

The Academic Value of Hands-on Craft Projects in Elementary Schools

Submitted to the Hobby Industry Association by ROCKMAN ET AL
San Francisco, CA 2002

Acknowledgements

We gratefully acknowledge the extensive cooperation and support of the many people who have made this evaluation possible. We thank the staff and board members of the Hobby Industry Association, especially Susan Brandt and the project consultant, Anne Marie Santoro. We also thank the many teachers who participated in the study and their students who provided wonderful projects for us to assess. While these teachers and students must remain nameless, we owe them a substantial debt of gratitude.

We also want to thank the many researchers who helped collect and analyze the data that make up this report, including ROCKMAN ET AL staff. In the Northeast, we thank Shelley Isaacson, Katherine Schwinden, and Tammie Patten; in the Midwest, Lynn Clark, Jennifer Rodalfsky, Chris Matthews, Esther Kim, and in the West, Beth Rabinowitz, Erik Weiss, and Grace Hwang.

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Table of Contents

EXECUTIVE SUMMARY	ii
BACKGROUND	1
RESEARCH APPROACH AND METHODOLOGY	1
PRELIMINARY WORK	1
DATA COLLECTION INSTRUMENTS ...	2
Teacher Surveys	2
Student Surveys	3
Writing and Drawing Knowledge Application Tasks	3
Scoring Procedures	3
MAIN STUDY	3
FINDINGS	4
WHAT TEACHERS ARE DOING	4
Subject Areas	4
Hands-On Craft Projects and State and National Standards	6
INCORPORATING HANDS-ON CRAFT PROJECTS INTO CLASSROOM ACTIVITIES	7
LEARNING OUTCOMES: TEACHER AND STUDENT PERSPECTIVES	10
Teachers Perspectives on Student Learning	10
Student Learning Findings	13
Student Perspectives on Classroom Activities	15
DISCUSSION	17
ISSUES	17
Motivational Aspects of Hands-On Projects	17
Collaboration and Working on Hands-On Craft Projects	17
Teaching Units with Hands-On Craft Projects	17
WHY WOULD HANDS-ON CRAFT PROJECTS HELP STUDENTS LEARN? ..	18
CORE SUBJECT AREAS, STANDARDS, AND LEARNING STYLES	19
CONCLUSION	19
APPENDICES	A21

The Academic Value of Hands-on Craft Projects in Elementary Schools

During the fall of 2001, the Hobby Industry Association (HIA) contracted ROCKMAN *ET AL*, an independent educational research and consulting company, to study the impact of hands-on projects as an instructional method within the core curriculum. Additionally, the Hobby Industry Association wished to determine ways this teaching technique links to state and national education standards.

As the only large-scale study of its kind, and one of the first efforts to investigate the area of hands-on projects and academic learning, this study found that a significant number of teachers use hands-on craft projects linked to core curriculum content to advance standards-based learning. Teachers said that hands-on projects enhance the instructional process and help students learn both basic information and more complex ideas. Additionally, students develop important learning skills and the abilities to articulate complex ideas, to use appropriate and sophisticated terminology, and to integrate the ideas they have learned into their continuing learning efforts. This belief was confirmed by student data evidence collected in this study.

Data Collection and Methodology

The research involved 76 teachers, with average teaching experience of 14.2 years, and more than 1,600 students in Kindergarten through Grade 6 from public and private schools in urban, suburban, and rural communities.

Three types of data collection tools were developed:

- teacher surveys
- student surveys
- student knowledge application tasks, in which students, through writing and drawing, applied knowledge of what they had been studying to new, not previously studied, situations in order to measure their ability to apply or transfer knowledge

Key Findings

1. Teachers regularly use hands-on craft projects to teach the core subjects and link the projects to state and national curriculum standards.

Almost three-fourths (72%) of the participating teachers indicated that they explicitly and intentionally link their instructional units involving hands-on projects to state or national standards. In addition, writing, research and presentation skills are typically incorporated into the projects.

Teachers combine hands-on projects with a variety of other instructional activities when teaching an entire unit, and also give these hands-on projects a prominent role. When asked to break down instructional time among a variety of activities, teachers reported devoting the largest single portion of classroom time to the hands-on projects (30%), followed by direct instruction (20%) and class discussion (20%).

2. Student learning improves when classroom lessons incorporate hands-on craft projects.

Students who spent a greater proportion of their classroom learning time engaged in hands-on projects scored significantly higher on writing and drawing knowledge application tasks. In classes that spent almost half of instructional time on hands-on projects (48%), students scored an average of 83 out of a possible 100 on the knowledge application task. By comparison, students whose classes devoted a low percentage of class time to

hands-on craft projects (11.8%) scored an average of 75. The creativity and level of detail demonstrated by students on the application tasks also indicated that the hands-on projects left many students with vivid and lasting understanding of both facts and concepts.

Teachers said that hands-on projects help students understand basic ideas (90%) as well as broader concepts (86%), and 82% of teachers said that handcrafted projects help their students apply information in new or different situations. Eighty-five percent (85%) of the teachers surveyed also agreed that long-term hands-on projects give students a greater depth of understanding than more conventional instructional methods.

3. Students develop greater curiosity about the subject matter when hands-on craft projects are included.

Ninety-six percent (96%) of teachers agreed that students exhibit greater curiosity about the learning unit when hands-on projects are included in the instructional approach.

Teachers also reported significant differences in learning behaviors when students are involved in hands-on projects. They reported increases in student motivation, willingness to ask questions and volunteer information, enthusiasm, and attention to assigned tasks.

4. Teachers say learning through hands-on craft projects accommodates students with different learning styles.

While 46% of teachers viewed hands-on projects as an effective learning technique for all students, 54% said this approach is particularly well suited for students who learned more effectively in non-traditional approaches, such as visual or kinesthetic learners, slow readers or writers, or non-native English speakers.

5. Student behavior and socialization skills improve when hands-on craft projects are undertaken.

Teachers reported enhanced cooperation, responsibility, dedication, confidence, and time management skills when students participated

in hands-on projects. Eighty-five percent (85%) of the teachers said students work cooperatively in hands-on projects, while only 50% of the teachers said they do so in non-hands-on projects. On a 7-point scale, teachers observed greater cooperative behavior (5.8) and perseverance (6.4) by students during learning activities involving hands-on projects than they observed during learning activities without hands-on projects (4.5 and 4.1 respectively).

Thirty-five percent (35%) of students indicated that, of what they do in school, they are most proud of a hands-on project they created. This was followed by success on a hard test, selected by 28% of the students. Eighty-six percent (86%) of the students felt that sharing results with others is very or somewhat important.

Conclusion

The study suggests that hands-on projects are an effective means of teaching a standards-based curriculum and that students develop both a greater appreciation for and understanding of what they are learning.

Hands-on projects appear to function as learning anchors that organize and integrate various classroom-learning activities. Learning anchors ground the classroom community around a shared set of integrated goals and activities and help make aspects of what the students need to learn more visible and explicit in a way that abstract conceptual learning rarely does. Hands-on projects also facilitate productive socialization by having students work together on a common effort that yields a tangible product.

These active learning activities expand educational experiences beyond the traditional and passive practices of teaching and learning, by incorporating creation, expression, and presentation of ideas. These experiences, this study finds, result in students' greater ability to transfer skills and ideas to new contexts. By making the learning experience concrete, the dynamics of these learning anchors inspire students to enjoy learning, accomplish goals, take pride in their achievements, and persevere in their learning.

The Academic Value Of Hands-On Craft Projects In Elementary School

Background

During the fall of 2001, the Hobby Industry Association (HIA) contracted ROCKMAN *ET AL*, an independent educational research and consulting company with headquarters in San Francisco, California, to study how elementary school teachers use hands-on craft projects in the core subject areas. The specific research questions for this study evolved through our discussions with HIA board members, feedback from fellow researchers and classroom teachers, and observations of how hands-on craft projects were actually being used in the “real world” of elementary schools. The study focused on five main research questions:

1. To what extent are teachers using hands-on craft projects to teach core subject areas in the elementary school curriculum and linking these activities to state and national standards?
2. Do hands-on craft projects help motivate students, generate an interest in subject matter, and help them develop interpersonal skills?
3. How effective is instruction that incorporates hands-on craft projects, and under what classroom conditions do students learn best?
4. Are there certain student learning styles for which teachers feel hands-on craft projects are particularly well suited?
5. What characterizes the classroom environments in which teachers are using hands-on craft projects?

Although the discussion of the research findings below focuses on these five research questions, the general richness and creativity in how participating teachers are actually using hands-on craft projects will be briefly considered as well. We have interspersed brief descriptions of classroom hands-on craft

projects as a means of illustrating what we saw in the classrooms.

Research Approach and Methodology

Preliminary Work

To begin to frame this study, we reviewed the published professional literature on previous research in the field, where we really found no directly comparable studies. Knowing, then, that we would be to some extent charting new ground, we talked with professional colleagues who have expertise in project-based learning, arts and crafts education, elementary childhood education, and developmental psychology. Their feedback helped us to identify the range of roles and functions that hands-on craft projects play in teaching and learning, the kinds of instructional management procedures that are engaged when hands-on craft projects are introduced to the classroom, and the strategies that teachers use for assessing the products generated by students.

We recruited teachers for the study through personal contacts, referrals, direct fax and phone contacts to school principals, and even notices to electronic bulletin boards and listservs. Those teachers who responded filled out an online survey that asked them about their schools, their classrooms, and their use of hands-on craft projects. We had originally planned to have both an experimental and a control group, but, as we reviewed teachers’ information, we found no teachers for the control group—in other words, no elementary school teachers who did not use hands-on craft projects as an integral part of their instruction in the core subject areas. We asked teachers who volunteered to identify others in their schools who might serve as comparisons, but very few were nominated. Their colleagues, too, were engaged in using hands-on craft projects in their teaching.

As a consequence of this accidental finding—that the use of hands-on craft projects is pervasive in elementary schools—the design of the study was modified to focus on the

contextual and strategic characteristics of the projects used by teachers who ask students to engage in hands-on craft projects as part of instructional units.

Hands-On Craft Projects Bring Ancient Greece to Life: 6th Grade Social Studies, Indiana

Instructional Goal

To have children understand all facets of ancient Greece, ranging from the everyday life of a child, to warriors in battle, to influences on our modern society.

Why Hands-on Craft Activities?

Hands-on activities make the learning more enjoyable for the children. Also, for the individual projects, the children become "experts" on their subject that they then present to the class. It gives even the slowest students a great deal of self-worth to know that they are perhaps the most knowledgeable on their topic.

Standards

Sixth grade Social Studies standards deal with Ancient Greece and its contributions to modern society. They also deal with forms of government, way of life, etc. in Ancient Greece. The simulation, and hands-on craft projects dealing with the simulation, encapsulated these standards.

Vignettes

Nam-Joon does not speak any English, so he was able to present information in picture and model form. This allowed him to work at his own pace on his "specialty area," and then present without necessarily having to speak. In addition, Adriel has a severe learning disability where reading is almost impossible for him. This project as well allowed him to present information that played on his strengths.

Data Collection Instruments

The research team developed three types of data collection tools in the main phase of the study: (a) teacher surveys, (b) student surveys, and (c) student writing and drawing knowledge application tasks. Please see the Appendices for copies of these instruments.

Teacher Surveys

We developed two different teacher surveys. The first teacher survey was primarily a sign-up form completed by interested teachers, designed to obtain background information about teachers, their schools, and their plans for hands-on craft projects. We used this information to screen the applications and select the classes to participate in the main portion of the study. We chose classes based on the specific instructional units utilizing hands-on craft projects; the coverage of the four core elementary school subject areas (Language Arts, Social Studies, Science, and Mathematics); and a distribution of schools in rural, urban, and suburban areas from around the country.

Participating teachers completed the second teacher survey at the end of the instructional unit with the hands-on craft project. This survey asked for detailed information about the instructional unit in which the hands-on craft project was done. (Please refer to sidebars in the report for general information the teachers provided about their projects.) Items on the survey asked teachers about their:

- Instructional goals for the unit.
- Alignment with state or national standards.
- Implementation plans for the teaching unit and hands-on craft project.
- Beliefs about teaching strategies and student learning outcomes.
- Beliefs about teaching with hands-on craft projects.

Having learned from the initial survey how pervasive hands-on craft projects were in elementary classrooms in our sample, we

wanted to learn more about the instructional context for the hands-on craft projects and the role the hands-on craft project played in the overall unit. We also wanted to get teachers' observations on the role hands-on craft projects play in the social context of the classroom.

Student Surveys

We developed the student surveys not only to answer some of the same questions from the perspective of students, but also to gauge how much students were learning from activities that seemed to play so prominent a role in instruction. We created two main versions of the student survey, one for grades 3-4 and another for grades 5-6, that varied in length and wording. The student survey questions gathered information on what students learned about the instructional content, as well as about their interest, motivation, and attitudes about learning and about hands-on craft projects in school. Interested in learning how these attitudes might affect students' learning preferences and even extend beyond school, we also asked the fifth and sixth grade students questions about some out-of-school choices.

Writing and Drawing Knowledge Application Tasks

The primary gauge of student learning was a knowledge application task, asking students to apply the ideas they may have covered in the unit they conducted in their classroom that included hands-on craft activities. We developed six versions of the task, for the different subject areas being taught in the classrooms we had recruited. There were knowledge application tasks for Language Arts, History, Geography, Earth and Space Sciences, and a design-a-museum prompt for interdisciplinary projects. Depending on the topic studied, students were asked to describe, in words and pictures, a day in the life of child from a different historical period, life and adaptation in a particular biome or habitat, a journey through space, or the next scene in a character's life.

Each of these tasks asked students to apply knowledge of what they had been studying to a new, not previously studied, situation. The main research purpose of these tasks was to obtain a measure of students' ability to apply or transfer knowledge—a demanding task but an important measure of deeper learning.

We piloted the student surveys and the writing/drawing knowledge application tasks in four representative classrooms in three states, with approximately 100 children, and made revisions based on the feedback and information collected during the pilot-testing phase.

Scoring Procedures

The teacher and student surveys contained mainly numbered scale items. The majority of teachers completed their surveys online; the student surveys were entered into the computer manually. We developed scoring rubrics for the open-ended items on the student surveys, such as those questions that asked students what they had learned.

We also developed a detailed coding rubric for the writing and drawing tasks, and trained two raters in its use. The two raters coded approximately 10% of each other's responses; a statistical test showed no significant differences in the two raters' scores. The coding scores by the primary rater were used in the analysis of the writing and drawing task.

Main Study

From the 89 classes that were invited to participate in the main study, 76 teachers, teaching over 1600 students, submitted all required data. The main study group consisted of 18 (24%) Kindergarten to 2nd grade classes, 32 (42%) 3rd and 4th grade classes, and 26 (34%) 5th and 6th grade classes. Public school comprised the largest group (93%), private schools made up the remaining 7%. The school locations were 34% urban, 44% suburban, and 22% rural.

The data we analyzed for this report came from the surveys completed by all teachers, from the student surveys, from the drawing

and writing knowledge application task completed by students in grades 3 to 6, and from classroom observations. The teacher-specific data reported here is based on responses from all 76 teachers. Because the student instruments required a certain level of writing and drawing proficiency, we analyzed the primary student data from students in 46 classes in grades 3 to 6. For statistical and logistical reasons, the data reported for students is based on a representative sampling of 178 students from 24 classes that allow findings from the sample to generalize to the overall group of 46 classes in grades 3 to 6. Table 1 shows the grades and subject areas represented in the student sample:

Table 1. Number of Classes in Student Sample by Grade and Subject Groupings

Grades	Math/ Science	Language Arts/Social Studies	Total
3rd–4th	6	6	12
5th–6th	6	6	12
Total	12	12	24

All teachers participating in the study received a digital camera, as an incentive and as a means to collect pictures of the actual student hands-on craft projects.

In the sections that follow, we report the findings from our studies.

Findings

We present, first, the results of our surveys, observations, and interviews with teachers, followed by a review of the results from students. We review how teachers incorporated hands-on craft activities into their lessons and projects, what roles and values they assigned to these activities, how students assessed the importance and utility of the hands-on craft activities and the nature of the impact of hands-on craft activities on students. We then offer some ideas about the overall

project and the role of hands-on craft activities in the classroom, with some notes about further research that would extend our findings.

What Teachers Are Doing

Elementary school teachers around the country are successfully incorporating hands-on craft projects in the core elementary school subject areas of Mathematics, Science, Language Arts, and Social Studies.

Subject Areas

We found an impressive range of hands-on craft projects, being used by teachers around the country to teach Language Arts, Social Studies, Science, and Mathematics. The variety of topics involving hands-on craft projects was quite striking—Mexican celebrations, desert habitats, the Middle Ages, prime numbers and patterns in mathematics, astronomy and space travel—and the hands-on craft activities themselves were quite creative—Native American medicine masks, pictographs, clay pots, and story pouches; homemade kaleidoscopes, 18th century French forts, sand clay Saguaro cacti with spaghetti thistles, medieval embroidery, table models of the Jamestown settlement, clay animals being readied for Claymation. There was also a considerable range in the craft materials being used: we found students using not only more traditional craft materials such as paper, paste, and paint, but also self-hardening clay, beads, feathers, Styrofoam, Popsicle sticks, uncooked spaghetti, papier mâché, synthetic moss, wax for homemade candles, and “found” or recycled materials. Below are more in-depth descriptions of representative subject areas and hands-on craft projects from the study:

- 1st grade Social Studies and Language Arts in Vermont: Students in the Native American Unit learned about communication tools used by Native Americans (pictographs); created story pouches about Native American life and their appreciation and reverence for their environment; created Moon Journals to describe phases of the

moon; engaged in an Image-Writing process of writing poetry and creating collages about aspects of Native American culture and life. See what follows for a picture of the Native American story pouches.

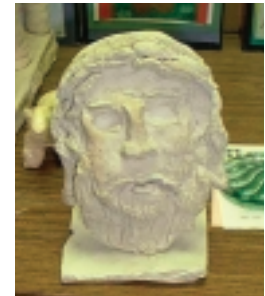


■ 4th grade Social Studies in California: Students did research on how to run a business, and then in pairs created a business for the classroom Mall. They designed a product or service, did market research to see if it would be desirable to clients (3rd grade students in another class), wrote a business plan, created and published an advertising flyer, produced enough items for 100 customers, created signs and displays for their "store," leased space from the Mall, and ran their business for a day.

■ 5th grade Mathematics in Massachusetts: Students learned the basics of number theory (such as place value, factors, multiples, prime and composite numbers, even and odd numbers, square numbers, greatest common factors, and least common multiples). The hands-on craft project involved constructing a pop-up report that consisted of a free standing model building made of tag board and paper that unfolded into four individual rooms. Each room had two walls and a floor, which the children "decorated" according to a mathematical theme of their "Special Number."

■ 5th grade Science in Missouri: Students learned about the biomes of the world and constructed an accurate map of biomes with labels and drawings. The students used technology to research the biomes of the world and wrote a report. They also built models of specific biomes.

■ 6th grade Social Studies in Indiana: Students learned about ancient Greek culture and history with hands-on craft projects that included constructing a model of the Acropolis; making Greek clothing, weaponry, and armor; creating sets for Greek plays; and completing a final self-selected project about a topic related to ancient Greece. Students also constructed a head of Zeus and examples of Greek coins. See what follows for pictures of coins and the head of Zeus.



We found examples such as these in all four regions around the country. The hands-on craft projects ranged from reasonably simple (such as making Thanksgiving turkeys and pilgrims) to quite sophisticated (such as the ancient Greece craft projects) yet they all shared a common theme of being linked to information and concepts being studied or to the development of academic skills such as reading and writing. In a number of cases, teachers were using hands-on craft activities not only to introduce content to students, but also to help them learn that content more deeply.

As can be seen in Figure 1, below, there were more hands-on craft project classes in Language Arts and Social Studies (44 out of 76 or 58%) than in the Math and Science (32 out of 76 or 42%)¹. The lower numbers in Language Arts could be explained by the fact that teachers often integrate Language Arts

¹ This study was not designed to collect data from a random sample of all elementary schools in the country and so our data may or may not reflect the extent to which hands-on craft projects are being used in core subject areas in the majority of U.S. schools. We are researching only classrooms that use hands-on craft projects and sampling from among those. We have not made comparisons with classrooms that do not use hands-on craft projects or use them sparingly. We are looking at the effects of hands-on craft projects. We do believe we portray a representative view of the ways that hands-on activities are used and the kinds of impacts they have on teachers and students.

into other subjects, especially Social Studies. When we asked participating teachers if they included writing in their units, all said they did; data from students and teachers confirm that teachers also incorporate presentation skills in projects. The data also suggest that over half of the teachers (60%) find that some subjects work better with hands-on craft activities than others. Math may be a good example: although those teachers who chose to use hands-on craft projects to teach Math addressed sophisticated concepts and did so in creative ways, there were fewer of them. For the purpose of statistical analysis, we grouped the Math and Science classes into a Math/Science group (n = 32) and the Language Arts and Social Studies classes into a Language Arts/Social Studies group (n = 44).

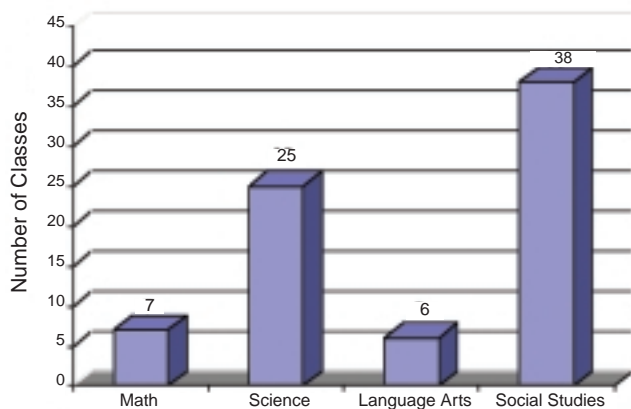


Figure 1. Number of Classes in Core Subject Areas

Teachers explicitly link the hands-on craft projects units to state and national curriculum standards.

Hands-On Craft Projects and State and National Standards

Given the importance of state and national curriculum standards and subject matter frameworks in the present educational climate, one of the main research questions of this study focused on the relationship between the hands-on craft projects and curriculum standards. We found that almost three-fourths of the participating teachers (55 out of 76, or

72%) indicated that they explicitly and intentionally linked their instructional units involving hands-on craft projects to state or national standards.

Another important research question concerned the match between hands-on craft projects and specific learning styles. On the follow-up teacher survey, we asked teachers if they agreed that hands-on craft projects were particularly well-suited to students with certain learning styles, and if so, to explain. We found that just over half of the teachers (53%) agreed that hands-on craft projects were suited to certain learning styles. Teachers in this group noted that:

“Students who have a hard time reading and writing can learn through producing a product. Kinetic learners need to demonstrate their learning in a more active way.”

“There are many different strengths children bring to their own learning. For those children who have trouble listening or remembering what they hear, hands-on craft projects provide a concrete picture of what we are trying to learn.”

“Kinesthetic and visual learners really benefit. They are much more apt to transfer their expertise and enthusiasm to reading and writing activities after having experienced the concepts with their eyes and hands.”

A large percentage of teachers (40%) disagreed with the statement, not because hands-on craft projects do not accommodate certain learning styles but because they are appropriate for all students. Teachers noted that:

“I feel that hands-on craft activities are beneficial for all learners. While those who face challenges in their literacy learning have the opportunity to succeed in another “forum,” strong academic learners benefit from using totally different criteria by which to express themselves.”

“I felt like all my students benefited from these experiences, in different ways. Some

of them might be able to do hands-on craft projects easier than other types of work, if that is what you are getting at. But every one of them got something out of it, whether from the actual project itself and working with the materials, or from designing the project.”

“I think all students benefit from hands-on craft projects. Certainly there are those who have a stronger artistic ability but everyone can be proud of something they make themselves. Students who may have other learning styles benefit too because they are challenged to excel in other areas.”

While teachers seem divided in their beliefs about whether hands-on craft projects suit some learning styles better than others, it is important to note that even teachers who agreed that some students would benefit more than others, still used hands-on craft activities with their entire classes. If hands-on craft projects were only effective with specific learning styles, then one would expect to find only students with those specific learning styles engaged in hands-on craft projects. This is clearly not the case in any of the classes involved with this study. Overall, this suggests that while hands-on craft projects seem particularly engaging for students who might not be as successful in other types of instructional approaches (e.g., “visual” or “kinesthetic” learners), there is value in involving all elementary aged students in hands-on craft activities.

Incorporating Hands-On Craft Projects into Classroom Activities

In order to understand how hands-on craft projects might add value to student learning, we explored how teachers are incorporating hands-on craft projects into their instructional units and into their classroom environments. Each classroom is a unique environment created by the teacher and his or her students. As noted above, the hands-on craft activities were elements in projects covering a wide range of curriculum and instructional content.

Native American Studies; 3rd Grade Social Studies

Instructional Goal

- Teaching students about the Vermont Iroquois Native American Tribes, and their culture and traditions
- Familiarize students with Iroquois arts (ceramics, stick weaving, wampum necklace patterns; creating pictographs and designing animal hide drawings)
- Examining the tradition of oral story-telling by reading Iroquois legends and having them create story pouches that contain special "treasures" to use to inspire story-telling

Why Hands-on Craft Activities?

I chose to incorporate hands-on activities into this unit as the Native American culture and traditions are so rich with a wide variety of the arts, that it was a great opportunity to engage third graders in "hands-on" learning opportunities that I thought would enhance their learning.

Standards

Links to Vermont state curriculum standards for Social Studies and Language Arts.

Vignettes

One student has great difficulty with his fine motor skills, particularly in reference to writing. Working with other mediums, such as clay, and yarn weavings, provided other forms of self-expression that proved to be much more rewarding for him.

A few children in my class are very young, and have emergent literacy skills. Using pictographs to express stories and story pouches to re-tell or create a story provided alternative activities for them, in which they could "succeed" without being proficient readers and writers.

Depending on a complex array of considerations, teachers assigned projects of varying styles, difficulties, and durations. Our findings suggest that teachers generally see hands-on craft projects as an integral part of instruction—not as peripheral activities included just because they are fun for students—and give students ample classroom time to complete hands-on craft projects. Teachers' responses to a series of questions about operational matters indicate that:

- The median duration of the instructional units involving the hands-on craft projects was three weeks with four class periods per week devoted to crafts.
- In three-fourths of the participating classrooms (74%), students did their hands-on craft activities primarily at school; 22% worked on them both at home and at school; and 3% did them exclusively at home.
- Parents were only moderately involved with the hands-on craft projects: in 47% of the classrooms, teachers report that parents were not involved at all; in 25%, parents helped students obtain materials; in 15%, they helped with hands-on craft projects done at home; and in 12%, they assisted at school.

- In approximately half of the classrooms (49%), students worked on hands-on craft projects both by themselves and as part of a group; in 41%, students completed their hands-on craft projects as individual projects; in 9%, students did only group projects.

The following illustrate some of the strategies teachers used to group students:

- Some teachers had students work on their project at home as well as in school. While sometimes students reported (and teachers reported that the products reflected) that parents assisted, most often the assistance was in the procurement of craft materials to accomplish the assignment.



“The [take home] projects were very impressive and had obvious parental support,” explained one teacher. This teacher challenged students to work on the next project only in class. “These in-class projects were more modest, but the students took great pride in them.” Working in groups, students created a 3-D box illustrating a specific biome. Students were encouraged to use many different craft materials to create their boxes (sand, pipe cleaners, tree branches, cellophane, clay, glitter, model animals, silk leaves, etc.), but could only use the materials that were already in the classroom. “Each biome group was assembled according to interest,” noted the teacher. “Students chose the biome that interested them, not their friends.”

By limiting the project to time in class, students were compelled to work together. This also proved to be a challenge. Because students were used to working on projects not only at home, but also on their own, several groups became mired in arguments resulting from trying to accomplish their goal. As one student pointed out, the arguments were about “lots of silly stuff. Like who was going to use the pens, glue.” Eventually, students learned to work out their differences and seemed happy with the final project. “By the time we stopped arguing we pretty much got it all together.” As a result, the in class project provided an opportunity for both academic and affective growth.

- In other classrooms, groups of students each completed a section of a larger hands-on craft project. The collaboration, like a jigsaw, permitted students to see how their individual efforts contributed to a larger accomplishment.



“The cardboard was divided into fourths, and we divided the children into groups of 4. Each group had to decide how what they created would work and fit together with the other groups. We painted the cardboard, and we put the village together. Then we decided where the colonists’ house and the blockhouses would be and what each of them would have.

This is Jamestown. We have the Chesapeake Bay up there, so we decided that we really didn’t need to paint the ocean. So I’m in the ocean right now.”

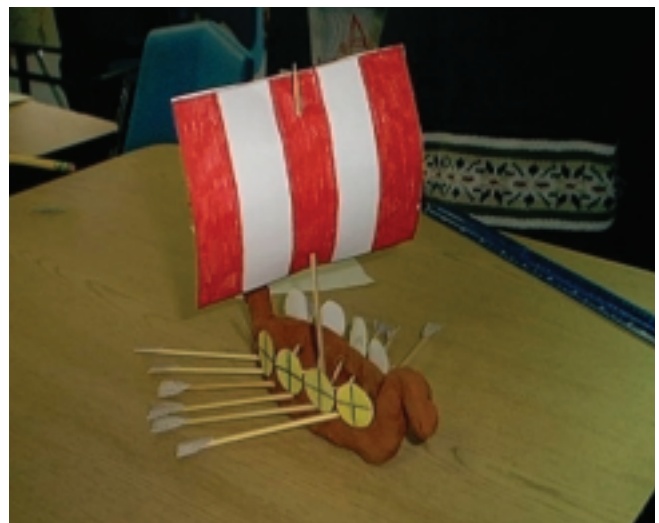
4th grade Teacher

- In some classes, all students worked to create the same craft product. This approach permitted teachers to see how students followed directions, while at the

same time, offered each student a chance to explore his or her creativity within a set of common constraints.

The hands-on craft activity is related to a unit on the Vikings in my 3rd grade of 17 students. We are each going to build a small model of a Viking longship to reinforce knowledge of the Vikings’ remarkably far-reaching abilities in plunder, trade, and adventurous exploration. This follows up a related map coloring project they’ve already completed.

The project will involve (1) design and manufacture of card-stock sails, shields, and oar-blades; (2) manufacture of the hull from brick colored Sculpey clay; and (3) mounting of sails and oar-blades on skewer sticks. Ship size is intended to be under 7" in length overall.



Teachers not only combine hands-on craft projects with a variety of other instructional activities when teaching an entire unit, but also give hands-on craft projects a rather prominent role. When we asked teachers to break down instructional time among a variety of activities, we found that they devoted the largest single portion of classroom time to the hands-on craft projects, followed by direct instruction and

class discussion. Figure 2, below, shows the percentage of time reported by the teachers on the following: Direct Instruction, Classroom Management, Class Discussions, Hands-on Craft Project, Non-Hands-on Academic Work, Assessment, or Other. (The profile of how these teachers integrate hands-on craft projects with other instructional activities is interesting, as we will see below when we discuss the findings related to learning outcomes.)

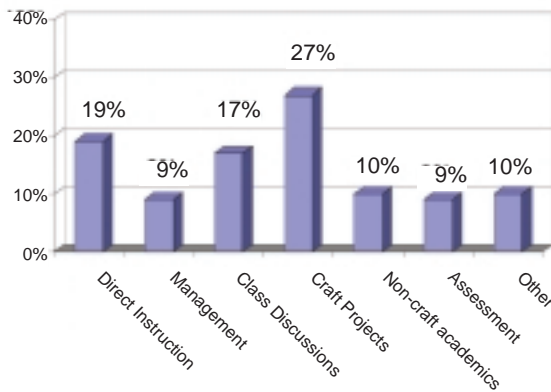


Figure 2. Percentages of Time Spent in Different Instructional Activities.

Learning Outcomes: Teacher and Student Perspectives

In this section, we discuss the findings related to student learning, from the perspectives of both the teachers and the students. We also consider the relationship between these two perspectives, noting instances in which the data we collected on student learning is consistent with the perceptions of student learning articulated by the teachers.

Teachers use hands-on craft projects to enhance both student conceptual understanding and to hone student writing, research, and presentation skills.

Teachers' Perspectives on Student Learning

On the follow-up survey, we asked teachers to indicate, on a 7-point scale that ranged from "not at all" to "a lot," their level of agreement with a series of statements about how well hands-on craft projects helped students

academically, and how they contributed to certain social skills.

The questions addressed students':

1. Grasp of both basic information and broader concepts
2. Willingness to volunteer information and ask questions
3. Motivation
4. Interest or curiosity about what they learned
5. Ability to apply knowledge

What we found was that teachers generally believed that hands-on craft projects helped students in all of these areas. For example:

■ Teachers believe that hands-on craft projects help students understand not only basic ideas and information but also broader concepts and ideas. Almost all of the teachers (90%) selected the top three levels of agreement when asked if hands-on craft projects helped students understand basic ideas and information; only slightly fewer, 86%, selected the top three levels of agreement when asked if hands-on craft projects also helped students understand broader ideas and concepts. (See Figures 3 and 4 below.)

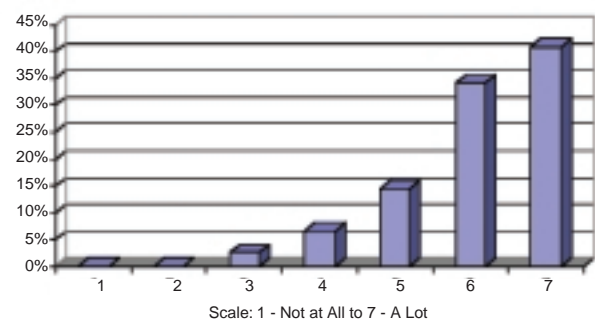


Figure 3. Hands-On Craft Projects Help Students Understand Basic Ideas and Information

Our purpose in asking these questions was to explore teachers' perceptions of what role hands-on craft projects play in their instruction efforts. They clearly see hands-on craft activities as a means of getting the concepts

and ideas of the unit across to all students. Through the use of hands-on efforts to portray, in concrete form, some of the elements of the lessons, students grasp the important elements.

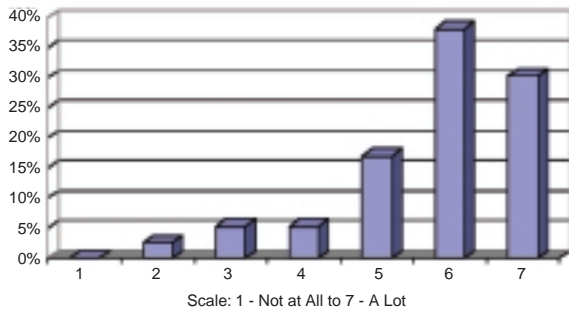


Figure 4. Hands-On Craft Projects Help Students Understand Broader Ideas & Concepts

Teachers also believe that hands-on craft projects helped their students apply information in new or different situations; here, 82 % picked the top three levels of agreement (see Figure 5).

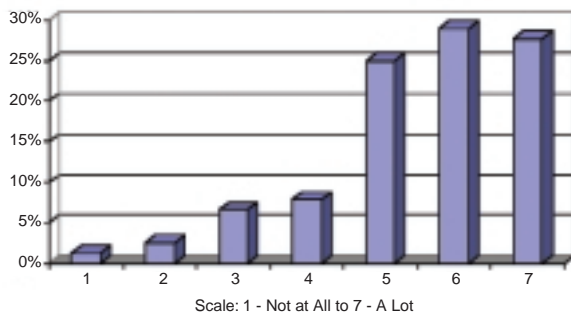


Figure 5. Hands-On Craft Projects Help Students Apply Knowledge Learned in New Contexts

They believed that, because students could externalize some of the ideas in the instructional unit, children could also take the ideas and apply them in other settings. The teachers saw this as an important benefit of the hands-on craft activity, and as a means of extending the lesson to new areas.

In a related series of questions that asked teachers to compare instructional units that

included hands-on craft projects to those that did not (but taught the same content), we asked teachers if they believed students developed greater curiosity about the instructional unit when hands-on craft projects were included. Again, levels of agreement speak to teachers' positive beliefs about the instructional value of hands-on craft projects—96% of the teachers picked the top three levels of agreement for this item.

We also asked teachers general questions about the role of hands-on craft projects in teaching important subject matter. They believe that hands-on craft activities are not only critical to learning, but that enjoyment of hands-on craft activities in schools and learning are not incompatible. The vast majority of teachers (93%) agreed with the statement “It is possible to both cover the material and do projects involving hands-on craft activities.” In a related question about the value of hands-on craft projects for learning, 85% of the teachers also agreed that long-term projects give students a greater depth of understanding than more conventional instruction. About two-thirds of the teachers disagreed with the statement that “Hands-on craft activities are fun but they do not always help students learn content deeply.” In the upper grades, teachers were also using hands-on craft projects to help students to develop problem-solving skills.

The final teacher survey item we discuss in this section concerns the extent to which writing was involved in the major student products for the instructional unit. We gave teachers the following list of ways writing could be incorporated. The percentages of teachers selecting each one follow each statement, and indicate that teachers put a strong emphasis on integrating student writing directly into the preparation for the craft project or for the actual craft project itself.

In addition to using hands-on craft projects to introduce basic concepts, deepen students' understanding of particular content, or understand other times and other cultures, teachers were also using hands-on craft projects to teach problem-solving skills. In one 6th grade class, with only 16 sheets of paper, 12 paper clips, 8 thumbtacks, 24" of tape, 10 rubber bands, and one marker, students had 30 minutes to make a model of a temple on top of an acropolis. In this case, the teacher incorporated the problem-solving exercise into a longer-term project about Greek history and culture.



In another 6th grade class, the teacher engaged students in a problem-solving activity as part of a longer design technology project. Students learned about bridge construction from handouts, viewing an episode of David McCauley's PBS series on structures, and trying out a prototype. They then designed their own suspension or truss bridge out of straws, tape, thread, paper clips, and/or straight pins, and tested the strength of the Thibridge using pennies.

Writing a report or story was a necessary part of the final student product:	56%
Writing was involved in planning the craft product, but was not part of the actual final craft product:	20%.
Writing a report or a story was one of the options for a student product:	8%
Writing was not involved in this unit:	0%
Other:	16%

Site visits confirmed that teachers typically incorporate writing into their units. In one first-grade classroom, students' poems about cacti and desert biomes decorated the room. In another classroom, again first grade, there were several books of drawings and poems that students had done in relation to their units; the teacher had laminated and bound these so that the students could read them later in the year.

They also wrote plays about Greek myths; different groups did different myths:

...We did the Greek play about ... the weaving contest. One student told the story of Narcissus, in love with his own image. The researcher asked if they had then used the word "narcissistic." A number of students said they now liked to use that word; [the teacher] confirmed that it shows up in various kinds of writing.

Overall, the picture that emerges from these responses is that teachers believe that hands-on craft projects can not only help students learn important subject matter but also develop the skills and curiosity that will help them extend that knowledge. Further, as the children collaborate with one another and present their accomplishments to others—including parents—they develop the ability to articulate complex ideas, to use appropriate and sophisticated terminology, and to integrate the ideas they have learned into their continuing learning efforts.

In addition to content learning gains, responses to other items on the teacher survey indicate that the experienced teachers who participated in this study (average teaching experience was 14.2 years) believe that students gain other affective and social skills when hands-on craft projects are integrated into instructional units. We asked the teachers to reflect on differences

in student motivation, subject interest, cooperation, and perseverance during instructional units taught with hands-on craft projects versus those taught without hands-on craft projects, assuming the content was the same. Figure 6, on the following page, shows the average responses to these items for units taught with hands-on craft projects and for those taught without hands-on craft projects.

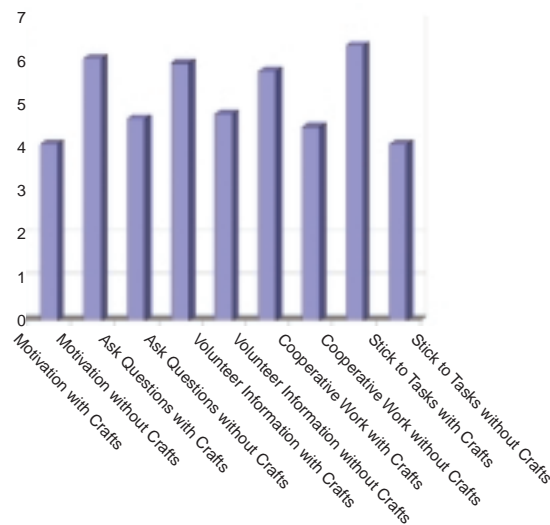


Figure 6. Mean responses to questions by teachers on student behaviors related to learning with hands-on craft projects and learning without hands-on craft projects.

It is clear looking at the chart that the mean scores for the learning behaviors are consistently higher with hands-on craft projects than without hands-on craft projects; these are also statistically significant differences for the pairs of items. Teachers have expressed their strong beliefs about the value that hands-on craft activities add to the instructional process and to students learning. Not only do they see students' improvement in learning, but also in how students are learning to learn, the evolution of learning skills, the processes needed to succeed in school.

Student Learning Findings

The previous section presented our findings about teachers' views on the value of hands-on craft projects for enhancing student learning. This section reports the data collected on student learning outcomes. The findings are

supportive of one another. To a great extent, what teachers saw and believed was consistent with what students reported about their efforts and accomplishments. Students' beliefs of the value of their participation in projects that included hands-on craft activities are in line with their instructors. But most importantly, there is clear evidence that students learned more as the hands-on craft activity took on greater importance in the instructional unit.

As discussed in more detail above, we collected data on student learning in two ways. The first was a short student survey, designed with age-appropriate questions and wording, that asked students about:

- their interest in various school subjects,
- their interest in doing hands-on craft projects,
- the important things they learned,
- an important school accomplishment, and
- out-of-school interests.

The second learning measure, also discussed above, was the writing and drawing task that asked students to apply knowledge they had learned to a new situation.

The learning responses on the student surveys were scored along three dimensions: the relevance of the response to the content studied; the specificity of information or concepts (in contrast to vague generalities); and the nature of the content listed (factual, conceptual, craft-related, or academic skill).

We found 84% of the responses were relevant to the content studied; that is, the students' responses reflected elements and information linked to the subject matter and the instructional approach taken by the teachers. We found that 76% of the responses contained specific or somewhat specific information about the curriculum and instructional content. Most of the ideas presented by the students, 92%, referred to factual information and what they had been studying. None of the responses listed craft

specific information (such as how to make a Greek sword), and none of the responses referred to general academic skills such as reading or writing. Students were very clear about what they had learned. The craft helped the students integrate their knowledge; it solidified the classroom learning experience.

Scorers assigned individual scores to the writing and drawing portions of the knowledge application measure, along with a holistic score for both. Each of these scores was highly and significantly correlated, so for convenience in this discussion, we will use the holistic score as a single measure. That is, we can assign a single score to represent the collective learning assessments. The average holistic score for the entire group was 78.6% out of the possibility of obtaining all of the highest scores on all elements of the knowledge application measures. This would have totaled 100% and was not a reasonable outcome given the variations among the students and their products.

In classes where teachers devoted a moderately large proportion of the instructional time to a hands-on craft project, students achieved significantly higher scores on a test that required students to apply what they had learned in a new context.

Given our interest in the relationships among student learning and various instructional activities—such as the percentages of time spent on direct instruction, class discussions, hands-on craft projects, and so on—we conducted a series of statistical tests to see if there were significant differences in the learning measures and the amount of instructional time spent in each of the learning activities. The main finding was that there were significantly higher student scores on the knowledge application task for those students whose classes devoted a higher percentage of class time (48%) versus a low percentage of class time (11.8%) to hands-on craft projects. (See Figure 7, above right.)

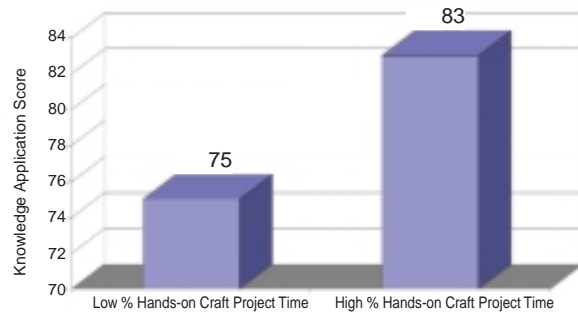


Figure 7. Holistic Scores of Writing and Drawing Task

Given the greater percentage of class time that was spent on hands-on craft projects in certain classes, the question may be asked if there were lower student scores on the other measures of student learning from the student survey. We found no significant differences in the student scores on the student survey learning items. This suggests that the high hands-on craft projects time students were learning similar content as their counterparts in the group that spent less time on hands-on craft activities.

The creativity and level of detail in what students actually wrote and drew also indicated that the hands-on craft activities left many students with vivid and lasting impressions of both facts and concepts. This seemed to be true across grades and subject matter. For example:

- In their descriptions of Pioneer Days museum exhibits, 3rd graders included weaving, candle-dipping, calico curtains, barrels with wooden nails, log cabins with mud and moss, and handmade toys—all things they had made during the unit. Drawing pictures of somewhat later pioneer life, other 2nd graders likewise depicted charcoal writing, pioneer games, and dunce caps for unprepared students in 19th century schools.
- 2nd graders portraying animals in their native habitats often used first person to put themselves in the place of the animal they

had just made of papiêr maché; many were very clear about predators, both what they ate and what ate them. The same age children, drawing volcanoes, were careful to label magma and recreate what they had just witnessed in their own “volcanoes” made of clay, food coloring, liquid soap, vinegar, and baking soda.

- One 6th grader who had worked on embroidery wrote as a young girl in the Middle Ages who, tired of painstaking needlework, disguises herself as a boy in order to train for knighthood. Another 6th grader who had studied the properties of light and made kaleidoscopes took visitors on a science museum tour that included demonstrations of reflection, refraction, and light waves.

The level of creativity and attention to detail of course varied across student samples, but each class had numerous examples like those described above. Teachers also commented on how eager most students were to write, draw, and share what they had learned when completing the prompts. What impressed researchers collecting data and administering and reviewing the learning prompts was the confidence and enthusiasm with which students stepped into the scene. Their responses showed a heightened awareness of sensory detail and an ability to identify with children, even animals, living in another time and place.

Teachers believe that when hands-on craft activities are part of a unit, students develop greater curiosity about the subject matter, gain confidence, take greater responsibility for managing their time, and are more cooperative in groups.

Before continuing with more findings from our student studies, it is worth commenting on the creativity of the teachers, too, for they often established the rich context for hands-on craft activities and encouraged innovation and exploration. They often supported risk taking and the personal attributes needed to attempt

new skills, persevere in working with materials, and linking the hands-on craft activities with the content and focus of their lessons. They focused on content, and the students had opportunities to explore the range of content in the lessons.

Student Perspectives on Classroom Activities

Just as their teachers do, elementary school students look at the work of school as encompassing much more than listening to a teacher speak and completing worksheets. For them, too, school includes creating things, working with others, presenting ideas to the class, and connecting activities over long periods of time. Given that craft activities go beyond the traditional and passive perceptions of teaching and learning, we wanted to see the full range of student interests and their responses to the tasks they are facing in the classroom. We asked students to respond to questions about what they enjoy about accomplishing schoolwork and what elements of the hands-on craft activities were the most engaging, successful, and productive for learning.

Students provided information about their learning experiences and the role of hands-on craft projects as elements in their workday. These students appear as active, engaged learners, who want to work with others in their classrooms and enjoy the social aspects of learning as much as the intellectual accomplishment of schooling. We also found that young children’s social interests go beyond small group work and include making presentations to their classmates about their ideas and products. These elements are also ones that the teachers identify as contributing to the learning that takes place and the transfer of skills and ideas to new contexts. The interplay of individual work, group work, and presentation result in more effective learning, according to the teachers, and they see the hands-on craft projects as an activity that brings many of these elements together. They especially see, as noted in the teacher section above, that hands-on craft projects can

be set up to facilitate productive socialization, having kids work together on a common effort, one that yields a concrete product that they can collectively take pride in, that the contributions of individuals as well as the group can be recognized, and that perseverance and creativity are rewarded. Much of what teachers say they want to introduce as part of a love of learning and the enjoyment of the learning process, kids are, in fact, adopting and internalizing.

Students report enjoying a range of activities associated with hands-on craft projects, such as drawing pictures; making things out of clay, wood, and other art materials; building models; and making posters.

We asked the students to indicate, on a 5-point scale, how they felt about doing various classroom activities such as drawing pictures, doing skits or plays, making things out of art materials (e.g., clay, wood, yarn), reading books and magazines, looking things up (i.e., research), and so on. Figure 8, that follows, shows the percent of students who indicated one of the top two categories for these items.

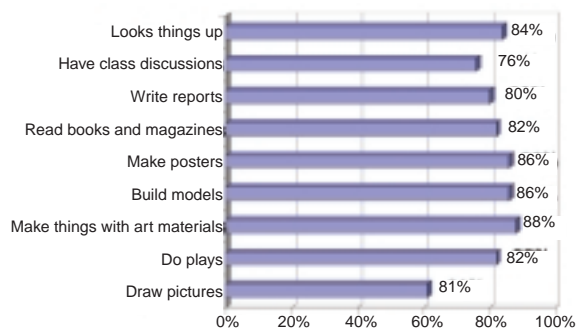


Figure 8. Student Preferences for School Activities

It is interesting to note that although the percent responses for these activities were fairly close, the activities with the highest percentages were those related to hands-on craft projects, and that the single highest percent was for using a range of craft materials.

We also checked to see if there were differences between the younger students and the older students for the types of activities

they liked to do. We found that there were no statistical differences between the grade groups 3-4 and 5-6 on the majority of these responses. However, there was a significant difference for “doing skits and plays,” which the younger students enjoyed doing more than the older students.

According to the responses in the student surveys, students preferred working on longer hands-on craft projects. The largest group of student respondents (41%) said they prefer hands-on craft projects that last for a few weeks, while only 23% said they like hands-on craft projects that were completed in one day. The remaining 35% of students preferred hands-on craft projects that lasted for a few days. Evidently, students are not only capable of longer hands-on craft projects, but they actually tend to prefer them to shorter hands-on craft projects.

The data indicate that hands-on craft projects not only help students develop the skills required to stay with tasks for longer periods of time, but that they also develop social skills when they undertake these projects in their classrooms. The students, on average, also preferred working on hands-on craft projects with other students. More than half of our student respondents (52%) preferred working with other students; 25% preferred working with their parents on hands-on craft activities; the remaining 23% liked to work alone.

Once again, this finding is consistent with the findings in the teacher survey. We found that 85% of the teachers felt students worked cooperatively in hands-on craft projects, whereas only 50% of the teachers felt they did so in non-hands-on craft projects.

We asked the 5th and 6th grade students if they felt sharing their hands-on craft projects was important (this question was left off of the 3-4 survey to shorten that survey). We found that 40% of the students indicated it was “Very Important” and 46% indicated it was “Somewhat Important” to share their hands-on craft projects with classmates, other students, or parents. This widely held perception of the importance of sharing their work is an element

of both how students learn and how they see themselves as learners. Public display of their handy work reflects on students' skills and accumulated knowledge. Sharing their hands-on craft projects serves as an acknowledgment of what they had learned—that they could demonstrate it to teachers, peers, and parents.

Students' pride in their accomplishments is an important part of motivation and learning, and so we asked them to think about things they had done in school this past year and to select, from a list of accomplishments (reports, hard problems, hands-on craft projects, etc.), the one they were most proud of. As shown in Figure 9, 35% indicated they were most proud of a hands-on craft project they had made.

Students indicated when looking back over what they had accomplished during the school year, they were most proud of a hands-on craft project they had done.

That the hands-on craft project is the highest of the alternatives we offered indicates the value that children assign to their work. That it was followed, somewhat closely (28%) by success on a hard test, also acknowledges that elementary school children already understand the system of education in which they find themselves, too.

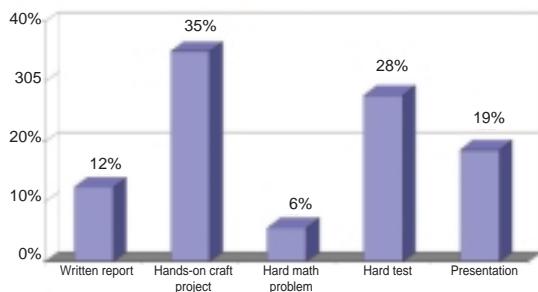


Figure 9. Student Accomplishment Most Proud Of

Discussion

Against the backdrop of the findings in this study, in this section we discuss issues in the data, propose a framework for why hands-on craft projects might contribute to student learning, and suggest areas for future work.

Issues

One of the questions for the research team was the extent to which the findings from the teacher surveys about the value of hands-on craft activities might be corroborated in the student data on learning and students' perceptions of the hands-on craft activities. This corroboration shows up in three main areas.

Motivational Aspects of Hands-On Craft Projects

In the teacher survey, we found that teachers believed student motivation would be higher when learning the same content with a hands-on craft project versus without a hands-on craft project. In the student survey, while we did not have a specific item on motivation, we did have several items gauging student interest in a variety of classroom activities (such as drawing pictures; making things out of clay, wood, and other art materials; and so on). The student responses to these interest items were consistently high. An indirect measure of student motivation would be their responses to the school accomplishment they were most proud of; over a third of the students choose their recent hands-on craft project, a greater percentage than any other option. One might infer that students would be motivated to do things for which they feel pride in accomplishment.

Collaboration and Working on Hands-On Craft Projects

Similar to the motivation and subject interest items, we found that teachers believed students would be more cooperative in group work when learning the same content with a hands-on craft project versus without a hands-on craft project. This teacher belief is corroborated by responses in the student survey in which the students indicated a preference for working on their craft hands-on craft projects in a group or with their parents rather than alone.

Teaching Units with Hands-On Craft Projects

Teachers indicated that various aspects of student learning—learning basic ideas and information, learning broader concepts, and

applying knowledge to new situations—are enhanced by involving the students in hands-on craft projects. We collected data on student learning related to accurate and factual information from the student survey and ability to apply knowledge from the knowledge application writing and drawing task. We found evidence of student factual learning in the student survey responses, and, more importantly, evidence of applying what they had learned in the knowledge application task. Thus, we have two corroborating findings related to teacher perceptions of student learning. In both cases, student learning benefited from participation in classroom projects that engaged them in hands-on craft activities. Further, that the more extensive the hands-on craft activity, the more of the project it consumed, the greater the learning.

Why Would Hands-On Craft Projects Help Students Learn?

Given the evidence in this study of student learning, particularly the link between participating in hands-on craft activities and improved knowledge application or transfer of learning, a question to consider is why would there be such a finding at all. After all, an argument might be made that involving students in hands-on craft projects would lower student learning, as time devoted to the hands-on craft activities reduces the time that could be spent on “real” academic activities.

We suggest that hands-on craft projects function as learning anchors for the teachers and students that organize and integrate various classroom-learning activities.² There are several findings in this study that suggest the

teachers were using the hands-on craft projects as learning anchors:

- Teachers reported using a range of different classroom teaching techniques—such as direct instruction, hands-on craft projects, research activities, and class discussion within the projects assigned to students.
- The hands-on craft projects were used as integrative activities involving the entire class, often with a number of different components such as background reading and research, writing, and class discussions that were integrated with the design and construction of the hands-on craft project. Some projects were individual, but most engaged a group of students to accomplish a task or had everyone involved in a single hands-on task.
- Frequently there were public displays or presentations about the hands-on craft project at the conclusion of the teaching unit. This was clearly important to the students as an element in lesson and provided a personal sense of accomplishment.

One of the well-documented findings about technological learning anchors is that students are often able to apply what they have learned to new situations and problems. The literature cited in the footnote above cites many of the studies that support the notion that transfer of learning seems to follow interactions that focus on the elements of the curriculum and that offer interactivity as a component. Consistent with this earlier research, we found evidence in this study of knowledge application associated with the use of non-technological learning anchors (although some classes did have students do research using computers to access the Internet).

² The discussion in this section is consistent with current ideas about how children learn, in particular the work of John Bransford and his colleagues at Vanderbilt University. The interested reader could consult Bransford, et al. (1999). *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academy Press. And Donovan, et al. (Eds.), (1999). *How people learn: Bridging research and practice*. Washington, DC: National Academy Press. Also, Cognition and Technology Group at Vanderbilt (2000) *Adventures in Anchored Instruction: Lessons From Beyond the Ivory Tower*. *Advances in Instructional Psychology* (Volume V. pp. 35-100). Mahwah, NJ: Lawrence Erlbaum Associates, and Cognition and Technology Group at Vanderbilt. (1996). *Anchored instruction and situated cognition revisited*. In H. McLellan (Ed.), *Situated learning perspectives* (pp. 123-154) Englewood Cliffs, NJ: Educational Technology Publishers. Reprint: Educational Technology, 33(3), 52-70.

There are other aspects about the notion of learning anchors and student learning that bear on the findings of this study. Learning anchors help make aspects of what the students need to learn visible and explicit in a way that abstract conceptual learning rarely does. These hands-on craft activity learning anchors are engaging and motivating to students and involve activities that the students themselves acknowledge are enjoyable. Further, the dynamics of these learning anchors i.e., engaging activities students enjoy doing are such that students are more likely to stick to both their academic and craft tasks until they are done, and that they also feel a sense of accomplishment and pride at the conclusion of the hands-on craft project. Hands-on craft activities make learning concrete, enjoyable, and help students persevere in their learning.

Core Subject Areas, Standards, and Learning Styles

It was clear from our sample, however, that it is not just the range in projects that hands-on craft activities make possible, or the creativity they inspire, that leads teachers to use them. Teachers today work under conditions of high stakes accountability; they are asked to focus on curriculum standards and state frameworks, they are challenged to prepare students to improve performance on standardized tests. Within our survey, we asked teachers if they directly linked their hands-on craft project activities to a state or national curriculum standard. Of the 76 teachers who responded to this item in the sample, 56 (74%) indicated that they did. This is an important finding since teachers would not give up valuable instructional time if hands-on craft projects did not help students learn and meet important national and state educational standards.

Another research question concerned the suitability of hands-on craft projects for students with different learning styles. When we asked participating teachers if they

thought hands-on craft activities accommodated different students, 41 (54%) of the 76 teachers in the sample said “yes.” Those who responded in the positive thought hands-on craft activities were best suited to students who were visual, kinesthetic, creative/artistic, slow readers/writers, and so on. Those who responded in the negative said that, although hands-on craft activities might help students with specific learning styles, they are also very effective for all students.

Conclusion

This study suggests that hands-on craft projects are an effective means of teaching a standards-based curriculum and that students develop both a greater appreciation for and understanding of what they are learning.

Hands-on craft projects appear to function as learning anchors that organize and integrate various classroom learning activities. Learning anchors ground the classroom community around a shared set of integrated goals and activities and help make aspects of what the students need to learn more visible and explicit in a way that abstract conceptual learning rarely does. Hands-on craft projects also facilitate productive socialization by having students work together on a common effort that yields a tangible product.

These learning activities expand educational experiences beyond the traditional and passive practices of teaching and learning, by incorporating creation, expression, and presentation of ideas. These experiences, this study finds, result in students’ greater ability to transfer skills and ideas to new contexts. By making the learning experience concrete, the dynamics of these learning anchors inspire students to enjoy learning, accomplish goals, take pride in their achievements, and persevere in their learning.

As the first large-scale effort of its kind, the study also documents the use of hands-on craft projects across core curricular areas and investigates student learning outcomes within

the context of classroom experience. There is obviously much more to be done in order to understand the dynamics of modern classroom learning environments in which hands-on projects are an integral component of student learning activities. Given the energy and enthusiasm we found in these classrooms, both from the teachers and the students, this future work promises to be rewarding and enlightening.



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Appendices

Teacher Preliminary Information Survey.....	A22
Main Teacher Survey.....	A27
Student Questionnaire: Grades 3-4.....	A38
Student Questionnaire: Grades 5-6, Version 1.....	A40
Student Questionnaire: Grades 5-6, Version 2.....	A42

Teacher Preliminary Information Survey

Hands-On Crafts in Elementary Education

Teacher and Teaching Background Information Survey

ROCKMAN *ET AL* is an independent educational research and consulting firm specializing in the evaluation of learning. We are conducting a national study of how hands-on craft activities contribute to student learning in elementary classrooms.

In this study, we are looking for approximately 80 K-6 classrooms representing different types of schools (e.g., urban, suburban, rural, private). Consequently, it may not be possible for us to use every teacher who applies for the study. However, we will send a \$15 gift certificate to Amazon.com in appreciation for the interest and time of the teachers who complete this survey but who are not selected.

This background information form should take 10-15 minutes to complete. *All information that is collected in this study will be kept confidential and will not be distributed to other organizations. No individual names or school names will be used in our reports.*

If you have any questions or problems, please contact Dr. Michael Jacobson by e-mail at michael@rockman.com, or call toll free at: (800) 410-2820.

A. School Information

School Name: _____

Work Phone: _____

Street: _____

City: _____

State: ____ Zip: _____

School type (select one):

- Public
- Private
- Parochial

School location:

- Urban
- Suburban
- Rural

What grades are taught in your school? (For example, your school might be K-5, so you would code: Lowest grade = K, Highest grade = 5.)

____ Lowest grade _____ Highest grade

List any special characteristics that your school may have:

- Charter
- Magnet
- Typically underserved populations
- Other: _____

B. Your Information

First Name: _____

Last Name: _____

E-mail: _____

Home Phone (optional): _____

What grade or grades do you currently teach?

____ Lowest grade ____ Highest grade

What subject(s) do you currently teach (select all that apply)?

- Art
- Language arts
- Foreign language
- Mathematics
- Physical education
- Science
- Social studies
- Other: _____

____ **How many years have you taught school?**

____ **How many children are in your class?**

____ **How many boys?** ____ **How many girls?**

What type of computer do you use with your students?

____ Apple Macintosh ____ Windows 95/98/ME ____ Windows NT/2000

____ Windows XP ____ Do not use a computer at school

C. Teaching Unit that Includes the Hands-on Crafts Activity

Here we would like for you to provide general information about what you propose to teach. Please note that we need to collect our information by approximately the first week of December, so the unit will need to be completed by that time.

1. What is the primary core subject area?

- Language arts
- Mathematics
- Social studies
- Science
- Other: _____

2. What do you call this teaching unit?

3. Please describe what specific content knowledge or concepts will be taught?

4. What is approximate date you expect to complete the unit?

_____ Month _____ Day

5. What is the expected duration of this unit:

- 1 week or less
- 2 weeks
- 3 weeks
- 4 weeks
- 5 weeks
- 6 weeks
- More than 6 weeks. Please specify: _____

5. What type of hands-on crafts activities and/or materials are involved (select all that apply)?

- Fabric, yarn, ribbon
- Construct models (not prepackaged)
- Styrofoam
- Popsicle sticks
- Paper/cardboard
- Plastic or rubber
- String or cord
- Tile or glass
- Clay or "moldable" materials
- Crayons, markers, or paint
- Other. Please specify: _____

6. Please describe what the children will be constructing:

7. How will the children be grouped as they work on their hands-on craft projects?

- Groups of: 1 2 3 4 5 6 7 8 or more Class Project
- Other grouping. Please describe:

8. The specific hands-on craft assignment is:

- Selected by me for the students to work on.
- Selected by each student from a list of possible craft projects I have approved.
- Craft projects are proposed by each student and I approve, revise, or suggest alternatives.
- Other. Please describe:

9. I would describe this teaching unit with the crafts as:

- Direct instruction
- Inquiry learning
- Issue or problem oriented
- Other. Please describe:

Please make sure you have answered all the items, and then mail or fax the form to:

Michael J. Jacobson, Ph.D., ROCKMAN *ET AL*, 605 Market Street, Suite 305, San Francisco, CA 94105
Fax: (415) 543-4145; Phone: (415) 543-4144; Toll free: (800) 410-2820
E-mail: michael@rockman.com; <http://www.rockman.com>

Thank You!

Main Teacher Survey

Hands-on Craft Projects in Elementary Education

ROCKMAN ET AL

Bringing Technology and Learning Together

Follow-up Teacher Survey

We are asking each teacher participating in our study of craft projects and learning to answer questions about their units. We are interested not only in your observations on this particular unit, but also in your more general thoughts about using crafts and projects in your classrooms. The insights and information you provide will help us understand how teachers are using crafts and how crafts contribute to teaching and learning. We estimate it will take approximately 20-30 minutes to complete this survey.

Your responses will be kept confidential and will only be used in aggregate in our discussions of findings. No individual names or school names will be used in our reports.

If you have any questions or problems, please contact Dr. Michael Jacobson by e-mail at michael@rockman.com, or call toll free at: (800) 410-2820.

Thanks for your help!

A. Your Information:

First Name: _____

Last Name: _____

Grade level(s) in which you used the unit (e.g., 5, 2-3)? _____

Subject(s) for which you used the unit:

____ Language Arts ____ Social Studies ____ Science ____ Math

Other (please specify): _____

B. Teaching Unit that Includes the Hands-on Craft Activity

1. In the sign-up survey, you described the teaching unit and the hands-on craft activity you planned to teach. Did you make any changes in what you actually did in the classroom?

____ Yes ____ No

2. What were your instructional goals for this unit (e.g., content knowledge, concepts, skills)?

3. Why did you choose to incorporate crafts into this particular unit?

4. Did you link this craft activity to a state or national curriculum standard?

____ Yes ____ No

If so, please describe the standard(s) and how the hands-on craft activity helped you meet it:

5. How long was the *overall unit* in which the children did their craft projects? _____ Weeks

6. During this time, how many *class periods per week* did you devote to the unit? _____
Periods/week

7. How long are your class periods? _____ Minutes

8. Where did students do their craft projects?

____ Students did their crafts solely at school.

____ Students did their crafts partly at school and partly at home.

____ Students did their crafts solely at home and brought them to school.

9. How were parents involved?

___ Parents were not involved.

___ Parents were involved only to the extent that they helped their children obtain materials.

___ Parents helped their children at home.

___ Parents helped their children at school.

___ I'm not sure.

10. Was the craft project a group or an individual activity?

___ Group ___ Individual ___ Both

If it was a group activity, what was the primary rationale for the grouping?

___ I assigned students to groups by *ability levels*.

___ I assigned students to groups based on *interpersonal skills and group dynamics*.

___ I assigned groups based on *previous groups and rotations*.

___ *Students picked the group* they wanted to work with.

___ *Students picked their projects* and that determined their group.

___ Other. Please explain:

11. Teachers may combine a number of strategies and activities when teaching. During this unit, about what percentage of class time did you devote to each of the following activities? (Note: The sums should add up to 100%.)

___ % time: Direct instruction (e.g., presenting specific content, background information)

___ % time: Classroom management (e.g., giving directions, selecting projects and groups)

___ % time: Class discussions

___ % time: Helping with project activities *related* to the craft projects

___ % time: Helping with project activities *not related* to the craft projects

___ % time: Assessment (e.g., grading, scoring projects with rubrics, conferences)

___ % time: Other. Please explain:

12. During this unit, to what extent did you use each of the following teaching styles:
(Please only circle ONE number per scale)

	Never Extensively						
a. Direct instruction	1	2	3	4	5	6	7
b. Inquiry learning	1	2	3	4	5	6	7
c. Project-based learning	1	2	3	4	5	6	7
d. Other. Please describe:	1	2	3	4	5	6	7

13. How was writing involved in the major student products for the unit?

___ Writing a report or story was a necessary part of the final student product.

___ Writing was involved in planning the craft product, but was not part of the actual final craft product.

___ Writing a report or a story was one of the options for a student product, in the same way that creating a craft product was an option.

___ Writing was not involved in this unit.

___ Other. Please explain:

14. During this unit, about what percentage of the time did *students* spend on the following activities? (Note: The sums should add up to 100%.)

___ % time: Working on the craft project

___ % time: Reading and looking things up

___ % time: Writing

___ % time: Preparing and giving presentations

___ % time: Other. Please explain:

15. After students completed their craft projects, did they share their work?

Yes No

If so, how did the students share their work? (Check all that apply.)

They presented their craft projects to their classmates.

They displayed their work around the school.

They presented craft projects to other classes.

They presented their craft projects to parents, family, or friends.

16. Please briefly describe the series of activities your students did in this unit:

17. What do you believe your students learned in this unit?

18. What types of assessments did you use in this unit? (Check all that apply.)

True/false, multiple choice questions, short answer tests

Essay tests

Worksheets

Reports or papers

Grades/rubric scores/feedback on presentations

Grades/rubric scores/feedback on craft projects

Self evaluations

Peer evaluations

Other. Please describe:

19. For this teaching unit, what percentage of each student's grade or evaluation was each of the following? (Note: The sums should add up to 100%.)

%: Tests

%: Craft project

%: Non-craft academic work

%: Other. Please describe:

%: Quality of collaborations in group work

%: Presentations

%: Effort

%: Contributions to class discussions

20. Did you use a rubric for evaluating the hands-on craft project?

Yes No

If so, what were the main criteria you used?

21. Do you think your students would have learned as much of the academic content of this unit without the craft project?

___Yes ___No

Why or why not?

C. Questions about Students

1. How well did the craft project help your students: (Please only circle ONE number per scale)

	Not at All			A Lot			
a. Understand the basic ideas and information about the subject being studied.	1	2	3	4	5	6	7
b. Understand the broader concepts or more complex ideas being studied.	1	2	3	4	5	6	7
c. Apply information learned in new or different situations.	1	2	3	4	5	6	7
d. Develop a sense of curiosity about the subject.	1	2	3	4	5	6	7
e. Gain confidence in their ability to create products they were proud of.	1	2	3	4	5	6	7
f. Develop a sense of cooperation.	1	2	3	4	5	6	7
g. Take responsibility for completing work on time.	1	2	3	4	5	6	7
h. Manage their time.	1	2	3	4	5	6	7

2. Pick 2 students in your class who you think really profited from doing the craft project. Briefly explain how or why working with hands-on crafts was particularly suitable for them.

3. Do you feel hands-on craft activities are more suitable for students with certain kinds of learning styles?

Yes No

If so, please explain?

4. Based on your overall teaching experience, how do you feel students in general respond to instructional units taught *with craft projects* versus *without craft projects*, where the content of the unit was the same? (Please only circle ONE number per row.)

Students are:	Not At All				Very Much So			
a. Motivated to do well on various tasks.	With crafts	1	2	3	4	5	6	7
	Without crafts	1	2	3	4	5	6	7
b. Cooperative in group work.	With crafts	1	2	3	4	5	6	7
	Without crafts	1	2	3	4	5	6	7
c. Eager to volunteer information about the subject(s) being studied.	With crafts	1	2	3	4	5	6	7
	Without crafts	1	2	3	4	5	6	7
d. Eager to ask questions about the subject(s) being studied.	With crafts	1	2	3	4	5	6	7
	Without crafts	1	2	3	4	5	6	7
e. Interested in using a variety of resources to find things out.	With crafts	1	2	3	4	5	6	7
	Without crafts	1	2	3	4	5	6	7
f. Able to stick with tasks until they were done.	With crafts	1	2	3	4	5	6	7
	Without crafts	1	2	3	4	5	6	7
g. Willing to take responsibility for getting work in on time.	With crafts	1	2	3	4	5	6	7
	Without crafts	1	2	3	4	5	6	7
h. Interested in assuming leadership roles in groups.	With crafts	1	2	3	4	5	6	7
	Without crafts	1	2	3	4	5	6	7
i. Respectful of class materials and activities.	With crafts	1	2	3	4	5	6	7
	Without crafts	1	2	3	4	5	6	7

D. Questions about Teaching and Learning

1. Please indicate how frequently you engage in the following teaching practices: (Please only circle ONE number per row.)

Teaching Practices	Rarely							All the Time							
a. I encourage students to take responsibility for learning.	1	2	3	4	5	6	7								
b. I encourage students to reflect on and evaluate their own work.	1	2	3	4	5	6	7								
c. I use a variety of alternative assessments for students to demonstrate knowledge.	1	2	3	4	5	6	7								
d. I provide opportunities for students to ask questions and discover answers.	1	2	3	4	5	6	7								
e. I have students memorize important facts about the topics they study.	1	2	3	4	5	6	7								
f. After students have worked on a problem or project, I ask them to think about new questions to ask or new problems to solve.	1	2	3	4	5	6	7								
g. I ask specific questions that have specific answers the students should be able to give.	1	2	3	4	5	6	7								
h. I encourage my students to form questions or hypotheses about issues or problems they are working on.	1	2	3	4	5	6	7								
i. I ask my students to talk about their own ideas before I provide mine.	1	2	3	4	5	6	7								
j. I encourage students to work collaboratively.	1	2	3	4	5	6	7								

2. We are interested in your opinions about the following statements about teaching. Please indicate the extent to which you agree or disagree with each statement.
(Please only circle ONE number per scale)

Teaching Statements	Strongly Disagree							Strongly Agree							
a. Crafts are fun but they do not always help students learn content deeply.	1	2	3	4	5	6	7								
b. Hands-on projects work better for some students than others.	1	2	3	4	5	6	7								
c. Some students learn better from direct instruction than from inquiry or project-based instruction.	1	2	3	4	5	6	7								
d. Not all content lends itself to crafts or long-term projects.	1	2	3	4	5	6	7								
e. It is important that students be able to select their own projects.	1	2	3	4	5	6	7								
f. Projects help students learn to manage their time.	1	2	3	4	5	6	7								
g. Project-based learning takes more time than more conventional methods.	1	2	3	4	5	6	7								
h. Most students can undertake a long-term project without prior knowledge.	1	2	3	4	5	6	7								
i. Standardized tests do not measure the skills children develop working on projects.	1	2	3	4	5	6	7								
j. Managing time and resources is a developmental thing: younger students gain skills with age, not necessarily with projects.	1	2	3	4	5	6	7								
k. For projects to really work, students need a definite structure.	1	2	3	4	5	6	7								
l. It is possible to both cover the material and do projects involving crafts.	1	2	3	4	5	6	7								
m. Projects are too much responsibility for some students.	1	2	3	4	5	6	7								
n. It is hard to prepare students to do long-term projects.	1	2	3	4	5	6	7								
o. Long-term projects give students a greater depth of understanding than more conventional instruction.	1	2	3	4	5	6	7								

3. How long did it take you to complete this survey? _____ minutes.

(Put return information here, both fax and mailing address.)

Thank You!

Student Questionnaire Grades 3/4

1. Your name: _____ (first name) _____ (last initial)

2. Teacher's Name: _____ Grade: _____

3. School: _____

4. Are you a boy or a girl?: boy girl

5. What's your favorite subject at school? _____

6. How do you feel about doing the following things? (Circle 1 face in each row.)

	terrible	not so good	okay	good	great
drawing pictures					
doing skits or plays					
making things out of clay, balsa wood, yarn, and other art materials					
building models					
making posters					
reading books and magazines					
writing reports					
having class discussions					
looking things up (on the Internet or in the library)					



7. Would you rather... (Check just 1 box.)


- do a project by yourself
- do a project with other students
- do a project with your mom or dad at home


8. What kind of project do you like best? (Check just 1 box.)

- one I can start and finish in one day
- one that takes a few days to do
- one that takes a few weeks to do

9. Think about the project you just did. How much did you like it? (Circle just 1 face.)

 I didn't like it very much  I sort of liked it  I liked it a lot!

10. What was your favorite part?  _____

11. What was your *least* favorite part?  _____

12. Describe 2 important things you learned about the topic you were studying.

1. _____

2. _____

13. If you walked into your classroom and saw centers set up for a new project, which table would you go to first? (Check just 1 box.)

a table with books and magazines



a table with a computer



a table with paint, clay, and other arts supplies



a table with objects and a magnifying glass



14. Looking back over the things you've done in school so far this year, what is the thing you're most proud of? (Check just 1 box.)

a report I wrote

a crafts project I made

a hard math problem I solved

a hard test I took

a skit or presentation I did in front of my class

15. If someone gave you money for your birthday, where would you shop? (Check 2 boxes.)

a bookstore 

a crafts store a sports store 

a music store



a toy store

a clothing store



Student Questionnaire Grades 5/6 Version 1

1. Name: _____
(first name) (last initial)
2. Teacher's name: _____ Grade: _____
3. School: _____
4. Are you a boy or a girl? boy girl
5. What's your favorite subject at school? _____
6. How do you feel about doing the following things? *(Circle 1 face in each row.)*

	terrible	not so good	okay	good	great
drawing pictures					
doing skits or plays					
making things out of clay, balsa wood, yarn, or other art materials					
building models					
making posters					
reading books and magazines					
writing reports					
having class discussions					
looking things up (on the Internet, in the library, etc.)					

7. The projects that I like best are ones that ... *(Check just 1 box.)*
- take 1 day to do take a few days to do take a few weeks to do
8. Would you rather do a project... *(Check just 1 box.)*
- by yourself with other students with your mom or dad
9. After you've finished a crafts project, how important is it for you to share it with someone?
(Check just 1 box.)
- Not at all important. I feel good just looking at it and admiring what I've done.
- Sort of important. I like for my teacher and other students to see what I've done.
- Very important. I want my teacher, other students, and my family to see my work.
10. Think about the project you just did. How much did you like it? *(Circle just 1 face.)*
- I didn't like it very much I sort of liked it I liked it a lot!

11. What was your favorite part? _____

12. What was your *least* favorite part? _____

13. Describe 2 important things you learned about the topic you were studying.

1.

2.

14. When you're studying something at school, how much do you *like* the following activities and how much do you think you *learn*? (Check just 1 box in each row.)

	I don't like this and I don't learn very much	I like this but I don't learn very much	I learn a lot but I don't like this	I like this and I learn a lot
reading textbooks or other factual information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
reading stories or novels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
listening to the teacher explain things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
looking things up (on the Internet or in the library)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
making models, working on craft projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
having class discussions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
writing (reports, stories, assignments)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
doing presentations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
listening to other students' presentations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
working on the computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. Looking back over the things you've done in school so far this year, what is the thing you're most proud of? (Check just 1 box.)

a report I wrote

a hard test I took

a crafts project I made

a skit or presentation I did

a hard math problem I solved

16. When you look at a kids' magazine or web site, which 2 sections do you usually go to first? (Check 2 boxes.)

science experiments

ideas for crafts you can do

puzzles, word searches

stories or articles

jokes, cartoons

contests for things to make or draw

Student Questionnaire Grades 5/6 Version 2

1. Name: _____
(first name) (last initial)














































2. Teacher's name: _____ Grade: _____

3. School: _____

4. Are you a boy or a girl? boy girl

5. What's your favorite subject at school? _____

6. How do you feel about doing the following things? *(Circle 1 face in each row.)*

	terrible	not so good	okay	good	great
drawing pictures					
doing skits or plays					
making things out of clay, balsa wood, yarn, or other art materials					
building models					
making posters					
reading books and magazines					
writing reports					
having class discussions					
looking things up (on the Internet, in the library, etc.)					

7. The projects that I like best are ones that ... *(Check just 1 box.)*

take 1 day to do take a few days to do take a few weeks to do

8. Would you rather do a project... *(Check just 1 box.)*

by yourself with other students with your mom or dad

9. After you've finished a crafts project, how important is it for you to share it with someone?
(Check just 1 box.)

- Not at all important. I feel good just looking at it and admiring what I've done.
- Sort of important. I like for my teacher and other students to see what I've done.
- Very important. I want my teacher, other students, and my family to see my work.

