EFFECTIVENESS OF AN INTEGRATED TECHNOLOGY EDUCATION CURRICULUM PRESENTED TO AT-RISK STUDENTS AT LUCAS CHARTER SCHOOL

by

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ABSTRACT

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Effectiveness of an Integrated Technology Education Curriculum Presented to At-Risk Students at Lucas Charter High School

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This study investigated and measured the effectiveness of integrating technology education with a math unit to address fractional computational deficiencies prevalent among some members of a group of Oppositionally Defiant Disorder high school students attending Lucas Charter School. A technology education unit was created and used to benefit the students and gather data for this study. A combination of motivation stemming from the students ownership of the goals of the unit and the integration of curriculum manifest into the improvement to grade appropriate fractional computational skill level of the group of students.

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Chapter I
Introduction

Students spend a majority of their formative years in the educational setting. The student is expected to learn social interaction skills and competencies in discrete educational subjects that are presented to him/her. A majority of students acclimate to the norms and function at the level of academic achievement that is expected of them in the formal education setting. For every majority, there must be a minority. A portion of this minority of students does not perform to grades appropriate to academic achievement comparable to their peers. Educators in the traditional educational environment focus on the class lesson plan for the group. A minority of students resigns from making academic progress, which results in alienation and disruption of their educational achievement. One of the conditions impeding the social and educational development of afflicted students is defined as oppositional defiance disorder.

Oppositional Defiance Disorder

Oppositional defiance disorder was described by (Riley, 1997, p.2):

> The diagnostic term that psychologists use for young people like Tom is oppositional defiant disorder. They come in all ages, sizes, races, all social backgrounds, and from both sexes. The American Psychiatric Association's Diagnostic and Statistical manual of Mental Disorders, Fourth Edition, Uses the following criteria to describe their behavior:
>
> A pattern of negativistic, hostile, and defiant behavior lasting at least six months, during which four (or more) of the following are present:
>
> - often loses temper
> - often argues with adults

- often actively defies or refuses to comply with adults' requests or rules
- often deliberately annoys people
- often blames others for his or her own mistakes or misbehaviors
- is often touchy or easily annoyed by others
- is often angry and resentful
- is often spiteful or vindictive

Lucas Charter School

Lucas Charter School is a facility in Dunn County that provides a place of learning for students. Academic and other problems the student encounter lead into a vicious perpetuating cycle of continued discontent and rebellion that lead to more problems in the educational and social institutions the student participates in. Barkley (1997) stated:

> Defiance spreads much like a cancer, from the home into other settings. Research suggests that children who display defiant behavior in one situation are highly likely to employ it eventually elsewhere, reacting to other commands of instructions and to other adults or children as they do to their parents. Failing to take steps to improve child defiance may therefore have effects across many situations and individuals. (p. 9)

A percentage of these students then find themselves out of the traditional mainstream facility and into an alternative educational setting (Kilkenny, 2000). Law also mandates that students with ODD be mainstreamed in an educational setting. The population at Lucas Charter School has a one hundred percent prevalence of ODD (Kilkenny, 2000). Some Schools are founded for providing an atmosphere for this type of at risk student. Lucas Charter School provides an environment where the exceptionality is understood and managed. An integrated curriculum of subjects and interests are the fare

at Lucas Charter School (Kilkenny, 2000). This study illuminated the advantage of utilizing a student's interest in subject that will allow them to overcome their condition and participate in the learning process utilizing an integrated curriculum.

Integrated Curriculum

Integrated curriculum is a concept of many facets and implementation strategies. Drake (1993) develops a strong rationale for integrated curriculum:

> The concept of integrated curriculum makes sense for other reasons. Students who drop out perceive little relevance in school life. Integration connects subject areas in ways that reflect the real world. When we set curriculum in the context of human experience, it begins to assume a new relevance. Higher-order thinking skills become a necessity as students begin to grapple with real issues and problems that transcend the boundaries of disciplines. (p. 2)

Participants in this study fell out of the mainstream educational environment for numerous reasons. Lack of interest in traditional fragmented subject disciplines is a common sentiment among the students. This disinterest combined with the recognized ODD disorder yields a strong revulsion of education and also of the effort required to succeed in education.

Integrating technology education and math offer educators an opportunity to reach students with minimal to no math skills. Technology education and math have similar themes. Measurement utilizes technology and math allows the interpretation of measurement to solve real world issues. Helping students "...'[discover] roots running under ground whereby contrary and remote things cohere and flower out from one stem' is at once the mission of the teacher and of the learner" (Fogarty, 1991, p. xi). Integrated

curriculum is a path that can lead to this objective. Real world relevance may convince the student to take a risk at attempting to learn and succeed at some academic topic.

Integrated curriculum is an appropriate means for educating the at risk learner. In fact, “More than one project has focused on the at-risk student; they claimed that this type of student benefited most from the integrated approach because the increased relevance meant increased motivation” (Drake, 1993, p.14). The integrated curriculum allows a student to explore and challenge an area of content of which they have taken interest and ownership in. Educators find the "... student to be an active learner who constructed meaning” (Drake, 1993, p.15). With a relevant construct of meaning a student can ask questions and engage in a pursuit of learning rather than posture a combative attitude against the authority of the institution and the educational goal. Student’s interest may then be focused away from combativeness and toward the process of learning. When the student understands that they are welcome to come back and learn, it diverts the energy back towards the goal of the lesson (Kilkenny, 2000). The option of returning to the learning unit is an important one for the ODD student. Some of these students exhibit behavior periodically that necessitates them leaving for a period of cool down time.

Paraphrasing Jacobs, (1991, p. 16) integrating curriculum can tie different concepts together such as business and math or reading skills and comprehension. Implementing integrated curriculum helps students gain knowledge of targeted concepts and skills of various disciplines more effectively

Purpose of the Study

The purpose of the study was to measure the effectiveness of an integrated curriculum unit of study. The integrated unit consisted of a math and a technology

education unit in a contextual format. Technology piqued the student's interest to cause them to make an attempt at learning a unit of math that up until that time the students had little interest in learning. It was in the context of technology that the students learned the math unit. The study was conducted at Lucas Charter School in the Menomonie Wisconsin school district. Learning effectiveness was measured by detecting the difference between the pretest and post-test scores. The results demonstrated the integrated curriculum has potential to improve overall learning by at risk students in an alternative school environment. Students at Lucas Charter School are at risk for not completing their high school education and literature indicated integrated curriculum units as an effective tool to reverse this event in some cases.

Research Objectives

The three research objectives for this study were:

1. To determine the level of basic competence in math, science and technology education skills prior to engaging in the integrated unit.
2. To determine the level of basic competence in math, science and technology education skills after participating in the integrated unit.
3. To measure students level of achievement by the completion of the unit.

Significance of Study

This study involved the creation of an integrated unit of study of Wood Technology utilizing technology and math. The students participated in the class voluntarily. The students chose to create a project of interest to them. These interests lead students to attempt a unit of math study necessary for measurement. Measurement and fractional computation went hand-in-hand with wood technology. The at-risk student of this study typically was labeled ODD. With this label, came a host of issues and habits

that interfered with the education of the student. Academic accountability is a growing phenomenon that students and educators alike are being held to. This study illuminated academic improvement because of integrated curriculum in the area of technology education and its impact on the proficiency level that at-risk students achieve.

Limitations of this Study

This study took place during one block of time specifically set aside for this unit of instruction. The students that participated were enrolled at Lucas Charter School during that time frame. No attempt to make any statistical correlation to a general population is inferred or recommended. This study was a preliminary study designed to give an indication of measured success to determine if further statistically significant studies are warranted.

CHAPTER II
Review of Literature

Student

The at-risk student lives within his or her own realization of social standards. The act of cooperation with others may or may not be in the student's repertoire of gestures or capacity of interaction in a particular instance of time. The student may comply or choose not to comply with requests for interaction, assignment of tasks or other activity that requires a cooperative interaction with peers or persons of authority.

Boiling down what (Barkley, 1997, p. 7) said in one sentence, this opposition can lead to an escalating, self-feeding confrontation of one ups-man-ship until a party in this confrontation retreats or is physically or emotionally challenged or hurt. A directive provided by a person of authority is as important to an at-risk student as he will choose to make it at the time. If the student may benefit from complying with the request, he/she may comply or he/she may choose not to heed the request. The student gets an impression that this is a successful way of dealing with this person or other people. This negative reinforcement carries through home, school, and later life for most at-risk students and provides the standard operating procedure of habit and response. The traditional educational institution and it's authority model will not tolerate this for any great period of time without imposing sanctions and then requiring interventions for the students' behavior.

The curriculum in the traditional, distinct, separate, compartmentalized methods of delivery may have little or no meaning for the student and increase frustration to those attempting to deliver and assess the result of teaching the curriculum. The at-risk student at times requires separation from those around the student in an authority role. The

traditional educational institution may or may not have the resources in terms of skilled personnel, facilities and experience to serve those referred to as at-risk. The referral or option to locate to a facility is then a choice in the Dunn County school system.

Student ownership is an often-overlooked component of the curriculum by choice or design. This study implemented student ownership in the design of the main instrument, the sub-box construction class. It was perceived through the literature that this increased student participation gave the student a positive reinforcement that would push him/her to accept consequences of behavior and merits of effort to complete this class. Students are creating some of the framework of the unit of curriculum by default. Their interest in the subject (sub-box construction) was motivating them to participate. Both the researcher and the student agreed upon issues of deviance of accepted conduct in the class and academic achievement. "Student ownership of the plan made all the difference in the world in their acceptance of consequences" (Homestead, McGinnis, & Pate, 1997, P. 23). The participants were aware of the framework of the unit of instruction and consequently aware of what behavior would cause less than optimal academic performance. This study's premise was that moving beyond the traditional compartmentalized approach to curriculum and moving towards student ownership and integrating disciplines with student interest will result in higher academic achievement.

School

An open school has a different method of curriculum that may give the student some choices for meeting law-mandated attendance and progress in the school system. Modular learning units and interest structured integrated curriculums may pique the interest of the student. When the interest of the student is captured, they are freed

temporarily from their internalization and may comply with requests. Teachable moments may occur and students can benefit from educational endeavors. Modular units, computer stations, and hands on materials provide opportunities for the student that is less available to the student in the traditional educational setting. These studies show student ownership of the academic day generates an understanding of general math and science concepts because of integrating with technology education. Perkins (1992) stated "One of the discomforting disclosures of the past two decades has been the students' fragile grasp of many key concepts in science and mathematics. Students commonly display naïve ideas about things even after considerable instruction" pointed the researcher to integrating curriculum in the alternative school setting as an effective way to work with at-risk student populations.

More importantly, the alternative school in Dunn County gives the at-risk student at least one chance after episodes of unacceptable behavior that are in excess of what is tolerated in the traditional school. This is not to say that the students can get away with repeated poor behavior and academic performance. The at-risk student must agree to some predetermined academic standards and social interaction habits. Failure to meet academic criteria will result in termination of the student's enrollment. Physical violence toward anyone at the school facility will also result in termination of the at-risk student's enrollment. The school is open to the student's suggestions for curriculum and related activities. The school is holding a prom this year in response to the students desire to have one. The students are planning the operations and financing of the prom. This experience can be noted in the students' academic progress as independent work. Again, students' interest leads to motivation to carry through the project and complete the

requirements in contrast to abandoning the project and again repeating a record of failure academically and in the social setting.

Curriculum

The curriculum follows an open classroom model. The students have autonomy to contribute to their personal learning growth pattern. The curriculum is created with an immediate interest of the students' input. The concept of sub-boxes and what they do came up. Sub-boxes are enclosures that house the bass speakers. These enclosures are typically used in automobile sound systems. Automobile sound systems are popular with adolescents both while "cruising" and in competitions of automobile sound systems. The purpose of utilizing sub-box construction as a topic for a technology class is the deep interest to the participants. Peer involvement, desire to own and career directions are some of the motivations for the participants. Issues such as current sound technology, calculations of dimensions, and problem solving brought out a collaborative problem solving strategy for the participants. Some of the participants brought different skills that others utilized to their advantage. Credit was given for interaction, leadership, and mentorship in the class setting while engaged in the instruction unit. Homestead, McGinnis, & Pate, (1997, p.19) pointed out the effectiveness of bringing strategies such as collaboration into the integrated curriculum. Student involvement and ownership created responsibility to the class unit and students were more aware of their positive as well as negative contributions to the class and the resulting consequences. Students know what is expected of them as explained by the unit objective sheet they each have in their possession.

CHAPTER III
Methodology

Purpose of the Study

The purpose of the study was to measure the effectiveness of an integrated curriculum unit of study. The integrated unit consisted of a math and a technology education unit in a contextual format. Technology piqued the students interest to cause them to make an attempt at learning a unit of math that they had little interest in learning. It was in the context of technology that the students learned the math unit. The study was conducted at Lucas Charter School in the Menomonie Wisconsin school district. The effectiveness of the integrated unit was measured and documented by detecting differences between the pretest and the posttest scores. The results demonstrated the integrated curriculum has potential to improve overall learning by at- risk students in an alternative school environment. Students at Lucas Charter School are at-risk for not completing their high school education and literature indicates integrated curriculum units as an effective tool to reverse this event in some cases.

Subjects

The subjects for this study are students attending Lucas Charter School. They had the option of attending the Lucas Charter School voluntarily or as an alternative to juvenile detention in some security institution. Voluntary enrollment means that the student either would attend Lucas Charter School or be placed in some sort of supervised curriculum in the traditional school facility. Herbert, (1978, p.13) explained in greater detail that some ODD students need to participate in an intervention as some of them have a disposition to tend in the direction of incarceration in their futures.

Instrumentation

Instrumentation for this study included a pre-test/posttest instrument keyed for anonymity. Students performed eight fractional calculations for the pretest prior to the start of the class handouts and discussion. A posttest demonstrated the students ability to again perform eight fractional calculations after completion of an integrated unit of study that included wood technology and fractional measurement.

A secondary measure of the effectiveness of integrated curriculum was the score for the question of measurement on the wood technology exam. A lesson of measurement in construction, an assignment check off sheet for the student to measure their own progress in relation to the objectives, and tool safety exams formed the backbone of the course.

Two test instruments served as the pretest and the posttest differing only in numerical values. Difficulty and sequence remained the same. The purpose of using these like instruments was to serve as an indicator of the students proficiency of fractional computation. The pretest was used at the beginning of the course to measure the students level of ability to complete fractional measurement. The posttest was compared to the pretest to determine any increase in the basic proficiency level of fractional computation of the student.

Procedures

The procedure for this study was an implementation of the unit of study in the curriculum planner. Prior to beginning the class, a pretest was administered. A two-week unit on the construction of a sub-box followed. The students designed and constructed the sub-boxes to specifications they determined. A check-off sheet that indicated their

personal progress in the unit of study was used. The pretest measured their initial comprehension and ability to perform fractional computation and the posttest measured their comprehension and ability at the conclusion of the study.

Data Analysis

The data for this study is listed in the appendix section. The tabulated data results from the pretest and posttest instruments appear in appendix B. The pretest instrument provided a measure of the student's ability in fractional computation ability prior to the beginning of the integrated curriculum unit. The posttest provided a measure of the students ability of fractional computational skills after completion of the integrated math unit. The resulting scores indicate how many fractional computations the students can successfully complete. An appreciation of the students skill level was the indicator of the success of the integrated curriculum unit. The scores was treated as interval data. Correct responses are the descriptor of the measurement that indicates the rank of the students and the range in which their score lies. A final measurement was compared to the posttest data. This comparison of interest is the completion of the measurement question to the posttest completion level. These are the statistics of interest to this study.

Chapter IV
Data Analysis

Introduction

Chapter IV starts with a recap of the purpose of the study. This recap is followed by a presentation of the data. The data is analyzed and presented for preparation of the reader for the next chapter.

Purpose of the Study

The purpose of the study was to measure the effectiveness of an integrated curriculum unit of study. The integrated unit consisted of a math and a technology education unit in a contextual format. Technology piqued the students interest to cause them to make an attempt at learning a unit of math that up to that time the students had little interest in learning. It was in the context of technology that the students learned the math unit. The study was conducted at Lucas Charter School in the Menomonie Wisconsin school district. The effectiveness of the integrated unit was measured and documented by detecting any difference in scores between the pretest and the posttest. The results demonstrated the integrated curriculum has potential to improve overall learning by at-risk students in an alternative school environment. Students at Lucas Charter School are at risk for not completing their high school education and literature indicates integrated curriculum units as an effective tool to reverse this event in some cases.

Data Analysis

Research objective one was to determine the basic level of competence in math fractional computational skills prior to engaging in the integrated unit. Fourteen students scores were tabulated for the pretest, posttest and measurement exam results. This study

used the median measure of central tendency to determine what the overall ability of the class is prior to engaging the integrated unit. The study then utilized quartile deviation to discus the distribution of math fractional computational skill. The significance of the scores is to exhibit the range of abilities of the students in the integrated unit. Figure 1 illustrates the range of scores and the count indicates the frequency of the scores.

Figure 1.

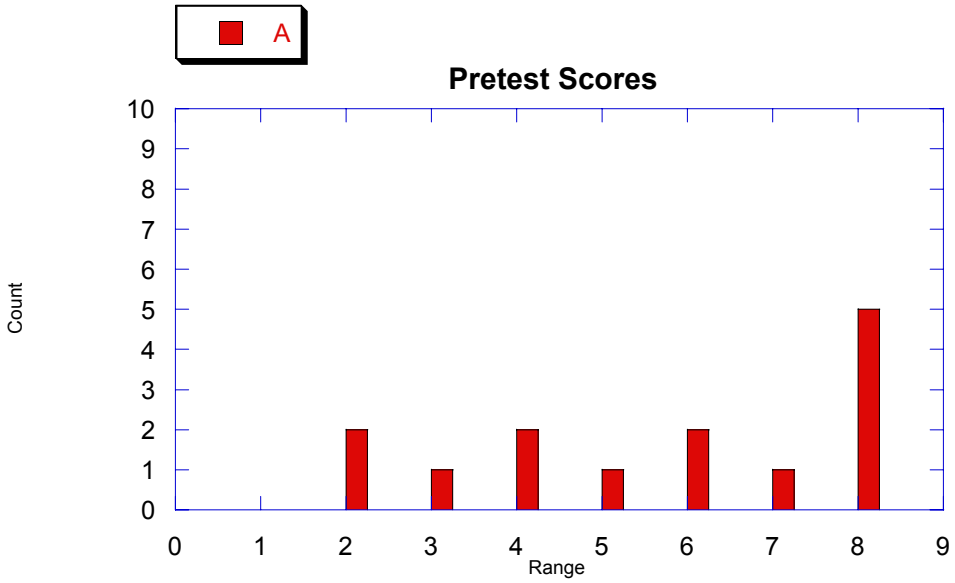


Figure 1. Range indicates possible scores on pretest. Count indicates number of students that attained respective scores. A indicates the pretest data.

The median score for the group was six correct responses. At least half of the class was able to achieve seventy-five percent or better on the pretest. Seventy-five percent achievement indicates approximately basic grade appropriate performance in fractional computation. The next measure of significance was the quartile deviations at the seventy-fifth percent level and the twenty-fifth percent tile deviation. Table 1-a illustrates the statistical data.

Table 1-a.

	A	B
Minimum	2	0
Maximum	8	8
Sum	79	89
Points	14	14
Mean	5.6428571	6.3571429
Median	6	8
Std. Deviation	2.3074176	2.7063215
75th. Quartile	8 correct answers	8 correct answers
25th. Quartile	3.5 correct answers	4 correct answers

The seventy-fifth percent quartile deviation is a score of eight correct answers and the twenty-fifth percent tile is a score of three and a half correct answers. The distribution of scores is negatively skewed. The range of the student's fractional ability charts from minimal to grade appropriate. The distribution illustrates actual ability of the students.

Research objective two was to determine the basic level of competence in math fractional computational skills after participating in the integrated unit. This study used the median measure of central tendency to determine what the overall ability of the class is prior to engaging the integrated unit. The study then utilized quartile deviation to discuss the distribution of math fractional computational skill. The significance of the

scores is to exhibit the range of abilities of the students in the integrated unit. Figure 2 illustrates the range of scores and the count indicates the frequency of the scores.

Figure 2.

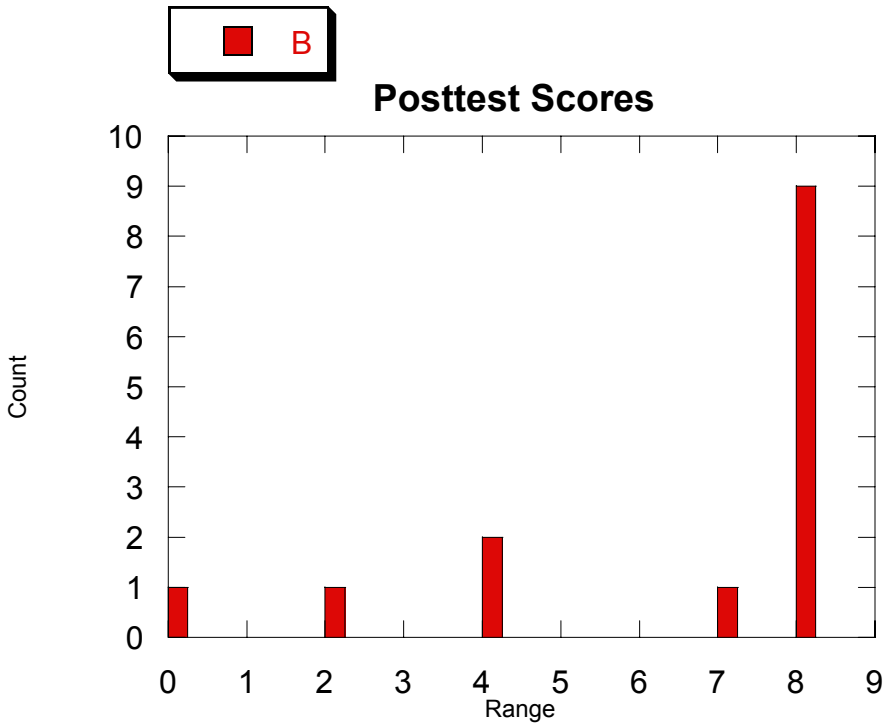


Figure 2. Range indicates possible scores on posttest. Count indicates number of students that attained respective scores. B indicates the posttest data.

Fourteen students scores were tabulated for the posttest graph. The median score for the group is eight correct responses. At least half of the class was able to achieve seventy-five percent or better on the pretest. The next measure of significance is the quartile deviations at the seventy-fifth percent level and the twenty-fifth percent tile deviation. Table 1-b illustrates the statistical data.

Table 1-b.

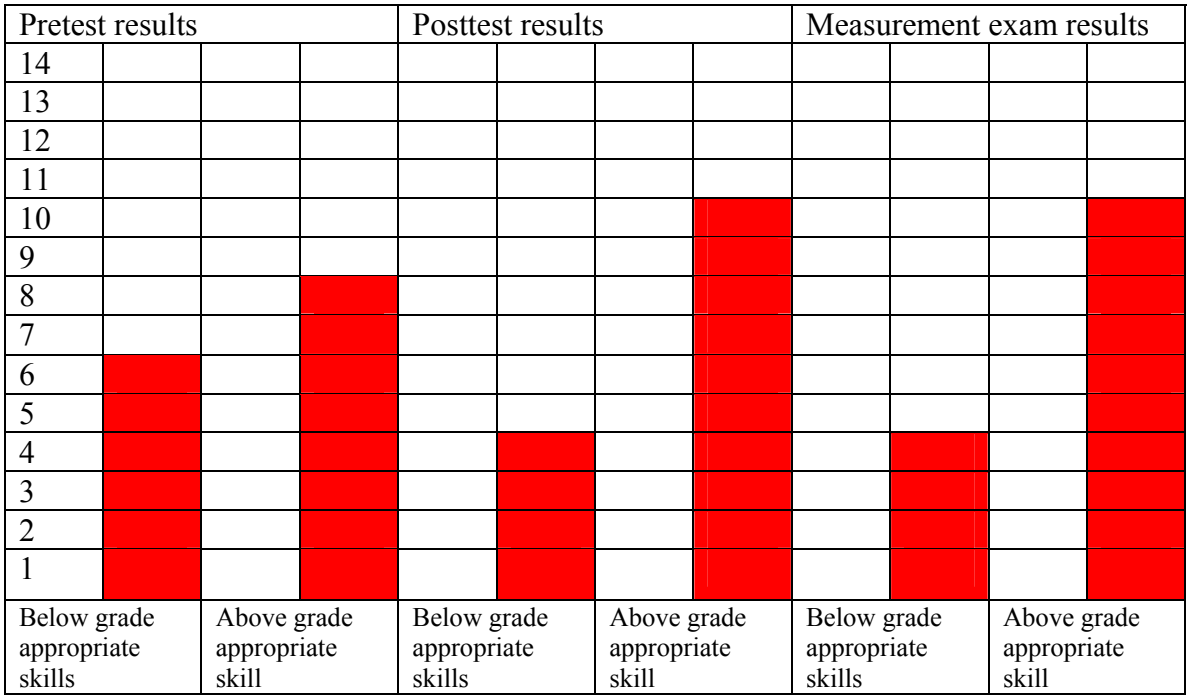
	A	B
Minimum	2	0
Maximum	8	8
Sum	79	89
Points	14	14
Mean	5.6428571	6.3571429
Median	6	8
Std. Deviation	2.3074176	2.7063215
75^{th}. Quartile	8 correct answers	8 correct answers
25^{th}. Quartile	3.5 correct answers	4 correct answers

The seventy-fifth percent quartile deviation is a score of eight correct and the twenty-fifth percent tile is a score of four correct. The distribution of scores is negatively skewed. The range of the student's fractional ability charts from minimal to grade appropriate. An important trend to note is the increase in grade appropriate skill level. The distribution illustrates actual ability of the students.

Research objective three was to measure the students level of achievement by the completion of the unit. The data was collected from the measurement question on the exam. The students ability to calculate a fractional measurement is tested by either a correct answer or an incorrect answer. The data measured for this objective is the data measurement on the scores sheet. This study looked at the results of the measurement

question completion rate and that data of the posttest score. This study treated this data as nominal data for the reason that completion of the measurement question was strictly one of being able to complete the measurement or not. The question incorporated several of the principles used to create the pretest and the posttest. The students ability to complete the measurement question was compared to the scores of the posttest. Figure 3 illustrates data from the pretest, posttest, and the measurement exam.

Figure 3. Pretest, Posttest and Measurement Exam Data.



Results of the measurement exam indicate ten students successfully completed the measurement question. Two students incorrectly answered the question and two students did not submitting an answer. Scores above 75% correspond to above grade appropriate skills and scores below 75% correspond to below grade appropriate skill. The incorrect responses and the unsubmitted responses were combined as ability below 75% or better.

Data for the posttest indicated that ten students achieved 75 % on the posttest, four students did not achieve 75% on the posttest and zero students failed to submit an answer for the posttest. Data from the measurement exam and the posttest appear identical and are compared to the ability level of the data from the pretest. The study compared these data sets as nominal level data. Submission of a correct response corresponded to a 75% or better score since the standard deviation incorporates a score of seven or more correct responses within the 1st standard of deviation. Submission of one correct answer on the exam measurement question indicated knowledge of fractional computation.

Chapter V
Summary, Conclusions and Recommendations

Introduction

This chapter includes the summary, conclusions and recommendations of the study. The chapter starts with a restatement of the statement of the purpose. A brief review of the methodology, which includes subject, instrumentation, procedures, and data analysis, will follow. Conclusions follow, succeeded by recommendations that pertain to the research objectives. Recommendations for revising the research method followed by this study and interacting with the at-risk population of this study follow in the summary.

Summary

The purpose of the study was to measure the effectiveness of an integrated curriculum unit of study. The integrated unit consisted of a math and a technology education unit in a contextual format. Technology piqued the student's interest to cause them to make an attempt at learning a unit of math that up until that time the students had little interest in learning. It was in the context of technology that the students learned the math unit. The study was conducted at Lucas Charter School in the Menomonie Wisconsin school district. Learning effectiveness was measured by detecting the difference between pretest and post-test scores. The results demonstrated the integrated curriculum has potential to improve overall learning by at-risk students in an alternative school environment. Students at Lucas Charter School are at risk for not completing their high school education and literature indicated integrated curriculum units as an effective tool to reverse this event in some cases. Sixteen students enrolled in the course and chose not to participate in certain exams. This is part of the reality of educating students with ODD. The data taken for the study was accumulated from students that completed the

pretest, posttest and measurement exam. The study portrayed a meaningful conclusion for the effectiveness of integrated curriculum units in this setting and environment.

Research Objectives

There are three research objectives for this study. They were:

1. To determine the level of basic competence in math, science and technology education skills prior to engaging in the integrated unit.
2. To determine the level of basic competence in math, science and technology education skills after participating in the integrated unit.
3. To measure students level of achievement by the completion of the unit.

Subjects

The subjects for this study are students attending Lucas Charter School. They had the option of attending the Lucas Charter School voluntarily or as an alternative to juvenile detention in some security institution. ODD students need to participate in an intervention as some of them have a disposition to tend in the direction of incarceration in their futures (Herbert, 1978).

Instrumentation

Instrumentation for this study included a pre-test/posttest instrument keyed for anonymity. This instrument demonstrated the students ability to again perform eight fractional calculations after completion of an integrated unit of study that included wood technology and fractional measurement.

A secondary measure of the effectiveness of integrated curriculum was the score for the question of measurement on the wood technology exam. The purpose of using these similar instruments was to serve as an indicator of the students proficiency of fractional computation. The posttest was compared to the pretest to determine any

increase in the basic proficiency level of fractional computation of the student. And this data was compared to the correct completion of the measurement question on the exam.

Procedures

The procedure for this study was an implementation of the unit of study in the curriculum planner. Prior to beginning the class, a pretest was administered. A two-week unit on the construction of a sub-box followed. The students designed and constructed the sub-boxes to specifications they determined. A check-off sheet that indicated their personal progress in the unit of study was used. The pretest measured their initial comprehension and ability to perform fractional computation and the posttest measured their comprehension and ability at the conclusion of the study.

Data Analysis

The data for this study is listed in the appendix section. The resulting scores indicated how many fractional computations the students can successfully complete. An appreciation of the students skill level was the indicator of the success of the integrated curriculum unit. Correct responses were the descriptor of the measurement that indicated the rank of the students and the range in which their score lies. A final measurement of the students correct completion of the measurement question was compared to the posttest data. These are the statistics of interest to this study.

Conclusions and Recommendations

Research objective one was to determine the basic level of competence in math fractional computational skills prior to engaging in the integrated unit. The median score for the group is six correct responses. At least half of the class was able to achieve seventy-five percent or better on the pretest indicating a grade appropriate to basic

fractional computational ability. The ability levels dwindle quickly in uniform ability level. Student scores diminish to two students achieving two correct responses.

At least half of the class was able to achieve seventy-five percent or better on the pretest. The seventy-fifth percent quartile deviation is a score of eight correct answers and the twenty-fifth percent tile is a score of three and a half correct answers. The distribution of scores is negatively skewed. The range of the student's fractional ability charts from minimal to grade appropriate. The distribution illustrates actual ability of the students.

Based on the data analysis it can be concluded that the students of diminishing ability have not acquired the skills to accomplish fractional computation to grade level. A host of factors contribute to the absence of the ability to perform these fractional computations as evidenced by the wide distribution of the scores that exists among this group.

Based on these conclusions it is recommended that pretesting a group of ODD students will give the teacher a good indication of the abilities of the ODD students participating in the integrated unit. The teacher can focus remedial work to students that exhibit a need for it while giving other students the opportunity to move through the unit at their own pace. Lucas Charter School will serve its students well by pretesting them in a context of integrated curriculum units that pique the student's interest.

Research objective two was to determine the basic level of competence in math fractional computational skills after participating in the integrated unit. The median score for the group is eight correct responses. More than half of the class was able to achieve seventy-five percent or better on the pretest indicating a grade appropriate to basic

fractional computational ability. The ability levels dwindle quickly. Student scores diminish to one student achieving zero correct responses.

The study then utilized quartile deviation to discuss the distribution of math fractional computational skill. The significance of the scores is to exhibit the range of abilities of the students in the integrated unit. The seventy-fifth percent quartile deviation is a score of eight correct and the twenty-fifth percent tile is a score of four correct. The distribution of scores is negatively skewed. The range of the student's fractional ability charts from minimal to grade appropriate. An important trend to note is the increase in grade appropriate skill level. The distribution illustrates actual increase in grade appropriate ability of the students.

Based on the data analysis it can be concluded that ODD students can be brought up to grade level appropriate ability if contextual integrated curriculum is presented to them. ODD students will find the means to overcome academic deficiencies to be successful if they perceive a need to. The ability to measure accurately with fractional computations and mechanical devices solidified the concepts of fractions and what these concepts were good for.

Based on these conclusions it is recommended that Lucas Charter School offer contextually relevant integrated curriculum to the students. Contextually relevant integrated curriculum starts with asking the students what is of interest to them. Their interest may carry them through difficult and ominous areas of learning such as fractions. The researcher encountered many instances of resistance to the math unit. These resistance episodes stemmed from the ODD prevalence among the group of participants.

A resolute plan and clear objectives that illustrated benefits to the students generally won them over to learning principles of fractional computation.

Research objective three was to measure the students level of achievement by the completion of the unit. This study looked at the mode and the range of the results of the measurement question completion rate and the posttest score. The students ability to complete the measurement question will be compared to the scores of the posttest. Ten students successfully competing the measurement question, two students incorrectly answered the question and two students did not submit an answer compared to ten students achieving 75 % on the posttest, four students not receiving 75% on the posttest and zero students not submitting an answer for the posttest. The researcher compared these data sets as nominal level data. Submission of a correct response corresponded to a 75% or better score since the standard deviation incorporates a score of seven or more correct responses with-in that first standard of deviation. Submission of one correct answer indicates knowledge of fractional computation.

Based on the data analysis it can be concluded that a higher percentage of students left the integrated unit of instruction with grade appropriate fractional computational skills than the percentage of students that entered the integrated unit of instruction with grade appropriate fractional computational skills. The increase in skill level corresponds to grade appropriate skill level.

Based on this conclusion it is recommended that Lucas Charter School implement integrated curriculum for at-risk students. The students see their own progress and achievement. This personal accomplishment can contribute to the overall effectiveness of the integrated curriculum. Students may work more effectively and not manifest their

ODD behavior at as high of an interference level towards their overall education. The integrated unit of instruction proved to be a useful vessel for success for the students participating at Lucas Charter School. Integrating Technology education with skills appropriate integrated units is a successful method of dealing with basic educational deficiencies. An integrated curriculum has the unique ability of addressing issues of the excessive range of educational achievement of individuals. A perceived ability deficiency contributes to a downward spiral of failure that results from educational settings that are not focused towards the ODD disorder. The curriculum can be built with consideration of their goals and their input for their intermediate steps along the path of a successful educational experience.

References

Barkley, R. A., (1997). *Understanding the defiant child: Program manual.* New York: The Guilford Press.

Drake, S. M., (1993). *Planning the integrated curriculum: The call to adventure.* Virginia, Alexandria: Association for Supervision and Curriculum Development.

Fogarty, R. (1991). *How to Integrate the Curricula.* Palatine, Illinois: IRI/Skylight Publishing, Inc.

Herbert, M., (1978). *Conduct disorders of childhood and adolescence.* New York: John Wiley & Sons.

Homestead, E. R., McGinnis, K. L, & Pate, P. E. (1997*). Making integrated curriculum work: Teachers, students, and the quest for coherent curriculum.* New York: Teachers College Press.

Jacobs, H. H. (1989*). Design options for an integrated curriculum.* In H. H. Jacobs (Ed.) *Interdisciplinary Curriculum: Design and Implementation* (pp. 13-24). Alexandria, Virginia: Association for Supervision and Curriculum Development.

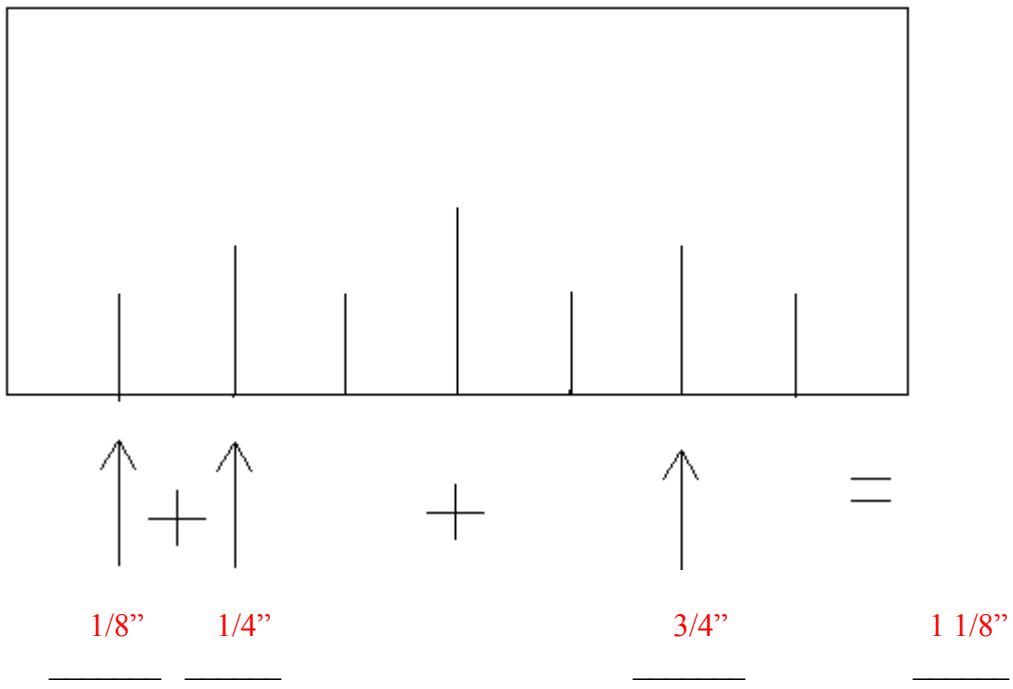
Kilkenny, J., (personal communication, September 18, 2000).

Riley, D. A., (1997). *The Defiant Child: A Parent's Guide to Oppositional Defiant Disorder.* Dallas: Taylor Publishing Company.

Appendix A
Measurement Exam

Measurement Exam Question

Directions: Add the following measurements. The arrow indicates the measurement.



Note. Numbers in red indicate the correct answer.

Appendix B
Student Scores

Student Scores

Student I.D.	Scores: Pretest	Posttest	Wood Exam	Completed Project
1.	6 wrong	no return	no return	no
2.	6 wrong	no return	no return	no
3.	6 wrong	6 wrong`	5 wrong	no
4.	4 wrong	0 wrong	2 wrong	yes
5.	2 wrong	0 wrong	2 wrong	yes
6.	0 wrong	0 wrong	2 wrong	no
7.	0 wrong	no return	7 wrong	no
8.	0 wrong	0 wrong	11 wrong	no
9.	0 wrong	0 wrong	11 wrong	no
10.	4 wrong	0 wrong	1 wrong	no
11.	0 wrong	0 wrong	11 wrong	no
12.	0 wrong	0 wrong	no return	no
13.	6 wrong	no return	no return	no
14.	2 wrong	no return	1 wrong	no
15.	1 wrong	1 wrong	14 wrong	no
16.	1 wrong	no return	no return	no
17.	5 wrong	4 wrong	15 wrong	yes
18.	5 wrong	no return	no return	no
19.	2 wrong	0 wrong	no return	no
20.	7 wrong	no return	no return	no
21.	0 wrong	no return	no return	no
22.	5 wrong	no return	no return	no
23.	7 wrong	no return	no return	no
24.	8 wrong	no return	no return	no
25.	3 wrong	4 wrong	17 wrong	no
26.	no return	no return	no return	no
27.	no return	no return	no return	no
28.	6 wrong	8 wrong	12 wrong	no
29.	no return	no return	41 wrong	no
30.	0 wrong	no return	4 wrong	yes

Appendix C
Pretest Exam

Wood Technology Evaluation and Assessment Instrument Pretest.

Directions: For each of the questions, select the correct response form among the four listed. There is only one correct response.

Student Number:_____

1. 1/4” + 1/2” =

a) 3/4”
b) 3/8”
c) 3/16”
d) 2/6”

2. 1/8” + 5/16” =

a) 5/24”
b) 6/8”
c) 7/16”
d) 6/24”

3. 2 1/8”+ 2 5/16” =

a) 4 7/16”
b) 5 3/8”
c) 5 6/8”
d) 4 6/16”

4. 1’ 1/4” + 2 1/2” =

a) 3’ 3/4”
b) 4’ 3/8”
c) 3’ 2/6”
d) 1’ 2 3/4"

5. 1’ 2 1/4” + 1’ 3 7/8” =

a) 2’ 6 1/8”
b) 2’ 5 7/16”
c) 2’ 6 1/16”
d) 2’ 6 1/4”

6. 5/8” - 1/4” =

a) 3/8”
b) 3/4”
c) 3/16”
d) 3/2”

7. 1 1/2” - 3/16” =

a) 1 5/16”
b) 1 5/8”
c) 1 2/2”
d) 1 2/16”

8. 1’ 2 3/16”- 1’ 1 1/4” =

a) 15/16”
b) 15/2”
c) 1/4”
d) 12/8”

Appendix D
Posttest Exam

Wood Technology Evaluation and Assessment Instrument Posttest.

Directions: For each of the questions, select the correct response form among the four listed. There is only one correct response.

Student Number:_____

1. 1/4” + 1/8” =

e) 3/8”
f) 3/4”
g) 3/16”
h) 2/6”

2. 1/4” + 5/16” =

e) 5/24”
f) 9/16”
g) 5/16”
h) 7/16”

5. 2’ 1/4”+ 2’ 5/16” =

e) 4’ 7/16”
f) 5’ 3/8”
g) 5’ 9/16”
h) 4’ 6/16”

6. 1’ 3/8” + 2’ 1/2” =

e) 3’ 3/4”
f) 4’ 3/8”
g) 3’ 2/6”
h) 3’ 7/8"

5. 1’ 2 1/4” + 1’ 3 7/8” =

e) 2’ 6 3/8”
f) 2’ 6 1/8”
g) 2’ 6 1/4”
h) 2’ 5 7/16”

6. 3/8” - 1/4” =

e) 3/8”
f) 3/16”
g) 1/8”
h) 1/2”

7. 1 1/2” - 3/16” =

e) 1 5/8”
f) 1 2/2”
g) 1 2/16”
h) 1 5/16”

8. 1’ 2 5/16”- 1’ 1 1/4” =

e) 1 1/16”
f) 1/4”
g) 1 3/8”
h) 12/8”