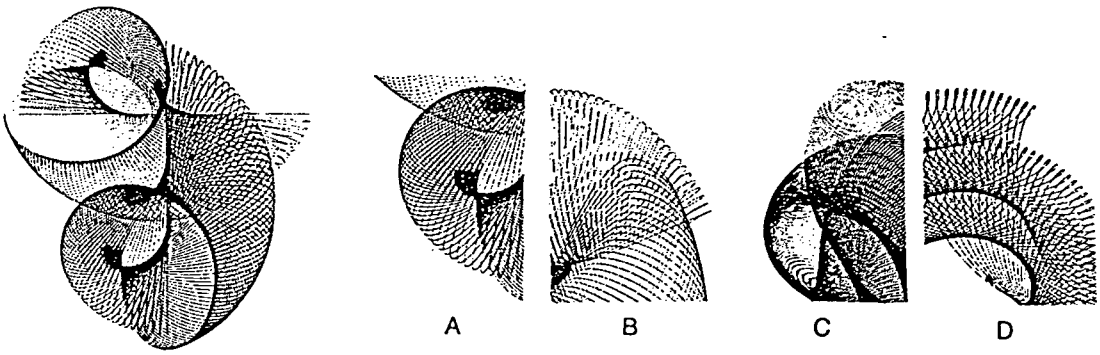
A. if the circle is *smaller* than the *sample*
B. if the circle is *larger* than the *sample*
C. if the circle is the *same size* as the *sample*

START HERE

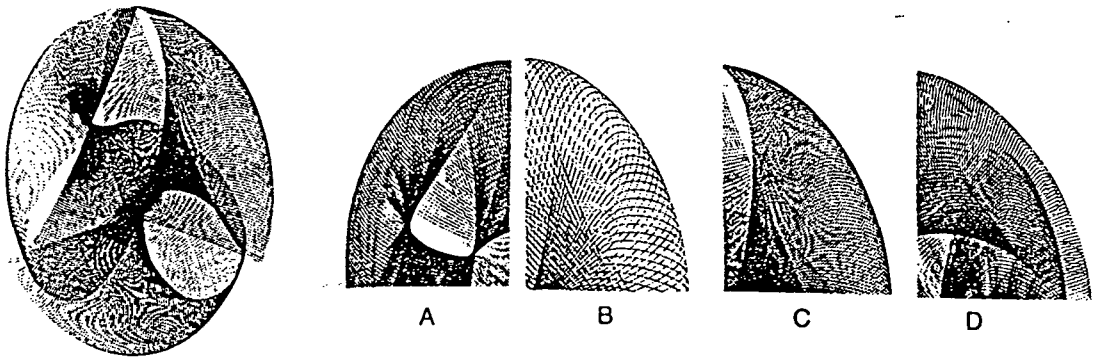


Look at each form below. Then decide which *one* of the four parts to each question actually comes from that form. The parts are FACING THE SAME WAY as the form, but are larger. Mark the letter of your choice on your answer sheet.

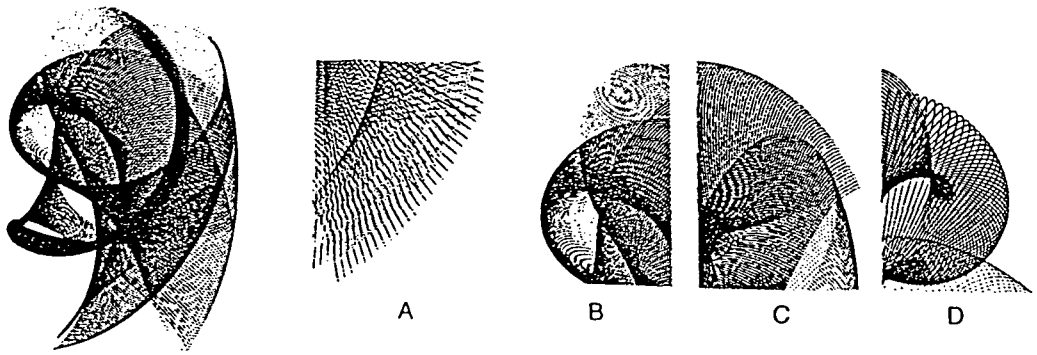
12.



13.

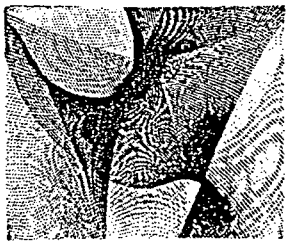


14.

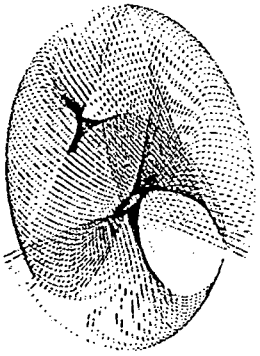


In these questions, a *part* of a form is followed by four complete forms. Decide which complete form actually matches the part. The part is FACING THE SAME WAY as the complete forms, but is larger. Mark the letter of your choice on your answer sheet.

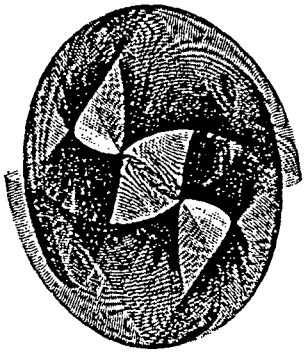
15.



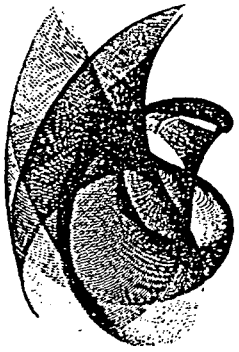
A



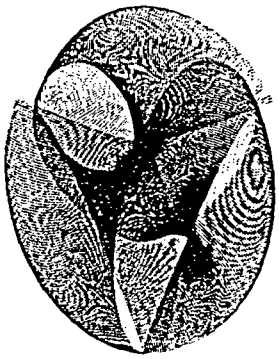
B



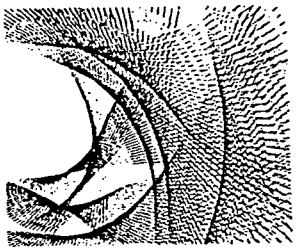
C



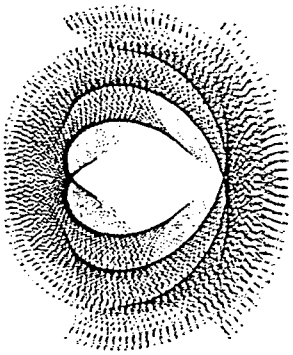
D



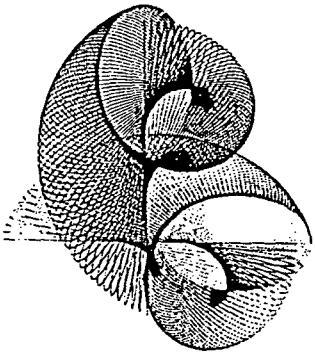
16.



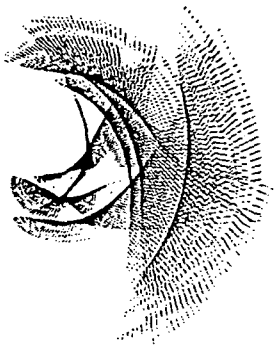
A



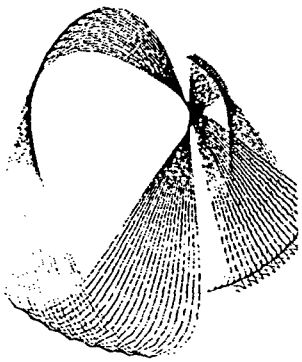
B



C



D



The following questions give averages for several categories of things. Decide what you think should be the largest and smallest choices for each category and mark them on your answer sheet. (No combination of choices will give you the *true* average so no arithmetic is needed. For each question, just choose the number you think is the most likely.)

The length of the average whale is about *65 feet.* What do you think:

17. is the length of the longest whale?
    A. 120 feet C. 86 feet
    B. 190 feet D. 75 feet

18. is the length of the shortest whale?
    A. 6 feet C. 52 feet
    B. 43 feet D. 21 feet

About *300 new comic books* have been written each year for the last 30 years. What do you think:

19. is the largest number of comics to be written in any one year during this time?
    A. 380 comics C. 870 comics
    B. 495 comics D. 620 comics

20. is the smallest number of comics to be written in any one year during this time?
    A. 145 comics C. 90 comics
    B. 205 comics D. 260 comics

From 1966-1976, the average number of baseballs used by a team in a season was *15,000.* What do you think:

21. is the largest number of balls used in any one year?
    A. 21,000 balls C. 50,000 balls
    B. 18,000 balls D. 30,000 balls

22. is the smallest number of balls used in any one year?
    A. 1,000 balls C. 5,000 balls
    B. 13,000 balls D. 10,000 balls

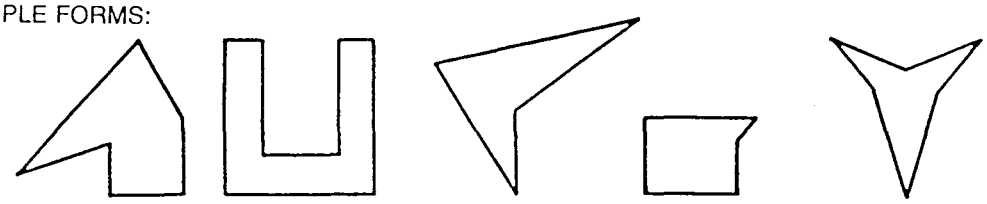
The average number of hot dogs sold at baseball games is *511 hot dogs.* What do you think:

23. is the largest number of hot dogs sold at any one game?
    A. 4,833 hot dogs C. 1,219 hot dogs
    B. 757 hot dogs D. 39,801 hot dogs

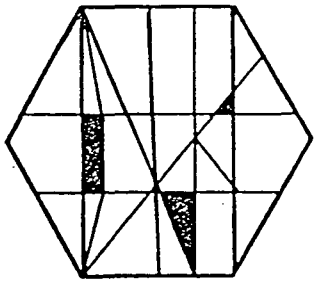
24. is the smallest number of hot dogs sold at any one game?
    A. 313 hot dogs C. 1 hot dog
    B. 146 hot dogs D. 23 hot dogs

ONE of the five simple forms below is hidden in each of the figures on this page. The hidden form is the SAME SIZE, SAME SHAPE, AND FACING THE SAME WAY as ONE of the simple forms. Mark the letter of the form hidden in each figure on your answer sheet.

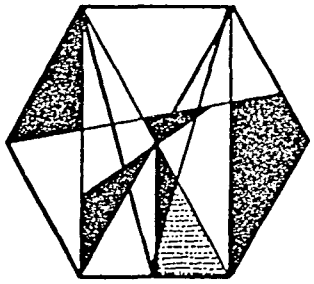
SIMPLE FORMS:



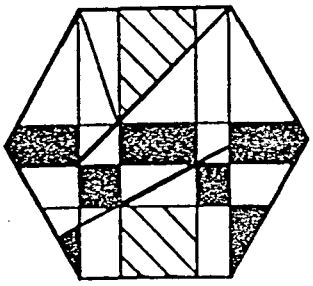
25. Find the HIDDEN FORM in this FIGURE.



26. Find the HIDDEN FORM in this FIGURE.

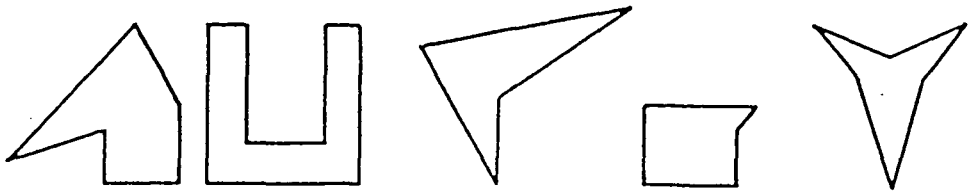


27. Find the HIDDEN FORM in this FIGURE.

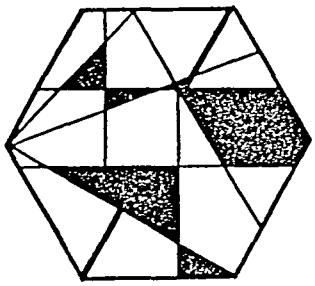


ONE of the five simple forms below is hidden in each of the figures on this page. The hidden form is the SAME SIZE, SAME SHAPE, AND FACING THE SAME WAY as ONE of the simple forms. Mark the letter of the form hidden in each figure on your answer sheet.

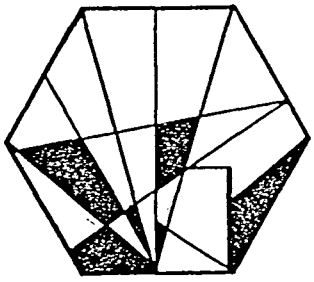
SIMPLE FORMS:



28. Find the HIDDEN FORM in this FIGURE.



29. Find the HIDDEN FORM in this FIGURE.



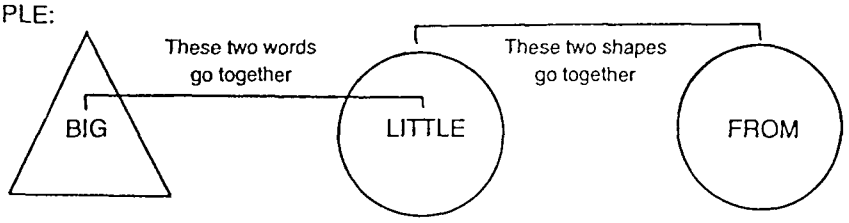
CHECK YOUR ANSWER SHEET NOW

YOU SHOULD BE READY TO BEGIN THE BOTTOM OF THE SHEET

YOU SHOULD NOW BE AT QUESTION NUMBER 30

Two WORDS or two SHAPES can go together in the questions below.

EXAMPLE:

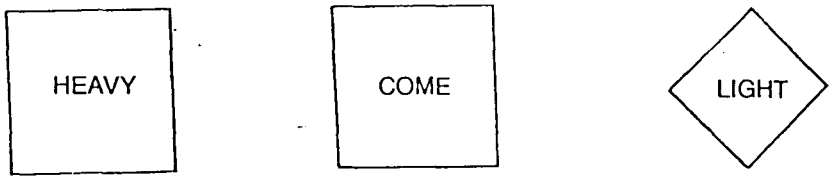


A. B. C.

Decide for each question if you like the two words or the two shapes. Then mark your answer sheet:

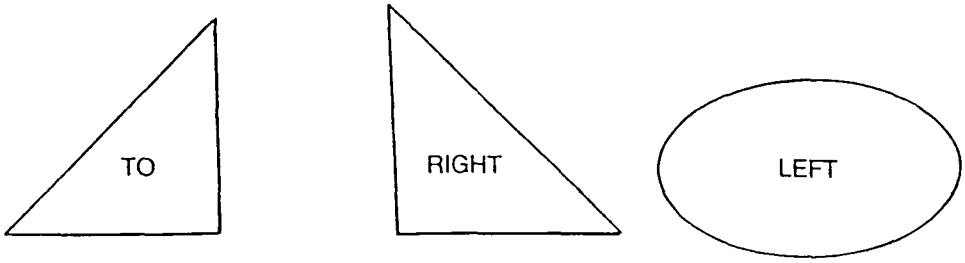
A. if you like the WORDS
B. if you like the SHAPES

30.



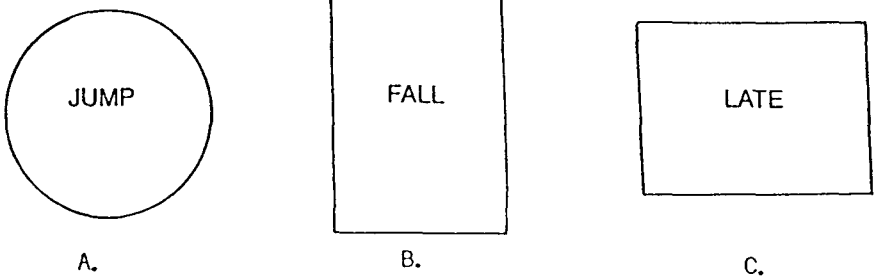
A. B. C.

31.



A. B. C.

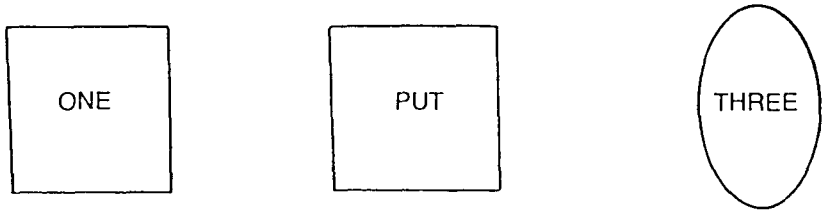
32.



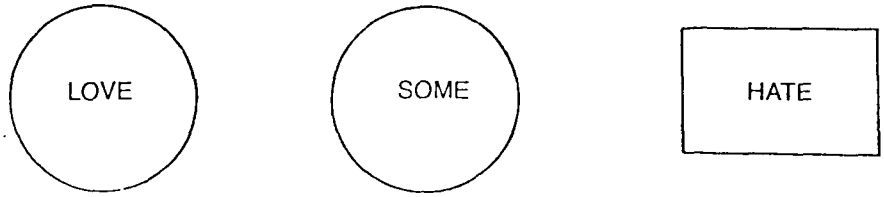
A. B. C.

Two WORDS or two SHAPES can go together in the questions below. Decide for each question if you like the two words or the two shapes. Then mark your answer sheet:

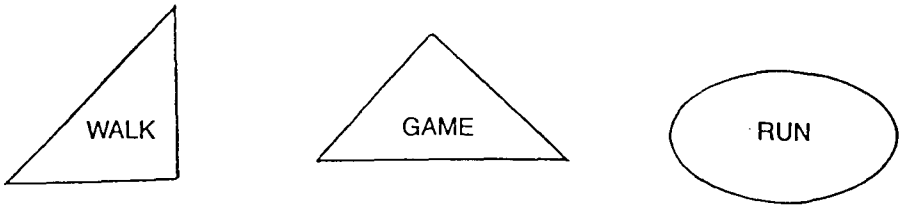
A. if you like the WORDS
B. if you like the SHAPES

33. 

A. B. C.

34. 

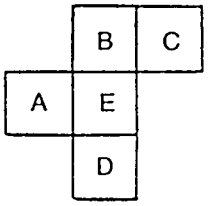
A. B. C.

35. 

A. B. C.

These squares will fold into a box which is open at the top. Which letter would mark the BOTTOM of the box?

36.



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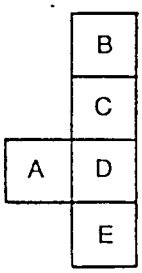
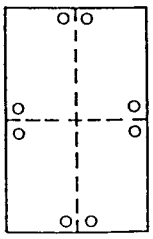
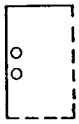
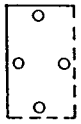


This sheet of paper has holes punched in it. How will the paper look after it is folded on the dotted lines?

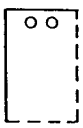
38.



A 

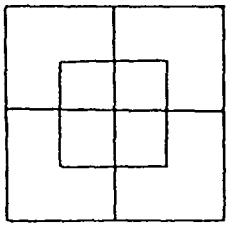
B 

C 

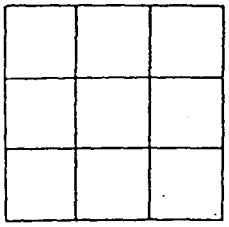
D 

E 

How many squares can you find in the shapes below?

39. 

A. 6 B. 8 C. 10 D. 12 E. 14

40. 

A. 9 B. 10 C. 12 D. 13 E. 14

In the questions on the following page, you will read some words that you know well. As you read each word, notice the *first thing* you think of:

A. Do you see a PICTURE of something?
B. Do you hear the SOUND of the word?
C. Do you have a FEELING about the word?

Example: Suppose you read the word "hold." You might see one football player holding another. In this case, you would mark A for PICTURE. Remember that it does not matter what you see, only that the word brings some PICTURE to your mind. Or you might not see a picture, but understand the meaning of the word from the SOUND alone. In that case, you would mark B for SOUND. Or you might have a FEELING about the word, as if you were holding someone, or feeling happiness or fear. In that case, you would mark C for FEELING.

Do not puzzle over your choices. Mark the first choice that comes to your mind for each word.

—CHECK YOUR ANSWER SHEET—YOU SHOULD NOW BE AT QUESTION 41—

On your answer sheet, mark A if you see a PICTURE, B if you hear a SOUND, and C if you have a FEELING about the word.

41.	SUMMER	A. Picture	B. Sound	C. Feeling
42.	CHICKEN	A. Picture	B. Sound	C. Feeling
43.	LIAR	A. Picture	B. Sound	C. Feeling
44.	BEAUTIFUL	A. Picture	B. Sound	C. Feeling
45.	FIVE	A. Picture	B. Sound	C. Feeling
46.	READ	A. Picture	B. Sound	C. Feeling
47.	BABY	A. Picture	B. Sound	C. Feeling
48.	ENEMY	A. Picture	B. Sound	C. Feeling
49.	STORY	A. Picture	B. Sound	C. Feeling
50.	OCEAN	A. Picture	B. Sound	C. Feeling
51.	DOWN	A. Picture	B. Sound	C. Feeling
52.	RUNNING	A. Picture	B. Sound	C. Feeling
53.	LAW	A. Picture	B. Sound	C. Feeling
54.	FRIEND	A. Picture	B. Sound	C. Feeling
55.	SWIM	A. Picture	B. Sound	C. Feeling
56.	POOL	A. Picture	B. Sound	C. Feeling
57.	GOD	A. Picture	B. Sound	C. Feeling
58.	KILL	A. Picture	B. Sound	C. Feeling
59.	HOUSE	A. Picture	B. Sound	C. Feeling
60.	HAPPY	A. Picture	B. Sound	C. Feeling

CHECK YOUR ANSWER SHEET

YOU SHOULD BE READY TO BEGIN SIDE 2 OF THE SHEET

YOU SHOULD NOW BE AT QUESTION NUMBER 61

For questions 61-108, read each sentence and select your answer from the following choices.

A. ALWAYS — This sentence *ALWAYS* describes me.

B. USUALLY — This sentence *USUALLY* describes me.

C. SOMETIMES — This sentence *SOMETIMES* describes me.

D. RARELY — This sentence *RARELY* describes me.

E. NEVER — This sentence *NEVER* describes me.

61. I work better in a room that is softly lighted.

A. Always B. Usually C. Sometimes D. Rarely E. Never

62. The best time for me to think is in the evening.

A. Always B. Usually C. Sometimes D. Rarely E. Never

63. When I really have to think I like to be in a cool room.

A. Always B. Usually C. Sometimes D. Rarely E. Never

64. I like to build things.

A. Always B. Usually C. Sometimes D. Rarely E. Never

65. School is more pleasant when our whole class works together.

A. Always B. Usually C. Sometimes D. Rarely E. Never

66. I do my best studying right before I go to bed.

A. Always B. Usually C. Sometimes D. Rarely E. Never

67. Bright lights hurt my eyes and make it hard for me to think.

A. Always B. Usually C. Sometimes D. Rarely E. Never

68. The harder the problem, the more likely I am to give up.

A. Always B. Usually C. Sometimes D. Rarely E. Never

69. If the lights in the classroom are too bright, it is hard for me to think.

A. Always B. Usually C. Sometimes D. Rarely E. Never

70. I like classes that break up into small teams.

A. Always B. Usually C. Sometimes D. Rarely E. Never

—CHECK YOUR ANSWER SHEET—YOU SHOULD NOW BE AT QUESTION 71—

71. I am bothered by any sound when I am trying to think and study for an exam.

A. Always B. Usually C. Sometimes D. Rarely E. Never

72. I feel more alert when I am given directions to follow in the early morning.

A. Always B. Usually C. Sometimes D. Rarely E. Never

73. I find it easy to fix things.

A. Always B. Usually C. Sometimes D. Rarely E. Never

74. If I get an answer wrong, I keep trying until I get the right answer.

A. Always B. Usually C. Sometimes D. Rarely E. Never

75. I bring up ideas in class that are different from my classmates.

A. Always B. Usually C. Sometimes D. Rarely E. Never

76. I find it easy to work for a long time without getting up and moving about.

A. Always B. Usually C. Sometimes D. Rarely E. Never

77. I get more work done in the evening than I do all day.

A. Always B. Usually C. Sometimes D. Rarely E. Never

78. Music has a way of helping me think about my school work.

A. Always B. Usually C. Sometimes D. Rarely E. Never

79. Doing homework is easier if I can lie down.

A. Always B. Usually C. Sometimes D. Rarely E. Never

80. I need to have very bright light when I am studying.

A. Always B. Usually C. Sometimes D. Rarely E. Never

—CHECK YOUR ANSWER SHEET—YOU SHOULD NOW BE AT QUESTION 81—

81. It is important for me to do my homework in a very quiet place.

A. Always B. Usually C. Sometimes D. Rarely E. Never

82. I like to make things with my hands.

A. Always B. Usually C. Sometimes D. Rarely E. Never

83. I enjoy school activities when I have a chance to work in a small group.

A. Always B. Usually C. Sometimes D. Rarely E. Never

84. I finish my homework even if it's really hard.

A. Always B. Usually C. Sometimes D. Rarely E. Never

85. I can learn best if I study in a place that is warm.

A. Always B. Usually C. Sometimes D. Rarely E. Never

86. I don't like it if I have to sit still when working on my school work.

A. Always B. Usually C. Sometimes D. Rarely E. Never

87. I study best while sitting straight up in my chair.

A. Always B. Usually C. Sometimes D. Rarely E. Never

88. If the classroom is warm, I pay more attention to the teacher.

A. Always B. Usually C. Sometimes D. Rarely E. Never

89. The late morning is the best time for me to work with my school textbooks.

A. Always B. Usually C. Sometimes D. Rarely E. Never

90. I would enjoy some of my school work more if I had a chance to work with one other student.

A. Always B. Usually C. Sometimes D. Rarely E. Never

—CHECK YOUR ANSWER SHEET—YOU SHOULD NOW BE AT QUESTION 91—

91. I don't finish my homework if it's really hard.

A. Always B. Usually C. Sometimes D. Rarely E. Never

92. I am very comfortable speaking in front of a group.

A. Always B. Usually C. Sometimes D. Rarely E. Never

93. I'm better at studying in the late morning.

A. Always B. Usually C. Sometimes D. Rarely E. Never

94. I never seem to finish things I work on in the afternoon.

A. Always B. Usually C. Sometimes D. Rarely E. Never

95. I state my own ideas even though others may disagree.

A. Always B. Usually C. Sometimes D. Rarely E. Never

96. It is important for me to do my homework in a cool room.

A. Always B. Usually C. Sometimes D. Rarely E. Never

97. I need a desk and chair to feel right about doing my school work.

A. Always B. Usually C. Sometimes D. Rarely E. Never

98. I cannot pay attention to my homework if the room is too bright.

A. Always B. Usually C. Sometimes D. Rarely E. Never

99. I like classes where everybody works together.

A. Always B. Usually C. Sometimes D. Rarely E. Never

100. I forget most things I study in the afternoon.

A. Always B. Usually C. Sometimes D. Rarely E. Never

—CHECK YOUR ANSWER SHEET—YOU SHOULD NOW BE AT QUESTION 101—

101. The radio or stereo helps me keep my mind on my school work.

A. Always B. Usually C. Sometimes D. Rarely E. Never

102. I am good at drawing things.

A. Always B. Usually C. Sometimes D. Rarely E. Never

103. I like to sit still until I have finished all my school work.

A. Always B. Usually C. Sometimes D. Rarely E. Never

104. It's hard for me to think in the afternoon.

A. Always B. Usually C. Sometimes D. Rarely E. Never

105. I prefer to sit on the floor when I am studying.

A. Always B. Usually C. Sometimes D. Rarely E. Never

106. I am able to understand more of what I learn in the early morning.

A. Always B. Usually C. Sometimes D. Rarely E. Never

107. Classmates would generally say that I'm a talkative person.

A. Always B. Usually C. Sometimes D. Rarely E. Never

108. When studying, I like to take breaks often.

A. Always B. Usually C. Sometimes D. Rarely E. Never

NOW CLOSE THIS BOOKLET AND TURN IT AROUND FOR

THE QUESTIONS PRINTED ON THE *BACK* OF EACH PAGE.

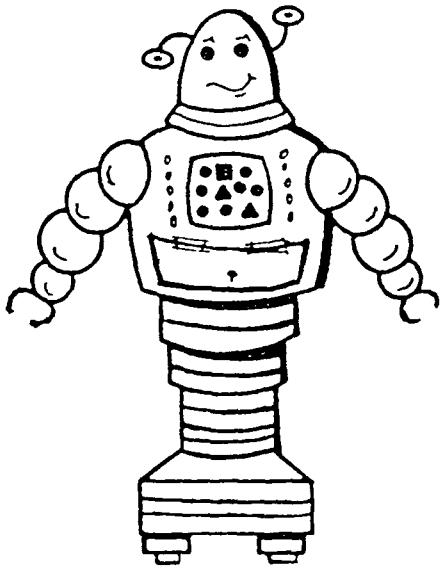
THE FINAL QUESTIONS (109-126) GO FROM THE BACK

TO THE FRONT OF THE BOOKLET.

STUDY THE PICTURE BELOW CAREFULLY!

You will need to remember what it looks like.

You will not be able to turn back to see it again.



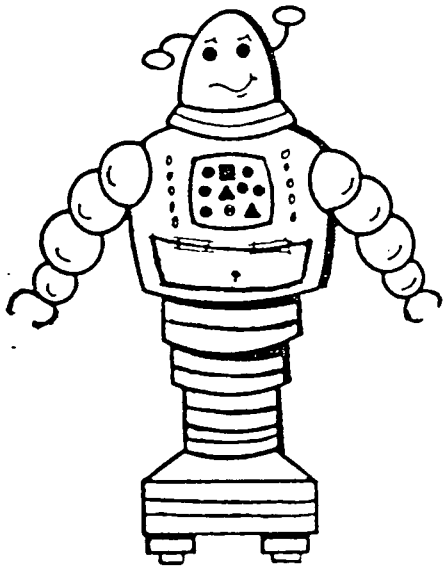
REMEMBER THIS PICTURE!

YOU MAY NOT TURN BACK TO THIS PAGE AFTER YOU GO ON.

TURN TO THE NEXT PAGE.

STUDY THE PICTURE BELOW CAREFULLY!

DO NOT TURN BACK TO THE PAGE BEFORE THIS ONE.



109. Is this picture:

A. The same as the one on the page before this one?
B. Different from the one on the page before this one?

REMEMBER THIS PICTURE!

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TURN TO THE NEXT PAGE.

STUDY THE PICTURE BELOW CAREFULLY!

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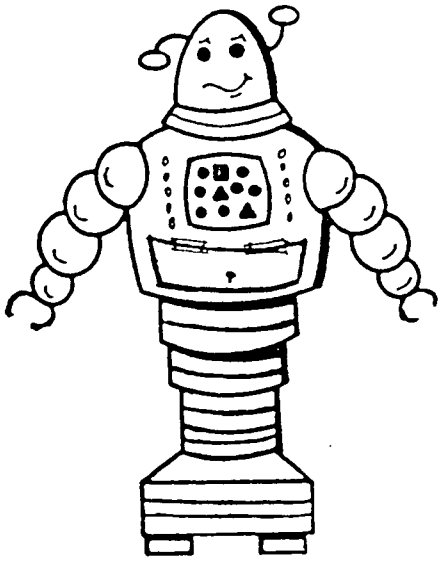

110. Is this picture:

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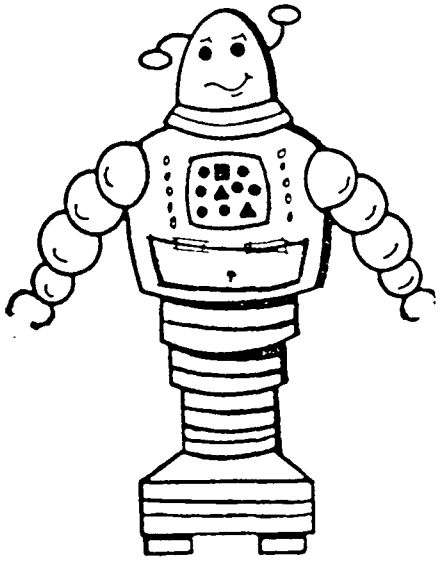

111. Is this picture:

A. The same as the one on the page before this one?
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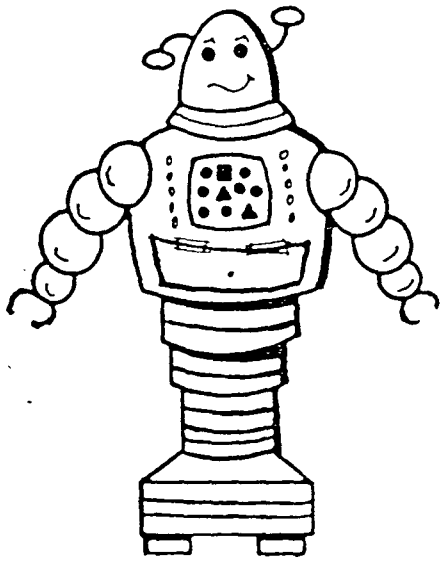

112. Is this picture:

A. The same as the one on the page before this one?
B. Different from the one on the page before this one?

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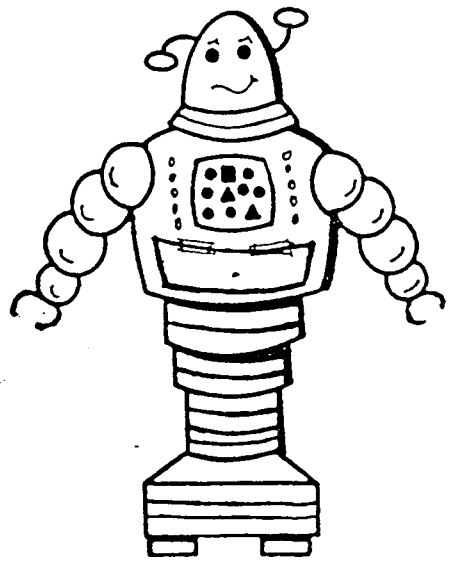

113. Is this picture:

A. The same as the one on the page before this one?
B. Different from the one on the page before this one?

REMEMBER THIS PICTURE!

YOU MAY NOT TURN BACK TO THIS PAGE AFTER YOU GO ON.

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STUDY THE PICTURE BELOW CAREFULLY!

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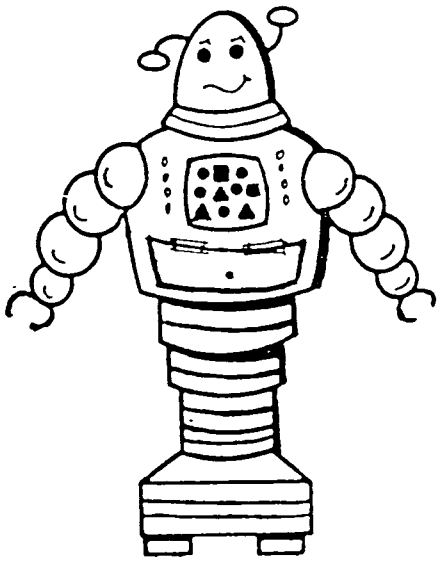


114. Is this picture:

A. The same as the one on the page before this one?
B. Different from the one on the page before this one?

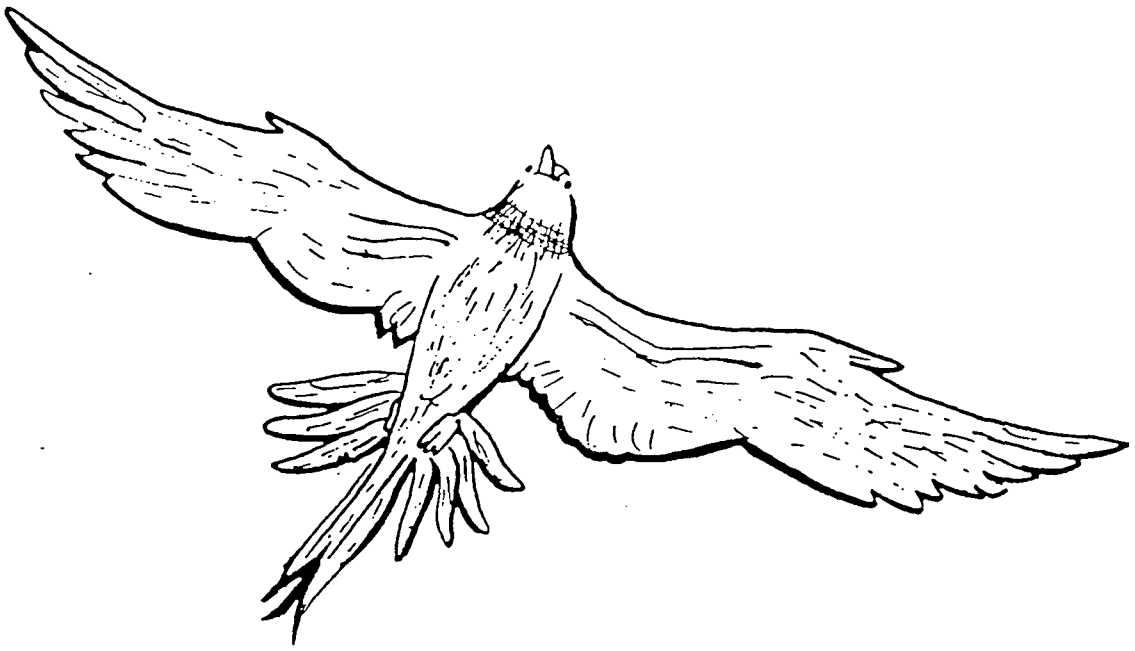
—CHECK YOUR ANSWER SHEET—YOU SHOULD NOW BE AT QUESTION 115—

TURN TO THE NEXT PAGE.

STUDY THE PICTURE BELOW CAREFULLY!

You will need to remember what it looks like.

You will not be able to turn back to see it again.



REMEMBER THIS PICTURE!

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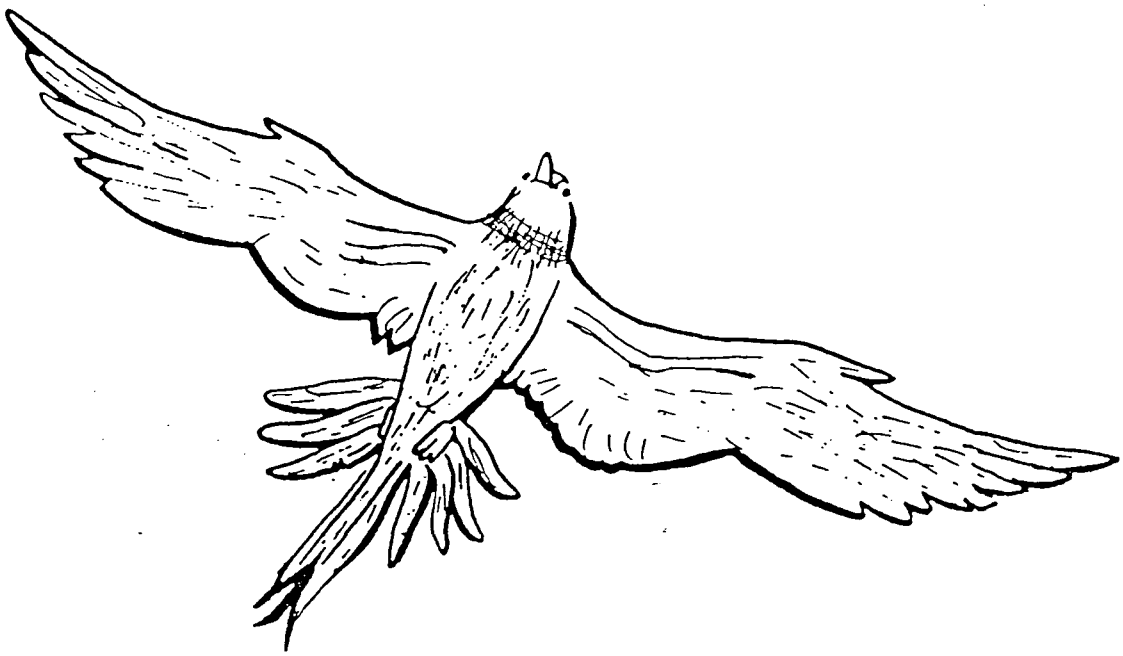

115. Is this picture:

A. The same as the one on the page before this one?
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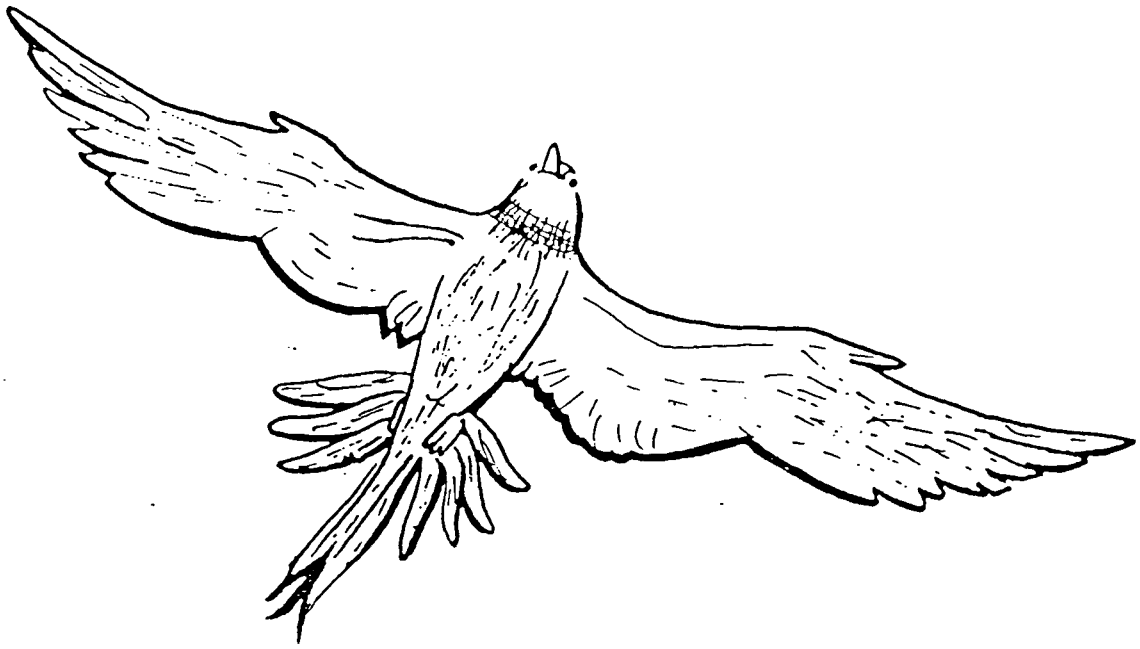


116. Is this picture:

A. The same as the one on the page before this one?
B. Different from the one on the page before this one?

REMEMBER THIS PICTURE!

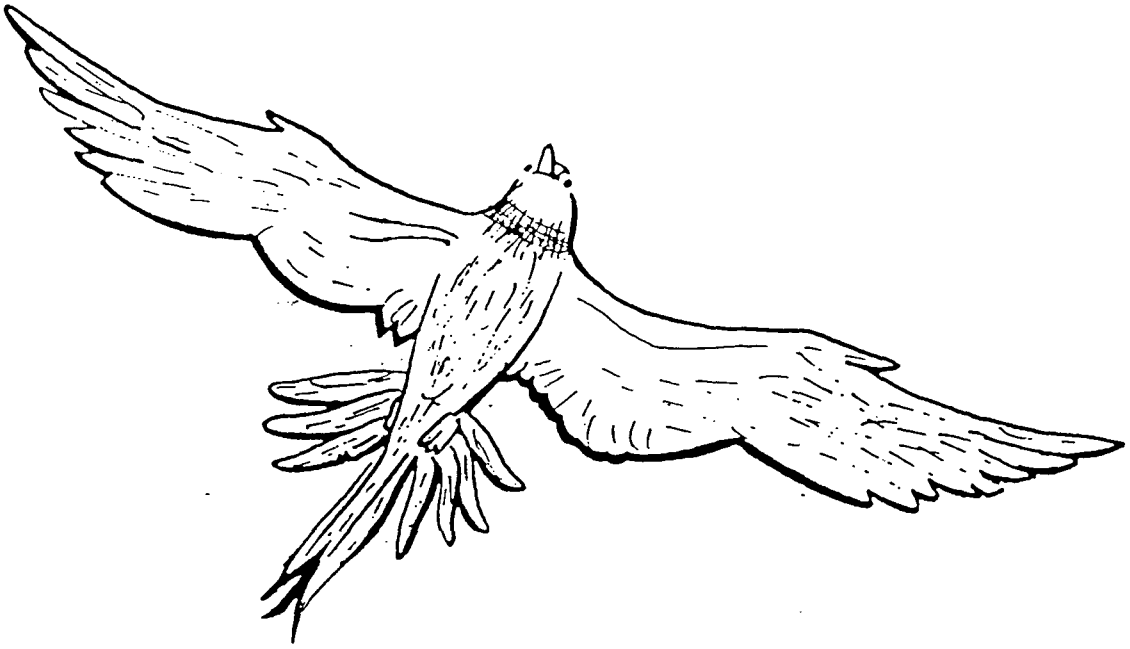
YOU MAY NOT TURN BACK TO THIS PAGE AFTER YOU GO ON.

TURN TO THE NEXT PAGE.

LEARNING STYLE PROFILE PAGE 31

STUDY THE PICTURE BELOW CAREFULLY!

DO NOT TURN BACK TO THE PAGE BEFORE THIS ONE.



117. Is this picture:

A. The same as the one on the page before this one?
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REMEMBER THIS PICTURE!

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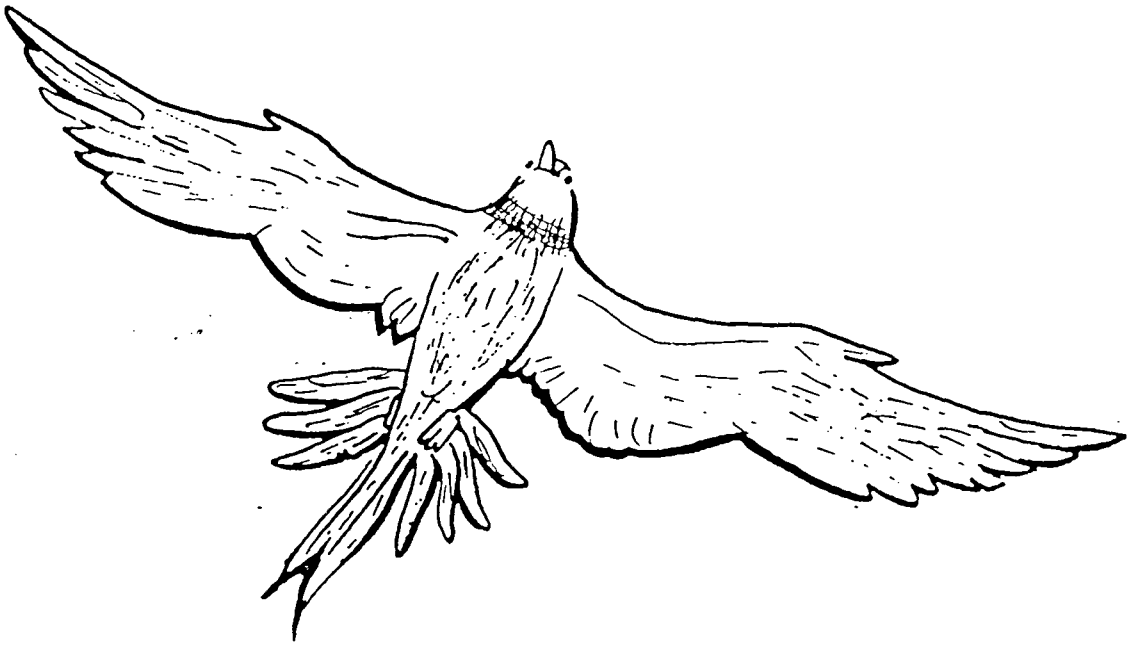

118. Is this picture:

A. The same as the one on the page before this one?
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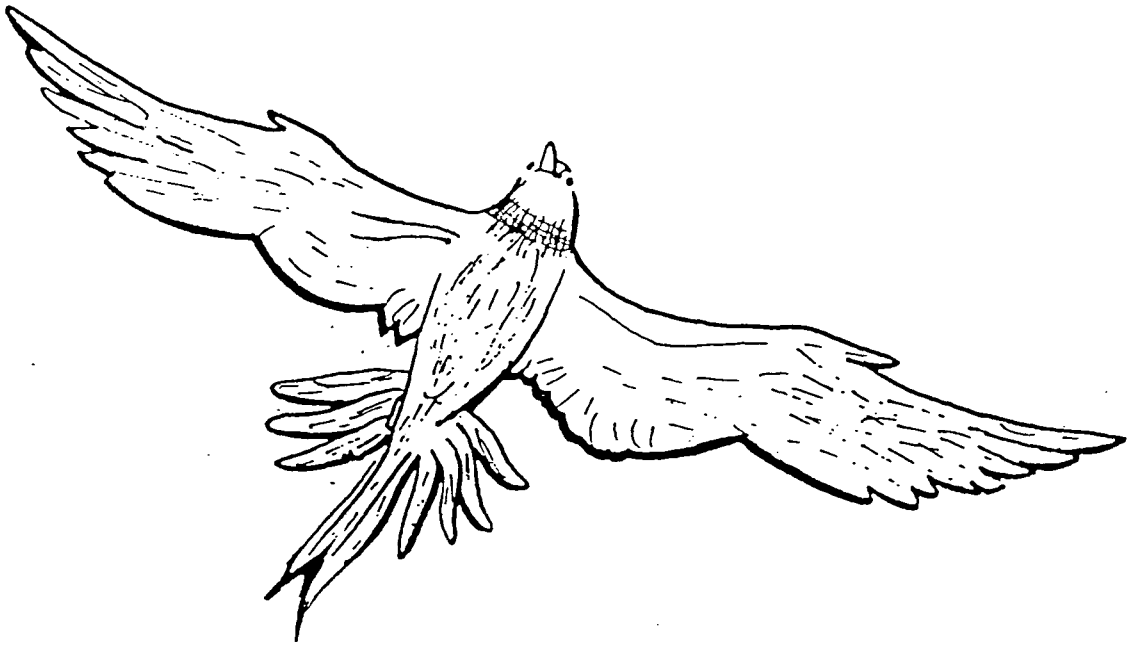

119. Is this picture:

A. The same as the one on the page before this one?
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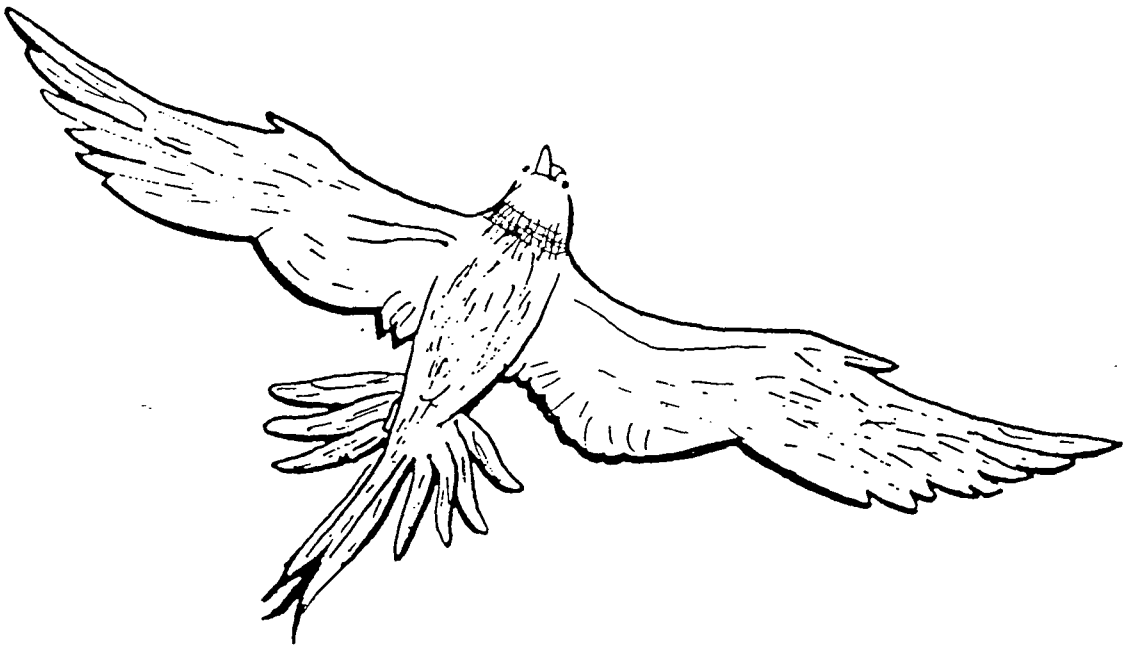

120. Is this picture:

A. The same as the one on the page before this one?
B. Different from the one on the page before this one?

—CHECK YOUR ANSWER SHEET—YOU SHOULD NOW BE AT QUESTION 121—

TURN TO THE NEXT PAGE.

STUDY THE PICTURE BELOW CAREFULLY!

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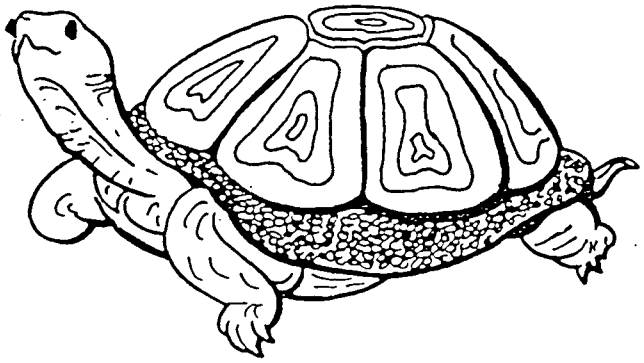
You will not be able to turn back to see it again.



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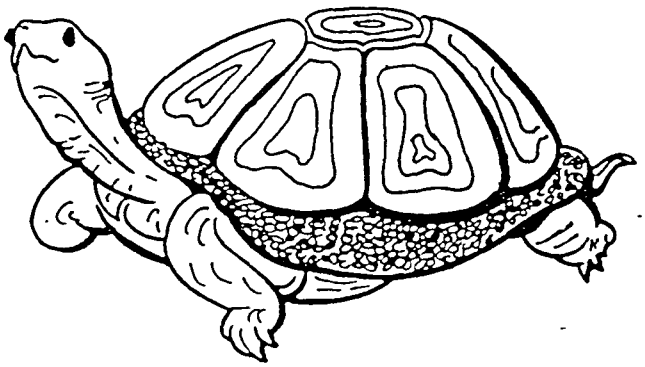


121. Is this picture:

A. The same as the one on the page before this one?
B. Different from the one on the page before this one?

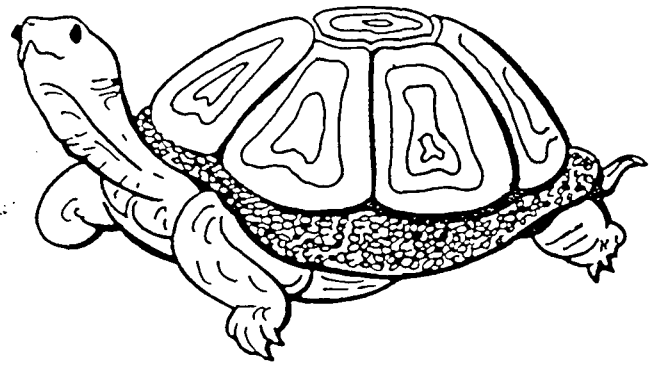
REMEMBER THIS PICTURE!

YOU MAY NOT TURN BACK TO THIS PAGE AFTER YOU GO ON.

TURN TO THE NEXT PAGE.

STUDY THE PICTURE BELOW CAREFULLY!

DO NOT TURN BACK TO THE PAGE BEFORE THIS ONE.



122. Is this picture:

A. The same as the one on the page before this one?
B. Different from the one on the page before this one?

REMEMBER THIS PICTURE!

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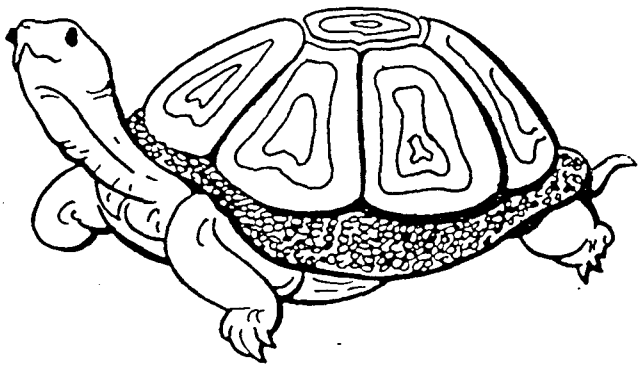

123. Is this picture:

A. The same as the one on the page before this one?
B. Different from the one on the page before this one?

REMEMBER THIS PICTURE!

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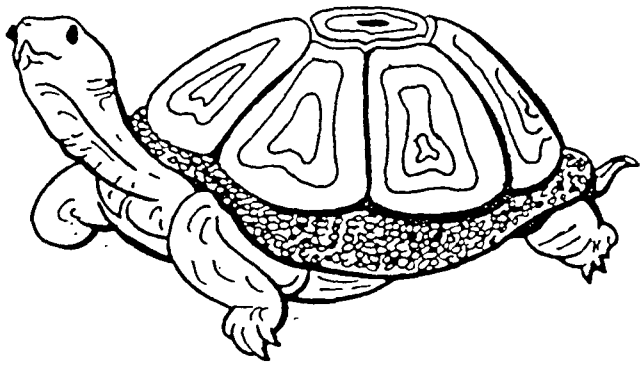

124. Is this picture:

A. The same as the one on the page before this one?
B. Different from the one on the page before this one?

REMEMBER THIS PICTURE!

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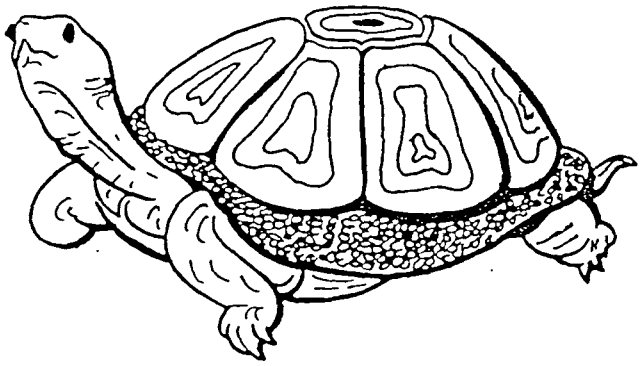

125. Is this picture:

A. The same as the one on the page before this one?
B. Different from the one on the page before this one?

REMEMBER THIS PICTURE!

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STUDY THE PICTURE BELOW CAREFULLY!

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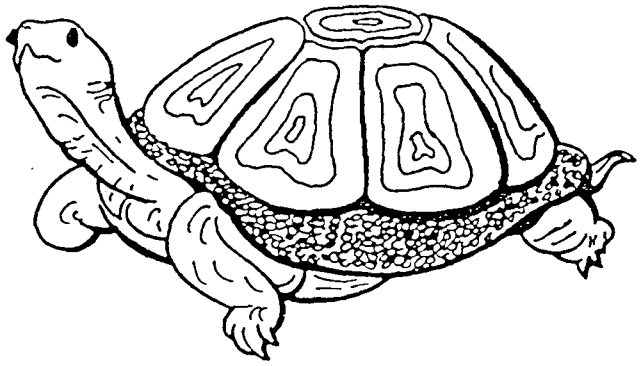

126. Is this picture:

A. The same as the one on the page before this one?
B. Different from the one on the page before this one?

CLOSE YOUR TEST BOOKLET

LEARNING STYLE PROFILE

THIS PROFILE IS FOR:

BIRTHDATE: SEX: GRADE: RACE:
DATE: SCHOOL: CLASS:

SKILLS—GENERAL APPROACH TO PROCESSING INFORMATION

	SCORE	WEAK	AVERAGE		STRONG
ANALYTIC					
SPATIAL					
DISCRIMINATION					
CATEGORIZATION					
SEQUENTIAL					
MEMORY					
SIMULTANEOUS					

PERCEPTUAL RESPONSES—INITIAL RESPONSE TO VERBAL INFORMATION

	SCORE	WEAK	AVERAGE		STRONG
VISUAL					
AUDITORY					
EMOTIVE					

ORIENTATIONS AND PREFERENCES—PREFERRED RESPONSE TO STUDY OR INSTRUCTIONAL ENVIRONMENT

	SCORE	LOW	AVERAGE		HIGH
PERSISTENCE					
VERBAL RISK					
MANIPULATIVE					
STUDY TIME:					
EARLY MORNING					
LATE MORNING					
AFTERNOON					
EVENING					

	SCORE	HIGH		NEUTRAL	HIGH	
VERBAL-SPATIAL		SPATIAL				VERBAL
GROUPING		SMALL				LARGE
POSTURE		INFORMAL				FORMAL
MOBILITY		STILLNESS				MOVEMENT
SOUND		QUIET				SOUND
LIGHTING		DIM				BRIGHT
TEMPERATURE		COOL				WARM

CONSISTENCY SCORE: NORMATIVE SAMPLE:

nassp National Association of Secondary School Principals, Reston, VA 22091

NASSP LEARNING STYLE PROFILE
ANSWER SHEET FOR HAND SCORING

NAME_____ BIRTHDATE_____ GRADE_____ SCHOOL_____

For each item, please mark the letter of your choice with an "X" in the appropriate column.

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126					

Directions for Scoring: Separate the two parts of the completed answer sheet. Do Step I on the second page to obtain Learning Style Profile raw scores. Then complete steps II, III, & IV as outlined on the back page.

SEPARATE HERE AFTER MARKING ALL ITEMS.

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