Teaching About Architecture:  
A Housing Design Unit in a Secondary Art Classroom

by

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Abstract:
The study of architecture should be part of the high school art curriculum. The project documented in this thesis encouraged students to enlarge their knowledge, insights and understandings of architectural design, housing, neighbourhoods and environments. A foundation was provided on which to build future experiences with architecture. This study documents a search for relevant curriculum material and the results of a limited action research study.
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Chapter One

Why Focus on Architecture in an Art Classroom?

1.1 Introduction and Research Questions

The purpose of this thesis was to investigate what architectural housing as an art form has to offer in a secondary art classroom. It began with my questions on learning and motivation. What art projects encourage the development of thinking skills, in high school students, while also increasing intrinsic motivation? What process teaches students to solve problems, as they relate to the world that surrounds us? Researchers comment that through problem-solving projects students can be encouraged to learn, by thinking, probing, and experimenting (Davis, Hawley, McMullan, & Spilka, 1997, pp. 2-4), and that their interest in a particular topic piques their motivation (Gardner, 1993, p. 243). It could be suggested, then, that a set of design problems of an interesting nature create challenges and encourage discovery for students who will begin to build skills for application to future activities, in the school and in the surrounding world.

The thesis will describe my search for curriculum materials that would encourage student learning while also motivating them. In the first chapter I describe the direction that I have taken to increase personal awareness of the power to teach through the use of problem-solving projects. I will then lay the foundation for the action research project which helped me uncover a fascinating way to help students to develop their skills. Included in this chapter is a short description of the areas of skill development that take place during problem-solving work.

1.2 Why Focus on Architectural Housing in a Secondary School Art Classroom?

According to Arthur Erickson (1975), “discovery” is the very essence of architectural buildings of all types (Erickson, 1975, p. 9). If the idea of discovery undergirds the practice of architectural design for a professional architect, then this source of discovery could also apply to a classroom of high school students. Architectural housing design, then, could be considered a good source of exploration and development for students.

When considering architecture’s place in our lives --- how it daily surrounds us in its three dimensional form, influencing our behaviours as we go about our activities, why do we find it difficult to describe our living and work spaces? We are never without its shelter, and its presence daily flavours our tasks and our existence. As people use architectural spaces they experience or react to the built environment (Canter, 1977, p. 9), whether they can verbalise...
their experiences or not. How can students be helped to verbalise their responses to the environments which surround them?

As the above comments suggest, part of the answer lies in the educational possibilities that may be found when teaching architectural housing as problem-solving through design. Another part of the answer exists in the fact that architectural studies can be enriching as learning experiences approached in myriad ways. A third answer is found in the value of sowing seeds of awareness in students that would encourage them to look carefully at their neighbourhoods and beyond, while analysing the homes that exist there and the effects the houses have on the personalities of the neighbourhoods themselves. An architectural housing study could enlarge students' skills and understanding beyond a confined awareness focusing within the school environment. And it could increase their consciousness of issues that will one day be of value to them.

I do not wish to leave the impression that I believe problem-solving and critical thinking to be the sole teaching methods to be used in art classes, although the book *Design as a Catalyst for Learning* (Davis, Hawley, McMullan, and Spilka, 1997) may suggest this. I am suggesting that through the use of problem-solving at intervals, students are offered vital learning experiences.

My own interest in teaching architectural housing in this fashion began with a set of questions that were my reflections as a Teacher-on-call. They were born out of my interest in student learning and motivation which were observable in my various classroom experiences. In classrooms where learning was observable, what was taking place? For one thing, learning was key to the curriculum and student interest was also visible. When considering these curricular attributes, what learning processes would aid students' thought development for an architectural housing design, while also becoming the foundation for intrinsic motivation? What projects would encourage students to invest time and energy, while they were also learning skills that would be transferable to other walks of life? It has become clear that through comments by students and the writings of many teachers and researchers that students want their learning materials to be applicable to life (Taylor, 1999, p. 118).

Keeping these questions in mind, as I read materials for this research, I uncovered valuable considerations and implications, and will present them in the following chapters. Interestingly, and perhaps one reason I have been so intensely motivated to choose the path I have for this thesis ---the topic of architectural housing as problem-solving --- lies in my own special memories and experiences.

My own learning about architectural housing began in my childhood as buildings were a
natural topic of daily conversation; I watched my parents, our friends and neighbours build their homes. I smelled the newly sawn wood as I sat on my swing that was fastened to the open rafters in our home in progress. Sometimes, I was bundled up in a snowsuit to ward off the cold prairie chill as I watched my parents build their home board by board, observing the developing structure. On completion of our home, my father landscaped the lot using the horticultural skills gained throughout his childhood work for a garden designer. Watching these developments and working with him when I was old enough, stimulated my own enthusiasm as I observed, learned, and worked by his side.

This focus on housing design springs from conversations my father and I had. Throughout my teens and adult years my father and I talked about architectural design and construction, giving me opportunities to learn some of the language of the field. The love of design directed my steps toward a profession in architecture which began with a pre-architecture study period — three years in architectural history and a part-time year of drafting. However, the economy was poor and I chose graphics and then teaching instead.

Even now, as an adult I enjoy watching building construction, which sometimes leads me into the hills near my home to watch the latest homes being built. I watch to learn about construction, though some of the designs produced are not to my interest. Each time I watch, the tree stripped land causes me to wonder if there will be a day when someone thinks of a better approach to building.

In my personal search for teaching material, regarding architectural housing, I have found several reasons to continue to believe that offering a problem-solving approach would strongly support student learning and development. It has taken time to choose this area, after reading sources that refer to the study of architecture in a high school classroom, as well as other materials through which students could learn from doing. But the idea of design, with a strong focus on problem-solving, has consistently seemed to me, to be an approach with flexibility and applicability to today’s students.

Throughout this winding search for architectural curriculum with its unexpected twists and turns, the process has sometimes felt like a walk through a large, three dimensional tapestry; a tapestry to be discovered not only by standing before it, but by walking through and around it.

The idea of the tapestry can also be applied to the thought development of the students. The warp of the tapestry is the latent thinking skills of the students, and as the students increase their skills, the weft is being added. Thoughts are strongly interwoven with
developments taking place in students' skills; and as in a weaving, they could be said to underlie each increase in students' skills — becoming the weft threads.

Davis, Hawley, McMullan, and Spilka (1997) point out that the thinking skills of students are increased through a problem-solving project (p. 20) such as a student's "dream home". The thinking skills are latent and need a source of stimulation to bring them to the surface, to become flexible through use. This process will be presented in the next few pages of this thesis. It will become apparent through a discussion of the ways in which students learn and develop their skills that the design process offers room for growth as well as a rich field of observation for a research project. Thus, my intent in describing the thought development below will be to set down the foundation for research in the classroom. Through the attributes of design, listed below, it should be possible to understand how students will attain new knowledge and experiences which will prepare them as flexible thinkers for a world in need of problem-solvers.

1.3 The Educational Reason for Considering Architectural Housing in the Art Classroom

Architecture itself is a very flexible topic of study for high school students, due to the many ways from which the material may be seen. Also, a multitude of issues connected with the topic can be woven into the curricular material — the natural environment, the world energy crisis, city bylaws, cultural issues, and others. Guilfoil and Sandler (1999), as well as other programs and authors, referred to in Chapter Two of this thesis, list a number of ways in which the subject may be studied, though only those that look at home design are considered in this thesis.

Specifically, due to students' own highly motivated interests in "dream homes", I look at how this art theme could become a powerful learning tool, with great dividends for students. Davis et al. (1997), in their book, state that the use of problem-solving in design is a rich source of learning for students (pp. 19-22). The Swedish Sloyd educational system supports the undergirded framework that Davis et al. (1997) present as a reason for pursuing design as problem-solving and this, among other things, leads me to believe that architectural design as housing would further student development.

Suggestions in Design as a Catalyst for Learning (Davis, Hawley, McMullan and Spilka, 1997) parallel the Swedish Sloyd educational system, in several ways. Both learning processes encouraged their students to learn through the use of hands-on activities. These educators believed that work with the hands caused students to think about what they were learning.
The hand building exercised students' skills in creative and critical thinking and over time became a desired approach for educators (Davis, Hawley, McMullan, & Spilka, 1997, pp. 3-5, 20; Eyestone, 1992, p. 29).

Eyestone (1992) points out that in the Sloyd system it was believed that handiwork was "beneficial to all children regardless of social status or gender, in developing skill, conceptual thinking, good work habits, respect for others, and aesthetic taste" (p. 29). The originator of Sloyd, according to Eyestone, believed that "spontaneous learning based on a child's interests was the most important means toward developing individual self-concepts" (p. 29).

This type of spontaneous learning is also very evident in the writings, in Design as a Catalyst for Learning (Davis, Hawley, McMullan, and Spilka, 1997), which are described with enthusiasm by the teachers who use problem-solving in their classrooms. Design as problem-solving is thus recognised by many to have a wide-ranging affect on student skills, while motivating and building knowledge of the surrounding world.

This issue of connectedness to the surrounding world is an important area of concern to many curriculum writers and researchers. Hicks and King (1999) comment that without an awareness of the world around us, we forget the meanings that exist in our surroundings; and we can no longer explain the meanings of the human side of our environment (p. 12). It follows that we would then create living spaces that ignore the feelings of people. This becomes evident in the United States where many mega projects were built resulting in ghettos, which then met the demolition crews. Students today will have an important role to play in making choices about the built and natural environment; they will have major impact on our future neighbourhoods. With more opportunities to communicate and think about their living spaces will they, in their choices, be more conscious of their surroundings, more aware of what various influences will do to the spaces?

Chapman (1999) comments that "students can and should play a major role" (introduction, p. vii) in shaping the spaces we live in. Chapman reminds us of the powers they will one day have:

As citizens, their individual and collective decisions will determine which values and meanings are affirmed by environments. In turn, all will feel the imprint of those values in their day-to-day lives...[Neighbourhoods] should be places worth caring about, belonging to, and celebrating as members of a community (introduction, p. vii).
The fact that students are the future decision makers suggests the need for learning which matches such a position of influence in the future. Just as an heir apparent is trained from childhood, about kingly decision making and activities, so should our students be taught to take their place as decision makers and problem-solvers. These areas of learning are the goals of Davis et al.'s (1997) writings and were the goals of the Sloyd system. This education method and Davis et al. share the belief that education should support a student in fulfilling his or her potential, so that students could then choose any desired direction in life. Sloyd also addressed the need for a child-centred, interdisciplinary curriculum (see Eyestone, 1992, p. 31). With their well-rounded education students could then make sound decisions which would affect the world surrounding them. This aim is described by Davis et al. (1997) and has become direction for my curricular research.

Davis et al. (1997) believe that problem-solving through design is a rich source of learning and is highly motivational. This belief caught my interest, though perhaps contrary to the authors’ desired direction, I would like to see it used as an unit of architectural study. I can also see applying the learning process they describe, to various units throughout the year, but not necessarily using it as an entire program, or a system of education, though this type of system became highly successful in Sweden.

Throughout my search, the material I have found encourages students to increase their thinking skills while being intrinsically motivational and has been most often situated in design projects. Problem-solving through design offers the opportunity to develop a set of skills to be used in a non-linear pattern (see figure 1), allowing students to experiment with ideas that increase their skills in thought and planning. In the search for solutions, students develop and adopt a different set of skills for each portion of the design problem (see figure 1).

In essence, the process that students will encounter by doing design projects is one of experimentation and reworking. Chapman (1978) comments that the experimentation style used for this purpose is meant to make discoveries that can be applied to students’ projects (p. 60).

Meanwhile, students’ internal motivation is built throughout a project such as their “dream home” because the art of building a home intrigues them; the students identify closely with the activity while it supplies them with new knowledge that may be applied to the world around them (Davis, Hawley, McMullan, & Spilka, 1997, p. 23). These are areas of development and increased awareness that the Sloyd system would have been likely to support.
Figure 1. Design processes encourage repetitive work that builds students’ thinking skills.

Figure 2. Interaction between the mind and hands supports design activities and increases the "fluency of thought operations".

From Design as a Catalyst for Learning. By Meredith Davis, Peter Hawley, Bernard McMullan, and Gertrude Spilka, 1997, Alexandria, VA: Association for Supervision and Curriculum Development. Copyright (1997) ASDA. Reprinted by permission. All rights reserved.
This framework of ideas, when applied to problem-solving and design suggests the direction taken in my action research experience. The following descriptions of student development would be likely to take place during a design project, increasing the thinking and personal skills of the students working on the project. Thus, when applied to an architectural housing project, the process promotes student development in language skills, problem-solving and critical thinking skills, inter-personal or group skills, manual skills, and awareness of the outside world. Below is a discussion of the effect of students’ work in design, considering the possible changes in students’ skills.

1.4 Architectural Housing as Design Promotes Language Development and Learning

The use of language has long been a recommended tool for skill development and learning in art classrooms. It has been visible since the work of Jerome Bruner, in the 1960s, (cited in Soep & Cotner, 1999, p. 351) when he activated greater interest in the use of language in art classes through the use of art criticism, art history and aesthetics. At this time educators began to use the “structures of related professional disciplines” (p. 351) as their sources of direction in the classroom. The curricular approach, called Discipline-Based Art Education, made a directional change that also surfaced in art classes at this time (p. 351). These new approaches to art developed out of concern for placing art classes on education’s cutting edge and were meant to help keep art in the educational forefront, while art material took an active part in the development of students’ knowledge, personal and manual skills.

While considering problem-solving and design education, relating to home design, how can an ability to describe space be developed in art students? Chapman (1978) suggests that understanding how to describe architectural homes could be developed out of experiences and studies in architecture or architectural history (pp. 80-90). Students would learn to critique housing in the same manner that a piece of art work would be critiqued. Through learning to describe what they are seeing in photographs or buildings, students would make decisions regarding the design characteristics of their model homes.

Communication is key to this learning process. Soep and Cotner (1999), who share the ideas of Vygotsky on words and thoughts, describe why it is useful to communicate about concepts and various topics in the classroom. The article suggested that there is an interdependency between thoughts and words which is very visible in experiences with art (Soep & Cotner, 1999, p. 350). Understanding and meaning develop out of the manipulation of words, making even complex ideas more understandable. Words and concepts used correctly
and repeatedly will build students' communication skills, preparing them for further thought about that particular set of ideas.

Therefore, the use of communication in the study of architectural housing can develop understanding in students through the use of verbal or written expressions, and through experience in manipulating words to express thoughts. Without opportunities to practice thinking in the language of the particular field being studied, one does not develop confidence in communicating about it. In turn, more adept communication increases understanding in the communicator and in the listener through the use of well constructed language and clear images. Increased quality in communication allows thoughts to be shared more freely. Careful thought and manipulation of the ideas as well as the validation by other group members will support and further strengthen students' skills. Through this process of development, encouragement, and sharing in group work, students continue to use and hone their communication skills.

Another side of verbal practice also affects the development of manual skills (see figure 2, p. 7). Through practice, students studying architectural housing designs, would develop "fluency of thought operations" or thinking in both words and images (Davis, Hawley, McMullan, & Spilka, 1997, p. 4). Words combined with activity become words in action. Richard Kimbell (1991), a British educational professional and assessment expert, comments on how valuable this is, due to the dynamic processes students experience while increasing their own design skills (Kimbell, Stables, Wheeler, Wosniak, & Kelly, 1991, p. 20). The more freely students are able to describe the project they are working on, the greater will be their facility when assembling the project. Their increased comfort with describing the home will give them an advantage when producing the design characteristics in the model form (see figure 2 for the changes in verbal and manual facility).

The use of communication, analysis, synthesis and application skills interwoven together plays an important role in the development of complex groupings of other student skills. This intricate mixture of skills reflects the synthesis demanded in the work of adults, which is now considered desirable in students of high school age (Davis, Hawley, McMullan, & Spilka, 1997, p. 3): Therefore, as an arena for development, the study of architecture as design can take a versatile and powerful place as a unit in an art classroom.

1.5 Architecture as Design Promotes Problem-solving and Critical Thinking Skills

Historically, architectural studies have been used as important programs for building problem-solving skills in students through art classes, in the United States, Canada and other
countries. For three decades, home design projects have been studied in grade school, with particular emphasis at the secondary level. The aim of this study material was to create design-sensitive and discerning citizens who would be well-educated clients and buyers in their adult years. Davis et al. (1997) comment that this is possible through the use of problem-solving projects with design as a focus (Davis, Hawley, McMullan, & Spilka, 1997, p. 5).

Due to the complex demands for solutions to problems, in our world today, people are in need of learning to apply knowledge, rather than learning by rote. Koroscik (1993) points out that students who are given opportunities to learn to apply their new learning will make meaningful and long lasting connections with the materials they are studying. They will move beyond short term retention skills (p. 8) strengthening their memory of the material studied. Ability to acquire and use new knowledge and other learned skills in relation to new and unfamiliar tasks and surroundings, builds in students a flexibility that is transferable to other task applications (Davis, Hawley, McMullan, & Spilka, 1997, p. 19).

Davis et al. (1997) report that teachers choose to teach design and problem-solving to help students acquire life's necessary competencies. Design's creative problem-solving demands a willingness to accept the uncertainty of unsolved problems and the ability to think through a problem (pp. 19, 20) while looking at a project's various angles and hidden difficulties. The set of tasks integral to the completion of problem-solving projects constantly challenges students, naturally encouraging them to think through the project before them.

The study of architecture through design, in a problem-solving project, influences students' thinking in several ways. In their documentation, Davis et al. (1997) present the experiences of teachers who have used design in problem-solving. The authors suggest that when students look for solutions to a design problem, they will likely be drawn into active learning, which causes increased thought, reflection, and synthesis while they are producing hands-on work. In addition, through this process, students develop personal interaction and communication skills (p. 61) which have already been mentioned as desirable.

Design projects using critical thinking will naturally demand the use of a combination of skills and knowledge. This need for the use of multiple skills, may be found in the fields of the sciences and in the humanities, as well as in the world outside of school; thus it is likely that students who work on design projects will also work with skills from all three fields as they apply thought to projects with unknown outcomes. A British designer and educational researcher, Nigel Cross (cited in Davis, Hawley, McMullan, & Spilka, 1997) has pointed out that in the sciences people "value objectivity, rationality, neutrality, and a concern for the
truth’...[and in] the humanities they value subjectivity, imagination, commitment and a concern for justice” (p. 2). A merging of both sets of values is common in design (p. 2). Designers use this merged set of skills; and so it seems likely that students who work on design projects will also develop and use a very similar set of skills.

In order to complete a problem-solving project, students’ thoughts move back and forth between a set of thought and communication dimensions — visual/spatial, linguistic, and mathematical — while they work on their assignments (Davis, Hawley, McMullan, & Spilka, 1997, p. 21). Students learn to cope with the complex learning combinations that apply to the assignment they are working on, and this capability is then translated to future assignments.

These interdisciplinary skills (Avery, 1993, p. 46; Davis, Hawley, McMullan, & Spilka, 1997, p. 25; Francis, 1999, p. 179; Guilfoil & Sandler, 1999, p. vi), sometimes referred to as design skills, are built together with knowledge through the inquiry process. Through exercising these skills, students increase “flexible thinking skills that are useful across disciplines” and which are highly desirable in the working world (Davis, Hawley, McMullan, & Spilka, 1997, pp. 3, 51, 121) — an important issue for high school students. Some educators believe that problem-solving has an effect on the development of students’ higher-order critical thinking skills: comparing, contrasting, synthesising, structuring, and innovating (p. 25). These skills, often used in combinations in the same project, are commonly used by designers.

1.6 Architecture as Design Offers New Challenges to Art Students in Group Work

Through the use of design, a unit of architecture could be influential in developing students’ thinking processes as they gain experience while learning to communicate their own ideas with others, and through co-operative work in groups, (Davis, Hawley, McMullan, & Spilka, 1997, p. 61) and hands-on work to produce a house model. Their work on the project would begin the actions of understanding and communicating the qualities they wish to see in their own “dream homes”.

Communicating with one another and sharing ideas creates greater exposure to new materials, as students will listen to one another’s ideas about how they desire the project to be produced. The ‘shared talk’ will play a large part in student skill development. Their skills will be developed from the perspective of sharing as well as listening; and so, students will teach one another (Davis, Hawley, McMullan, & Spilka, 1997, p. 33).

By working together on a “dream home” design project, students learn to not be daunted by the complexity of a project, and discover how to break down a problem into workable parts,
sharing the work with fellow group members (Davis, Hawley, McMullan, & Spilka, 1997, p. 88). They experience organisational demands and find themselves managing the application of new knowledge and skills just as they would on a work site.

Students who work through this type of learning discover how to co-operate, being open to sharing ideas while also reworking them with flexibility and willingness. There is often the need to change directions as a group, redesigning the project where necessary; and while they work on the model together, changing the plans to suit the needs of the project’s completion, they refine their ideas through group consensus (Davis, Hawley, McMullan, & Spilka, 1997, p. 33).

1.7 Hands-on Work Demonstrates the Crystallisation of New Knowledge

It is not enough to have a house drawn on paper or produced in facade form, without full crystallisation of the ideas through the use of three-dimensional model production. Without building the model, the design remains a product of students’ minds alone, causing uncertainty regarding how well the students thought through the sculptural concepts and leaving no way to observe whether the home design works.

Nigel Cross (1983) makes a point regarding student projects in design. He stresses that students need to be allowed to take a design to its physical state. He says that unless a design is worked out to the point where its physical shape can be seen, it is difficult to decide whether it will work or not. It may look fine on paper (as a drawing or set of drawings), but in reality it may be unworkable. The design’s capability is better visible when it is created as a model. Cross comments that there is a special, one of a kind opportunity that design experiences offer to children, taking them through a set of connections across disciplines and illuminating life in an unusual way, while constructing new learning for the students (p. 224).

This learning process is complex and multifaceted, full of challenges, but it also has its rewards. Students learn together to face daunting challenges in co-ordinating an architectural project. The discoveries made by students and the feelings of satisfaction on completing the task warrant a careful look and serious consideration for architectural home design to be used in art classrooms.

1.8 Multiple Views in Architectural Education

Many educators comment on the need for students to experience the many ideas and concepts that exist in the world that surrounds us. People have many views about life and
about values that they consider important. Students can be exposed to some of these views through the use of various art projects, and architectural housing is a good example of an area that has a great deal of flexibility in the way that it is presented.

Guilfoil and Sandler’s (1999) book Built Environment Education in Art Education, makes interesting suggestions about displaying the multi-sided approaches that are available to teachers who wish to encourage their students to make new discoveries. Many of its articles are well worth considering for art classes as they stimulate thought in students. Not all are related to architectural housing, though some that are will be viewed in the next chapter.

Other sources, such as architectural programs also allow teachers to approach the teaching of architecture from a variety of points of view. In these programs the authors offer suggestions on how architectural housing may be studied. With a combination of suggestions from a number of sources it is possible to create an interesting set of descriptions for the classroom material.

1.9 Sowing Seeds of Awareness — The Neighbourhood and Beyond

Homes affect the atmosphere of a community, while sheltering the owner and offering challenges in creative continuity, and the work on the neighbourhood continues after it is built (Chapman, 1999, pp. vi-vii). Therefore, allowing students to make discoveries about house design would increase the likelihood of better decisions regarding the future of our neighbourhoods and communities. Through the process of architectural design students begin to experience and learn how to handle its complexity. The use of design-based curriculum, focusing on architecture as housing, helps students learn about taking part in the complex nature of the real world surrounding them.

Research material in art education commonly reiterates this need for the existence and use of learning material that is closely connected to the world around students. The above mentioned process would have clear application to areas of students’ lives beyond school; thus making the work they do in school pertinent both in the present and in the future (Duncum, 1999, p. 296; Gardner, 1993, p. 389; Taylor, 1999, p. 118).

1.10 Summing Up

In-class communication gives students an arena in which to increase their comfort with expressed thoughts about a topic that is being studied. Thoughts cannot be fully developed unless they are expressed in some way — verbally, in written form or by physically producing
their ideas through drawings and or models. Students do not often have a classroom opportunity to talk about or to think about buildings and their influences and so they do not have organised space in which to develop skills in this field. It is necessary to have this place of learning, because being adept at making oneself understood comes out of practice with pertinent vocabulary, until one can communicate and think comfortably about issues and ideas from the field studied.

Through students' interest in the topic of architecture and the investment of themselves, their time and energy in the project, they experience achievement and success, which then heighten their sense of self-confidence, while increasing their motivation to work on the project. The students gain skills in co-operation and in the sharing of ideas as they work together (Davis, Hawley, McMullan, & Spilka, 1997, p. 94) to create plans and models. Thus, in all its complexity, when teaching architecture through the design-based curriculum, there are powerful positive outcomes as it builds the experiences of the students.

As I think of my own experiences with architecture, I find that I wish to encourage students to discover a fascination with architecture and built spaces, particularly in the area of personal housing design. The type of student discoveries I would hope for will only develop through exposure to building forms and design, with opportunities to communicate about them and to manipulate and handle space from an artistic position, allowing development of discussions about the designs — students with students, and students with their teacher.

Again, through such an architectural housing study, students will be given new opportunities to stretch their capabilities, developing skills that will become applicable to other subjects in school and to other situations beyond school life. In the following pages, I will attempt to answer --- what art projects promote the development of thinking skills and intrinsic motivation, in high school students? What process enables students to solve problems, which relate to the neighbourhoods and life that surrounds them? As well, I will describe the architectural unit development and its application in the classroom.

In Chapter Two I will review programs that are available in the area of architectural education and articles on architecture in education. Chapter Three documents ideas concerned with producing curriculum and the process of doing action research, while considering its application to this thesis. Chapter Four delineates the architectural unit as a sample. The fifth chapter describes this unit in action --- defining my experiences with applying the unit to a classroom and the students' experiences, while they worked out the complexities of the learning
process through problem-solving. A discussion of the conclusions is found in Chapter Six, as well as the implications for further classroom learning and for further research.
Chapter Two
Literature Review

2.1 Preliminary Comments

There is a wide range of possibilities for curriculum using architectural housing content for an art classroom. Yet the topic is seldom approached for presentation in high school art classes. It has not been frequently found in journals, though it is now gaining some momentum as an art subject. In spite of this, for years architectural forms have been studied as art in art history programs in universities.

Some very good examples of curriculum for architecture in education exist, but by focusing on my topic of architectural housing, I am not able to present all that I find interesting and informative. Avery (1993), however, highlights many ideas connected with the study of our built and natural environments and makes comments that clearly define architectural studies as an important topic to be used in an art classroom (pp. 21-24).

In her analysis she presents the undervalued or misrepresented position that architecture has in art education; she stresses the need for studies in this area that include valuing issues of social importance, such as our lack of resources, low-income groups and gender bias in reference to housing (Avery, 1993, pp. 21-24).

Avery (1993) points out that the study of our environments began almost a century ago. The subject grew into an important area of study in universities by the 1970s in Britain, Canada and the United States (pp. 41-44), yet it is still seldom used as a secondary art project. Avery (1993) indicated that Eileen Adams (cited in Avery, 1993) made changes in the field of environmental studies which would also affect how teachers presented the topic. Through her analysis of art education and its teachers she pointed out that environmental studies or social issues connected with architecture in an art classroom were seldom studied (p. 46). Adams (cited in Avery, 1993) claimed that in a cited study, art educators failed to handled the topic of architecture:

[m]any teachers were confused about the purposes of art education and therefore found it difficult to relate to built environment education. Although art education was supposed to be a method for communicating response to the environment and a means of identifying and transmitting cultural values, teachers did not connect these concepts to the study of the built environment. When art teachers were asked to define their philosophy none included social content. The closer the art activity was to what was
considered "fine arts", the greater its relevance and legitimacy. The built environment was sometimes considered as reference material for making art products but rarely as a comprehensive study in its own right. (p. 47)

Since this analysis of art teacher's responses, however, Adams has helped to change the focus and relationship between the study of environments and art education (Avery, 1993, p. 48). Architecture has a place in art education and could be used in units that would prove interesting, provocative and abundant in learning for students and teachers alike.

In the following section, I will look at art curriculum with an architectural home building focus --- analysing articles, programs and a book, adding notes at the end of each summary to review and designate the material's position in relation to my teaching unit. The sources that I have found have been developed through work from Britain, the USA and Canada.

With guidance, the study of the environment --- built and non-built --- naturally draws students into thinking about the realities of our complex world of cultural, economic, and political issues, (Chapman, 1999, p. iv) embedded in artistic and design issues, while various aesthetics may also be considered. I have been looking for material that supports this type of development in students as it allows them to think through problem-solving as housing design, as mentioned in Chapter One.

What makes homes appear as they do --- what building elements are compiled to create their designs and what significance do they have for the observer and user of the space? Should we be willing to buy the cookie cutter spaces that are built in the developments of today? Why do developers ignore the value of age old forest growth when they build their neighbourhoods, razing mountainsides and valleys? All these questions relate to home building and ownership today and would be useful for students to consider.

When carefully designed, built and natural environments are inter-dependent, it may be said that one part of the tapestry depends on the other for the whole to exist. Is it possible to encourage students to see the possibility of interweaving their built space with nature, as they practice leaving more of the natural environment intact or at least think about how this can be done? If they were given an opportunity to work with architecture in three-dimensional form, also considering natural surroundings, would they look at their neighbourhoods in a different light and perhaps one day improve the standards that exist because they are more aware?

All environments, even our homes, are more public than we often realize. Other people
are affected in some way by the buildings, gardens and parks that we create to in which to conduct business, live our lives, and enjoy the beauty of our surroundings (Chapman, 1999, p. vii). Yet few people consider how their created space is likely to affect other people or the surrounding natural environment.

2.2 The Many Faces of Architecture in Art Classrooms

Due to my interest in high school curriculum, the works of authors who have developed ideas for secondary art education will be among my choices. Guilfoil’s and Sandler’s (1999) materials develop students’ thinking skills and challenge them to increase skills in many other areas as well --- three articles from their compilation will be included in my list. Next, I will look at a program that was created by a Canadian architect from the Architectural Institute of British Columbia, in 1999. The third set of curriculum materials was produced as a documentation of design in action and the power it has to produce change in student skills, Design as a Catalyst for Learning (1997). My work is largely based on its description of design at work. Then the Philadelphia Program (Abbau, Copeland, and Greenberger, 1986) will be looked at for specific areas of the program that apply to designed housing.

The book compiled and edited by Guilfoil and Sandler (1999), (Built Environment Education In Art Education) looks at some of the many concerns that are present in our world and that would make interesting architectural studies. The authors of the articles found in this book “identify major issues and offer diverse views about the meanings of environments --- multicultural, feminist, ecological, social and personal” (Chapman, 1999, p. vii). They focus on the varied concepts common in art, such as architectural history, urban planning, and criticism, which would fit readily into a high school art program.

The book’s articles are written as suggestions for teachers who would produce the actual lessons, sometimes through further research, while building on the information offered. The articles are clearly not prescriptive, or pre-designed packages, but are more open-ended ideas encouraging analysis and creativity from the teacher. It is material that could be considered by both elementary and secondary school teachers who wish to develop their own class material.

2.3 Personal Space and Public Place: Architecture and Narrative in Built Environment Education

Guinan (1999) draws on story telling (narrative) as an approach to architecture and built spaces. She shows the reader that through the process of telling our story we can learn
about ourselves while making connections with one another, in ways that are less likely to be available in a non-narrative course of study. Ideas found in Stories Lives Tell: Narrative and Dialogue in Education by Witherell and Noddings (cited in Guinan, 1999) are recommended for curriculum studying the built environment (p. 57).

Guinan (1999) points out three assumptions as foundations for narrative pedagogy:

1) “we live and grow in interpretive, meaning making communities”.
2) through story telling we can learn to “find our place in the world”.
3) understanding ourselves and others will begin to create our futures with suggestions for all that life can offer us. This understanding will be born out of sensitively and respectfully accepted dialogues among students, teachers and administrators.

(pp. 58-59)

In narrative form, students are encouraged to describe events and experiences from life, in the form of “histories, novels, photograph albums, movies, paintings, diaries, dreams, and imagination”. To use narratives in education, to our advantage, there must be a way for us to place ourselves in relation to other people, groups, cultures and environments — respecting, as valid, the experience and importance of others. Learning that exists through narrative is non-objective and non-hierarchical in nature. This type of teaching offers a place for exploring, asking questions, and challenging the architectural paradigms in existence, through students’ and through the teacher’s own narratives, and others’ narratives all juxtaposed. Through the shared stories there would be the hope that a socially critical view would develop into ethically oriented “care” and “reciprocity” (Guinan, 1999, p. 59).

The outcome of the narrative is perceptual development and increased understanding. Communicating through the use of a narrative (or a story) enables students to develop their awareness of an architectural space; and as students organise their ideas regarding particular spaces, at a subconscious level, their relationships with the spaces will change, actively, through the use of developing perception and through the development of the story or the narrative that springs from the descriptions of that space (Guinan, 1999, p. 59).

A narrative told by a person in a group can become an instrument of social change. By focussing narratives on many different areas of our surrounding built environments, the students doing this type of project could begin to describe our city neighbourhoods, increasing their understanding of the built surroundings. For instance, stories would exist as a part of the life
found in a store next door or in a roadside cafe — in such descriptions the lives of the clients could be described as they transact their business and interact with the built space and human beings that reside or work there. The focus could be a “garden in time”, or it could be a description of the building changes in the neighbourhood as people make their choices regarding building design and as they discover ways to build their communities. The narrative could also describe the story of the architect as he or she designs the architectural space (Guinan, 1999, p. 60).

“Narrative in architecture is the making of being in relation to time, space, people, culture, ideas and physical topographies” (Guinan, 1999, p. 60). And as the stories are told they may influence the thinking of the community of listeners or just one other person, bringing a new understanding of our history or the history of someone from another land. What are the interwoven tapestries like in our neighbourhoods?

To make architecture meaningful, it is crucial to consider the human and social relationships inherent in architectural forms and spaces and how we relate to them. These relationships cannot be ignored. For just as we may attribute minute personal associations to details in a room, on a much larger scale the tapestries of our individual lives are composed of fibers specific to our own environments, histories and social circumstances. The very structures of our built environments connect us not only to personal memory, but to those with whom we share our world and those who have come before us. (p. 61)

Life is full of stories and those stories are a part of the architectural trends visible in our cities. How a neighbourhood was designed, how it was built, how it has been used or is presently being used and how the architectural spaces affect the user, are all history. These questions and many others that students would have, could become the direction for narratives that build a history of the places in which we live.

Guinan’s (1999) stories from habitations of street-people displays the fact that all people who build dwellings place themselves in the built environment, even the buildings that for most of us would appear to be ghetto. These homes, though they are tenuously built and placed, make the builder and user feel rooted and positive in some way. The people, living in them, take pride in having a place that expresses their souls rather than being in a city institution’s room where “you leave your soul at the door”, (pp. 63-64) inhabit the room for the
night and then have to vacate during the day. A soul-less place of disconnection is created by institutions where the street people are sometimes forced to live.

A social theorist — Richard Sennet (cited in Guinan, 1999) commented that “the foundation of self-respect in our society is not having cash, but a place to live, ...” (p. 64). Having no home or no place to lay your head leaves the unrooted people with no sense of pride and ascertains that indeed they are poor. But a “home”, even if very simply built of discarded materials creates health and rootedness, no matter how uncomplex.

Guinan (1999) suggests that narrative can offer a way for people to communicate verbally the “experiences of their existence” (p. 65). The process, then, can become the development of a story giving opportunities to the listeners to hear deeply the life experiences of someone else and through doing so, they may change an attitude or a way of thinking to accommodate and understand life from someone else’s position. Everyone has their own experiences that are valid and enlarging for the hearer, if only we can learn to listen.

My views on Guinan’s article in response to my own area of interest:

In my opinion this article contains an excellent set of ideas that could be applied to curriculum that would expand student consciousness of their homes and neighbourhoods, as well as the history in one another’s lives. The material directs the teacher to use narrative and learning through the telling of students’ stories. Connections with others are built and identified with, purely because the story is personal, and people identify with others due to having had similar experiences or by being touched by a story told.

The students from the class I will be working with would have some very interesting stories to tell, as they are a multi-cultural class and their neighbourhoods likely reflect their multi-cultural roots. This is what makes working with my borrowed class interesting. But the time frame available for the class is already too short for all that I have hoped to do, and doing a narrative as described here would greatly lengthen our unit. Though I will not formally incorporate this idea into this research project I am sure that informally students will bring up information that suggests this method of study.

For my unit, I will allow students room to share spontaneously in this manner, but will keep this specific method of studying history in mind for many other possible units in the future as it will likely increase the learning possible, and will show students how interesting our lives can be and how much we can learn by being brave enough to share them. This type of study would most certainly encourage students to learn from one another.
2.4 Lessons of the Prairie School

Knivsland (1999) comments that architecture is the only art form that has so much everyday influence on our existence. Interwoven with its everyday importance are lessons that can be valuable to students. Through the study of architecture an array of other disciplines can be studied — history, sociology, economics, technology, and psychology as well as industry’s building materials and design itself (p. 69).

Analysis opens the way for many probing questions to be asked — “What is this building telling us?” “How is my neighbourhood different [from others]?” “Do these places affect who I am?” These questions could lead to questions of aesthetics such as “Is this good house design?” “Is that building art?”

As a meaningful study in architecture Knivsland (1999) recommends looking at the Prairie School of architecture and its place in society with the work of the architects from this group of designers. The Prairie School of architecture began at a time when Neoclassicism, the “Gone with the Wind” style of house, was in vogue. Houses built in the Prairie style were middle class accessible and were designed with usefulness and convenience in the designers’ minds, rather than being the display of wealth that Neoclassicism suggests (p. 71).

The Prairie School of architecture had a place in the movement against the art world that supported the Neoclassical and more formal designs. Other movements in the art world at this time were gathering strength against the more formal, extravagant architecture. The Prairie School held the view that “form follows function”, paralleling the thoughts of architects in Europe and in other areas of the United States (Knivland, 1999, p. 71) working against the standard flow of the times.

This school’s architectural style became a common style of home building, as its costs were within reach of the general American middle class. The group of architects who created this style leaned towards producing homes that projected visual stability. A variety of materials that were affordable were used in building the homes — plain concrete building blocks, decorative concrete blocks, wood, and stucco. Later metal and terra cotta were added as decorative touches in pierced art work (Knivland, 1999, pp. 74-75).

Frank Lloyd-Wright, a leader in this design movement, created influential design ideas such as those seen in the Ward Willetts house, in Highland Park, Illinois. Wright’s ideas were dominated by his aim to build aesthetically pleasing housing at a reasonable price. Most of his commissions were from educated middle class buyers, opening up an area of design that was
previously held by wealthy prospective home owners, who could afford costly designers and the costs of building large and sprawling homes.

Wright’s designs became so popular with everyday people that one of the plans was printed in the *Ladies Home Journal* in 1906. A “Fireproof House for $5000” was featured by the journal. This home plan became the architect’s most successful design and the most commonly used design during his early years as an architect. To create it he had used the “vernacular American four-square” design as his spring board and manipulated the shape to change it from a box form to a varied plan. It was designed to be inexpensive to maintain having energy efficiency, even with an open space plan. The windows were organised into horizontal bands and the lower elevations displayed geometric shapes for interest. A unique physical form and interior design with integrated wood work in the interior gave the house a more elegant and prosperous appearance dramatically changing it from its austere predecessor (Knivland, 1999, p. 72). It was carefully set in its natural surroundings, also being designed with sensitivity to human scale.

Knivland (1999) comments that architecture by its nature is “a collaborative art form, a result of a place and time. The people Wright inspired also inspired him” (p. 73). Just as other people inspired Wright, other architects from his time and later times borrowed ideas while creating new ideas --- a fusion of elements and styles became new looks. One such architect is Vancouver’s Arthur Erickson, who has expressed the same love for cantilevered planes and floating blocks of concrete and wood which he interweaves with nature to build homes in West Vancouver. Wrights’ influence, then, can be seen reverberating long after his first prairie designs, or his later housing such as Falling Water, Pennsylvania.

When Wright no longer worked on houses in the Prairie style, other architects continued with a similar Prairie design. For instance, a man and woman team Burley Griffin and Marion Mahoney produced homes that were original in form while still carefully considering nature. The homes were built out of cast concrete and reflected an influence from “Native American sources” (Knivland, 1999, pp. 73-74). Architecture and nature were analysed together while being visually balanced as total designs. Mahoney’s sense of decorative detailing gave the homes a distinctive appearance (Knivland, 1999, pp. 73-74). Other well known architects also worked in this design style and were successful in their work with the public.

The Prairie School Style of architecture offers many lessons in design that students could study. The designs offer aesthetic challenges, natural setting challenges and interesting floor plans followed by architectural articulation and sculptural form. While being varied, the designs
have an integrated design approach and issues related to homes are raised and are observable in students' responses to their learning material as they study the built spaces. Ecological and social consciousness are visibly interwoven with the designs, creating a unique learning opportunity through the introduction of design as housing. Harmony with nature, affordable construction and a 20th Century housing style become useful study material in the 21st Century (Knivland, 1999, p. 77).

My views on Knivland's article in response to my own area of interest:

This paper is among my preferred articles in Guilfoil and Sandler's (1999) book and as I read I seriously considered whether I could use even parts of it in my proposed curriculum. In it, one reads about Wright's ability to weave his houses into nature. His thinking and the thinking of other Prairie designers could be a strong influence in student design, thus the consciousness of the natural environment that is projected in this paper would be valuable in the unit that I would like to produce.

However, the author's views regarding housing design curriculum would remove the freedom of choice that I wish to encourage in students. I want to allow them room for ideas that express their own aims for their dream homes. No one will have exactly the same ideas as another person, so to force all the students to follow one style would remove, from the unit, the characteristics that teach the greatest amount of knowledge and skills through students' personal choices, while also encouraging the greatest amount of motivation. Choice offers freedom for different learning styles and interests to be expressed, while it increases the chances of greater motivation in students (Davis, Hawley, McMullan, & Spilka, 1997, pp. 121-122). I believe, though, that ideas from Knivland's article will be likely to permeate what I do with the class, even though it will not be directly written into the classroom material --- thoughts about ecology and energy efficiency are a few ideas that are parallel to ones that I will be exploring.

2.5 Going Home: Finding Our Roots in Late 19th and Early 20th Century Architecture

The purpose of this paper, by Francis (1999), is to look at the topic of the "home" in American Culture and to draw out of students their interest in architecture and history through increased awareness of their roots and their contemporary experiences (p. 174). The author feels that students are presented images of architecture that offer economic and social differences rather than being socially inclusive. Instead only the homes of those in the upper social stratus are viewed in the classrooms. This would create a continuation of social structure
that supports the ideas of class and exclusivity, alienating students who cannot attain this financial "level". Instead, Francis says that there is a need for a blend of vernacular structures and fine architecture, making the curriculum a "deeper and more interdisciplinary learning" experience (Francis, 1999, p. 174).

Architecture, Francis (1999) comments, can be used to create comparison discussions regarding our built environments as homes. Narratives about these personal spaces would be possible, resulting in increased understanding and appreciation of the values and possibilities that are expressed in our human-built environments (p. 174).

Homes create a sense of identity, and are a dramatically large part of a person's sense of self-worth. And "the relationship between self and shelter is formed under the canopy of culture, and education begins in the home, an unchosen space which surrounds and subtly shapes the development of young thought" (Francis, 1999, p. 174).

The wide gap between the home user and the creator or builder of a home has not always existed. Homes at one time were built by the users themselves (Francis, 1999, p. 175) --- though now most often they are created from a plan that is duplicated over and over with little or no novel variation. Houses, today, are designed by designers in a large firm working for a developer, or the designer's firm is the developer herself.

Presently, in Canada and the United States we see architecture that has been influenced by design styles from all over the world. The memories of the people who immigrated to North America were capsules of the culture left behind and people built their homes based on these memories. From log homes of the Nordic and Germanic peoples to Greek and Gothic influences, house designs were highly varied at the turn of the 20th century. Ornamental details were applied to a vernacular home design offering a variety of appearances to the home owner (Francis, 1999, p. 176).

The author asks how we, as teachers, can begin to draw students into an understanding of architecture during a time when homes were built of sod and stone, or other available materials; and then proceeds to answer that question by commenting that it might be done through inquiry. Students could do a search of their own family trees --- through the use of photographs and family history and through classroom discussions of cultural roots, a mapping exercise at local, regional, national and global levels (Francis, 1999, p. 177). Other suggestions are made for methods of research with a project of a model to follow.

The hope of this study would be to draw out "the architect within". The teacher would enable this development through moulding the classroom environment into an arena for gaining
knowledge. To produce this aimed for affect, students would be encouraged to observe the cultural and historical architectural settings, while also giving them opportunities to communicate about the importance of aesthetics throughout their work. Thus, students would increase their perceptual awareness, technical skills, and their awareness of good design and its principles (Francis, 1999, p. 179).

Students would improve, through practice, their artistic skill as they drew building elements describing “texture, value, space, balance, proportion, line, form, and perspective” (Francis, 1999, p. 179). Francis (1999) also comments that architecture as an art form, in three dimensions, “can provide opportunities for manipulation of solid, void or continuous spaces, the study of light, or rendering of planes and masses” (p. 179). Architecture’s multi-faceted qualities allow it to be a multi-tasked teaching tool with endless possibilities for learning.

*My views on Francis’ article in response to my own area of interest:*

*The idea of the architect within is the soul of my art curriculum’s direction. Each student has desires that they wish to develop, as they experiment with space. Their interests and experiences, which would include their own connection with historical design ideas found in their neighbourhoods, are likely to be highly influential in the house design that they share with their group members.*

*In my material for research, I would not ask students to dig into the history of the housing styles of their ancestors, as this would likely force them into building designs that they are not likely to want to create as their dream home. But the idea of doing such a study is an interesting one and would be informative if a teacher chose to use this material for an art class. Francis’ suggestions of students doing inquiry to produce preliminary ideas, then producing a 3-D model with the students playing the part of the architect clearly support my own curricular ideas.*

In the material I have read in Guilfoil and Sandler (1999), a challenge is offered to art teachers to help students develop architectural design consciousness while also encouraging them to see the varied and interesting views that our world can offer through studies in architecture. If a teacher chose to look at art education through the views offered here, students would be given a deeper understanding of the world and themselves through intriguing interdisciplinary projects, while students, themselves, would also contribute to the development of their own personal skills. In my research, I know that I will be affected by Knivland’s (1999)
sensitivity to the natural environment; and will use the ideas of the "architect within" from Francis' (1999) chapter. She also supports my wish to have students produce a model and believes they are capable of learning to do so.

2.6 An Architectural Design Package by AIBC

The second set of architectural curriculum suggestions that I will look at was created by an architect from the Architectural Institute of British Columbia (AIBC). The institute has produced architectural curriculum for various levels of grade school, though the package I am commenting on is recommended for high school. This package explores design, what it is, and how the phrase "form, follows function" plays a part in the design process. Students are drawn through various stages of architectural design, experimenting with design's influences on space as they look at how functions are part of the design equation. In general, the curriculum suggests studying work by architectural designers, observing how they manipulate the forms, how they use rhythm in the placement of architectural elements, and how designers interweave the parts to create the whole. It encourages students to observe the effects of various ways of seeing building designs; and they are to consider how buildings affect viewers and users — emotionally and physically, while they experience the spaces. It looks at architecture from analytically "poetic and prosaic" positions by asking students to analyse building appearances to comment on the rhythm, cadence, and line of various buildings (AIBC, 1998, np.).

The curriculum begins by asking students to study building entrances that they appreciate or find attractive (AIBC, 1998, np.). Through this assignment students learn about individual and societal values visible in our cities, in public spaces and private sector spaces, as well as in our homes. Students are given an opportunity to observe the variety in building personalities which would be found in building entry ways. Architectural vocabulary is developed and students will learn to be discriminating through analysing their chosen entry ways and through working on other related projects.

This curriculum presents various paths into the study of architectural material. It looks at proportional systems using thought from the Renaissance to Japanese tatami mats for dimensional discussions. These studied proportional systems are later meshed producing an altogether new proportional system. Building space is explored through the discussion of symbolism. Human values and needs play a part in the symbolism and are communicated as well as experienced in built environments. This communication and experience is translated into a simple form that can be looked at in art classrooms in high schools (AIBC, 1998, np.).
The use of broad gesture brush strokes that simulate the work of an architect in his or her preliminary thinking stages, that create atmosphere and indicate form and articulation is set into a lesson plan and project. Students are asked to illustrate and communicate the building design, rhythm, structural form, fenestration, landscape, materials and even signage through this loosely drawn style of hands-on communication (AIBC, 1998, np.). Experimentation becomes an important focus as students work to express their ideas through an artist’s/architect’s brush, without an abundance of detail.

The lesson plans created for this curriculum package are based on ways that architects think and see, while they are creating built spaces; the lesson plans are clear windows that allow a view of the thinking, while also teaching students to think in the manner that an architect would.

My views on AIBC’s curriculum in response to my own area of interest:

This package, if put to use, would mean that architecture would be taught as art over a two month or longer period of time, rather than merely a unit in architectural design. Perhaps portions of the package could be used, touching on chosen parts of the material. However, the package is designed to be used as a whole curricular experience, and one section would tend to build on another, and this quality would be lost if the material was presented in pieces.

Nevertheless, I will be using portions of these ideas as they overlap into the design area that I have been looking at for my research experience. For example, AIBC’s material recommends that students analyse the work of various architects to learn about design. It also suggests that students can produce work in a similar way to an architect. These two suggestions are parallel to the curriculum that I have chosen to present, and they afford a fresh and enriching opportunity for a whole new learning experience.

2.7 Philadelphia’s Architecture in Education Program

This next package was designed to be used in Social Studies, Language Arts, Math and the Fine Arts, again a clear reference to architecture as interdisciplinary work which is also found in Chapter One and in previous examples of architecture in an art classroom. Here, guide lines are suggested for teachers, who then decide on the direction of all their classes’ activities with support from the material that was designed by architects and other teachers.
Alan Levy (cited in Abhau, Copeland, & Greenberger, 1986), an architect, states that teachers should feel free to use their own planning skills to further develop these lessons or to develop their own material. He believes in the knowledge and teaching skills that teachers have personally developed and fully supports their own curriculum search and development (introduction, np.).

When this program is used each year in Philadelphia, though, the material is presented by a professional architect, a student of architecture and two teachers. As the teachers work with the program and become more familiar with it they develop their own additional material (Abhau, Copeland & Greenberger, 1986, introduction, np.).

The guidelines described in the program have been used in the Philadelphia area for a number of years, building students’ awareness and knowledge of architecture. It looks at architecture as perceptual, social and technological concepts. The program assumes the position of training students for their futures as leaders and decision makers in neighbourhoods of tomorrow. It is believed by the program’s organisers that students will one day build these neighbourhoods and work with the city leaders to make positive changes where they live (Abhau, Copeland, & Greenberger, 1986, introduction, np.).

Rolaine Copeland (1986), the director of the program, comments that the Philadelphia program has been influential in bringing about change. She states that students show their enthusiasm while working on assignments from the program, and through their work with the program, students increase their awareness of the effect of the environment on behaviours. They learn how they can be influential in changing the environment and how they can become more conscious of issues applicable to environments (Abhau, Copeland, & Greenberger, 1986, introduction, np.).

The home is a common topic of focus for this architectural program which is organised through a set of lessons that develop work with students and their homes. Students are walked through memories of their past and present family homes, homes from other cultures and their own “dream homes”.

In the curriculum, the reader finds that in one lesson students are led through several steps as the material helps them practice communicating about their own ideas, while defining their home. It begins with the teacher asking students to remember the first house they lived in by sharing a description with a partner, then they are to produce written material that describes it. The verbally compiled description is solidified by a drawing in colour (Abhau, Copeland, & Greenberger, 1986, p. 84).
Next, they are asked to write a description in mini-essay form, developing the details that they have already practiced while refining the description of the space on their own and with a partner. In their mini-essay students are to recall smells, sounds, tastes and tactile experiences that were part of their childhood environment. They are also asked to consider emotional experiences and neighbours together with other visual or verbal descriptors that communicate their lives in this first home. These pieces of information are to be added to their essays (Abhau, Copeland, & Greenberger, 1986, p. 84).

During this period of written and verbal communication practice for students, teachers are asked to consider their students’ cultural populations. Are there students from multicultural origins in the classroom? If so, then it is recommended that the teachers show slides, of housing from other countries, to the class. This would aid the memories of students who had left other countries and who were having difficulty remembering their first houses (Abhau, Copeland, & Greenberger, 1986, p. 84).

Developing the idea of the home further, another section of the program considers students’ “dream homes” as a valuable study topic. The material has students write an essay that describes the “dream home” by answering a series of questions. For instance: Where would it be? What would it look like? What would it be made out of? How big would it be? How many rooms would it have? (Abhau, Copeland, Greenberger, & 1986, p. 92).

A close look at housing details takes place throughout the use of this topic. Some lessons consider details and openings in housing. For a teaching opportunity that shows students about the importance of the exterior environment, they are asked to draw their environment at home, as home work, by observing the exterior through their windows (Abhau, Copeland, & Greenberger, 1986, p. 89). The drawings of the exteriors then, are framed by their windows. In this way students are being asked to become conscious of what they find beyond their windows. What is the exterior environment like? The interiors are treated in a similar manner.

Throughout various sections of the program, students learn architectural vocabulary; and during the “dream home” project they also study planning and model building techniques while they work on producing a three-dimensional model, based on their writings and drawings that were executed earlier (Abhau, Copeland, & Greenberger, 1986, p. 92). Through this set of exercises the students are using a number of skills combined with communication and hand work, to produce results in student learning. Architecture is looked at from several directions as students study housing details that increase their knowledge and awareness of their spaces at home and in their imaginations.
The program looks at some areas that are very pertinent for today. For instance, with our looming energy crises in the western portion of North America and other portions of the world, the program looks at how to solve the energy challenges for home owners, due to the importance of grappling with this problem as a world issue. Through home work and in class work students are encouraged to think of solutions that teach them active awareness of the difficulties presented to a home owner. (No candy coated dream homes in this program.) The program also has parents communicate about maintenance that is necessary for a home in real life. Even their neighbourhoods are studied through various exercises and finally the cityscape is analysed. The material is a widely used package in the United States and has also been used in schools in Canada, being revamped for a local school district.

My views on Philadelphia’s curriculum in response to my own area of interest:

Again, this package, would be too large for me to use as it stands. It is very comprehensive with exercises that would gradually build student skills in thinking and design. Its use would give students many new experiences, while allowing them to rehearse the process of learning to communicate about architecture and more specifically about housing through verbal communication with classmates, written essays, drawings and then through producing models.

This approach verifies a number of activities that I have chosen to use in my curriculum. For instance, the usefulness of communication with a partner that I have read about in Davis et al. (1997) is applied in this program. The Philadelphia Program (1986) initiates students’ design process having them sort through details for designing their “dream homes” through verbal and written communication about housing, in general. I have, also, chosen to have students work on a written description to work out their preliminary thoughts about their dream homes. However, my additional learning strategy is to have students communicate with one another as they analyse the work of architects. In the Philadelphia Program (1986) they look at their own housing, past and present, much as Guinan (1999) recommends (pp. 174-180).

Many curriculum writers, though, comment on the study of architectural history as a valuable source of learning (Chapman, 1978, pp. 60-70; Szekely, 1999, p. 170); history can be a strong support to student discoveries in design, as together the topics are a natural combination for student learning. I have chosen to ask students to think about the designs they see in history books because generally, housing purchased by home owner’s is not
often designed in a sculptural fashion. The houses are based on a box shape with a facade that sometimes varies from home to home, but the plan is a basic square or rectangular.

When considering the work of Frank Lloyd Wright, or Greene and Greene, the design elements are clearly defined and the houses look well thought out with interesting plans and building shapes, as well as having additional elements of design that combined make the buildings unique. Also, these designs are more often worked into the surrounding landscape — the architect considers nature while creating the home. While generally, housing is built in the shape of a simple box, with a facade, the plan lacks a sculptural design; and it is less likely to have design details or natural environment to analyse.

In the material to be used for my own research, I will ask students to describe the home they wish to create, basing their descriptions on a handout of questions. They will talk to group members about housing ideas analysing them for good design qualities and I will ask them to draw their house plans, with bubble drawings and later with plans and elevations. This sequence of activities is similar to those listed in the Philadelphia program, however my material will be geared for senior high school, and though the material I have read appears to be k through 12, because the titles say so, the language used seems to be keyed for middle school; this, however, could be adjusted by any high school teacher who has chosen to use this material.

Students are involved in the process of learning in a number of ways, throughout the Philadelphia Program's (1986) material. Some of these curriculum ideas, and some in the upcoming review will encourage the teacher to arrange to have student leadership throughout the unit of architectural study. Facilitation by the teacher is in evidence in this program, which is also recommended in the material to be reviewed next. Students will do their research, and share their ideas with one another and with the teacher who then plays the part of a listener, an encourager and a guide. This practice, it would seem to me, would come out of the training the architects have received in their architectural schools — there facilitation is a common teaching practice.

2.8 Architectural Housing — An Art Project in Design

Another set of curriculum suggestions are found in a book by Davis, Hawley, McMullan, and Spilka (1997), where architecture is described as a multi-faceted place of learning for contemporary high school students. It is presented in ways that parallel, as closely as possible, the real world of design.
Design as a Catalyst for Learning (Davis, Hawley, McMullan, & Spilka, 1997) analyses challenging projects that can be avenues into complex and productive learning about the world we live in. This book is about design, in general, developed for K to 12 levels, as cross-course, interdisciplinary studies, but it also refers to art classes and presents design material that would lend itself well to challenges in an art classroom. For instance, it suggests, just as other programs have, that when studying architecture it should be interwoven with the world around us, in connection with the natural settings or the urban landscape.

Davis, Hawley, McMullan, and Spilka (1997) help the reader to consider the many ways that design can be used in any classroom; one can see that through a project that focusses on design, such as in its application to architecture, qualities of immediacy and reality draw students into the learning process and encourage students to invest their time and energy while solving the problems. Thinking through the complex projects that are offered to them challenges the students to view architecture or other topics in a realistic surrounding, while also giving special opportunities to the teacher.

Knowledge gained is further exercised through the development of interdisciplinary critical thinking skills, with higher order skills being used by the students. For example, through the process of producing a design, they will be: “comparing, contrasting, synthesising, structuring and innovating” (Davis, Hawley, McMullan, & Spilka, 1997, p. 26); these learning skills are exercised throughout the planning and designing stages, as well as during the production of a “dream living space”. Architecture’s complexity presents a space for interdisciplinary problem-solving with a need for students to think laterally and to develop alternatives while they assess their designs, choosing and discarding various architectural elements until the project is completed (Davis, Hawley, McMullan, & Spilka, 1997, p. 27).

Through architectural design students will learn to acquire flexible thinking, as most often design projects will consist of elements with varied priorities and conflicting needs. Ideas, then, must be carefully balanced to solve the problems, and choices must be justified. J. C. Jones (cited in Davis, Hawley, McMullan, & Spilka, 1997) calls the process of solving the complex problems — “glass box” thinking. This type of thinking requires an ability to “step outside of the process to watch oneself solve a problem” (p. 29), and to closely analyse one’s problem solving strategies and solutions while looking for an appropriate set of answers. The students, as the artists or architects, enter into the resolution of the problems through the use of self-reflection and self-evaluation — learning to reject poor solutions imagined, while further developing the promising ones (p. 29).
If the design project is challenging students will use a multi-dimensional set of intelligences, causing the development of skills useful to life outside of the school that are not often well developed in school. These skills are developed when a topic is viewed from a number of perspectives invoking students' responses, then, from more than one angle and with a response that has many parts to it, as one discovers in the complexity of architecture. Davis et al. (1997), comment that Gardner (1993) presents the following skills as those that are developed in students when projects have the desired complexity:

<table>
<thead>
<tr>
<th>Skill</th>
<th>Description</th>
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<tbody>
<tr>
<td>Narrational</td>
<td>presenting a story or narrative about the concept in question.</td>
</tr>
<tr>
<td>Logical</td>
<td>invoking numerical considerations or deductive reasoning processes.</td>
</tr>
<tr>
<td>(quantitative)</td>
<td></td>
</tr>
<tr>
<td>Foundational</td>
<td>approaching the concept from a philosophical and terminological perspective.</td>
</tr>
<tr>
<td>Aesthetic</td>
<td>emphasising the sensory responses to surface features that capture the attention of students who favour an artistic stance to the experiences of living.</td>
</tr>
<tr>
<td>Experiential</td>
<td>dealing with relevant materials that embody or convey the concept in a hands-on approach (Gardner, 1993, pp. 244-246).</td>
</tr>
</tbody>
</table>

Development in students takes place through the many thought processes needed to initiate and complete the design project and through the direct ownership that is part of the design process. For a designer (in this case the student) the planning and project phases are as follows: first, there is the need to understand and identify the problem, or problems inherent in a particular design. Next, the designer gathers and analyses information (research) that would apply to the design. To complete the information gathering stage the designer must decide how the project will be used and set up criteria for its functioning behaviour. Alternate solutions are studied and then the prototype is built. Designers' evaluation skills combined with their selection of the best choices will lead to the desired implementation of these choices. And finally, the designers will evaluate the project as a completed scheme (Davis, Hawley,
Students who are given opportunities to think through these steps will benefit as they practice critical thinking.

Growth in critical thinking is a natural outcome of design projects that allow students to make choices, while they experience the research, analysis and synthesis states that are commonly found in design projects recommended by Davis et al. (1997). Through synthesising and applying information that can be used to complete their architectural design project as a model, students are learning to work as a designer of architecture (Davis, Hawley, McMullan, & Spilka, 1997, p. 5). Students’ solutions to the project’s problems are not created through teacher directives and absolutes, but instead solutions are found through a process of discovery, as the students work through their research and apply it to their designs.

The exciting end product of student led research is that the students’ research will uncover a wide variety of areas that can be viewed and discussed, while being focussed on the general topic of architectural housing. Each student will see the problem set before the class from a different angle as they bring their own backgrounds, interests and experiences to the discoveries and will communicate these ideas to their group members, broadening the range of ideas brought to class (Davis, Hawley, McMullan, & Spilka, 1997, pp. 42-44).

This is a method of teaching that can have risks, as it is never clear beforehand what the direction of the class will be. The direction is worked out as students share their research — living and studying without preknown answers can be invigorating and some teachers find that they do their best teaching when they are “on the edge” of their own knowledge and understanding in a design, inquiry project (Davis, Hawley, McMullan, & Spilka, 1997, p. 42).

When initiating a design-based, architectural unit as an inquiry project teachers would not need to be concerned about lacking knowledge in architecture. Comments made by Barbara Van Wicklin (cited in Davis, Hawley, McMullan, & Spilka, 1997), who teaches gifted and talented students in New York, describe the experiences of a teacher who chose to teach design as inquiry:

Design adds to my effectiveness because I become a facilitator rather than a knowledge giver. I allow for learning to take place rather than be the information giver... I set judgment aside and join [students] in their quest. I am open to change and failure — and so are they (Davis, Hawley, McMullan, & Spilka, 1997, p. 43).
This teaching style sets aside text books or previous and over-used lesson plans. Each adventure with inquiry-based architectural design projects is new and fresh and motivating, because it is full of unknowns and unexpected discoveries (Davis, Hawley, McMullan, & Spilka, 1997, p. 43).

New “students ask different questions and invent new solutions”, so that each class functions creatively and finds a different set of questions and takes an all new direction (Davis, Hawley, McMullan & Spilka, 1997, p. 43). Even the teacher has his or her own creative needs met in the working out of the project. Mark Ceconi (cited in Davis, Hawley, McMullan & Spilka, 1997) in New Rochelle, New York says that inquiry helps him grow as a teacher by continuing his interest in his teaching; and he tends to be confirmed as a teacher as he views his ability to present his course materials from the best perspective possible --- which is design, with its many developmental outcomes (p. 43).

My views on Davis et al’s (1997) curriculum in response to my own area of interest:

This book contains the information that will fully support the curriculum that I wish to look at in my “art class on loan” and in any other art classes that I may work with in the future. The material recommends open-ended architectural design projects that support problem solving, critical thinking, and model production interwoven in one project. The student learning outcomes that are common to this area of study are ones that I desire to watch develop. The authors have written material that applies to cross-subject, interdisciplinary courses, and it does make specific references to architectural projects that would apply to my research situation, though it does not describe in full the direction I wish to take. Rather, the ideas are reinforced through the documented classroom successes and the comments made by the authors.

The material I wish to use will likely deal with four of the five intelligences that Gardner (1993) lists above, but if the period of classroom time available to me had been longer, it would have been possible to use all five --- all but narrative will be used for this curriculum. To avoid squeezing the last drop of willingness and energy out of the students, taxing their willingness to work on this project, I will limit the work load and alter my expectations to fit the conditions. This project is likely to fully involve the four intelligences listed as a good combination of traits to be found in learning exercises, according to Gardner’s (1993) views on multiple intelligences. According to his descriptions listed above, one would find that the project would be logical, foundational, aesthetic and experiential, increasing students’ knowledge and
experiences through their joint efforts in model planning and building; while the material would also be applied to life beyond school.

2.9 Summing Up

In light of all the interesting ways to study architecture it is difficult to understand the reasons for avoiding it as a branch of art; but it was once suggested that a greater number of art educators have focussed more specifically on doing interior design projects than on building designs (Stankiewicz, November, 1999, personal communication). As a study topic, however, architecture in its sculptural form is highly valuable as a tool for stretching student skills, as well as for its ease of focus on history, or on a study that includes the natural environment and sustainability or on other endless and intriguing issues.

Guilfoil and Sandler’s (1999) compilation of papers fulfil a need for imaginative views of architectural or built environment and suggest that through neighbourhood studies students could be taught to make building decisions for their own homes, or for local city buildings or for those across the sea, as in a global village project. Some of these studies could become experiences for the purpose of learning about preservation.

For my own purposes, in creating a “dream home” the most helpful source for producing art class material in the area of architecture is the book Design as a Catalyst for Learning (1997). It supports an approach that seeks to strengthen students’ problem solving and critical thinking skills, combined with manual skills. Design is intricately interwoven into the existence of architecture and so the design skills described in this book may be applied to the project produced for my research purposes.

Davis, Hawley, McMullan, and Spilka (1997) do not support teacher or program prescribed design --- such as that recommended in Knivland’s (1999) “Prairie Architects” article in Guilfoil and Sandler (1999) --- but rather they recommend encouraging individual designs as created through the students’ own ingenuity. They aim for designs based on the development of students’ initiative, their analysis of style and their problem-solving skills supported by the material that they are learning; and students, in their creativity produce their pieces through the use of multiple design approaches and solutions, due to varied ideas throughout their group work and influences from the class.

During my review of the literature, I found that my thesis questions were supported most clearly by documentation in Davis et al.’s (1997) book. There the authors describe learning
environments as they grew out of various experiences teachers had when doing problem-solving through design with their classes.

In my classroom material, suggestions from Davis et al. (1997) were supported by portions of the Guilfoil and Sandler (1999) book, together with the architectural programs, and make up the framework of my chosen curriculum materials. The blend of suggestions creates an art experience for high school students, that is described and documented by me, as the teacher-researcher, in Chapter Five.

Chapter Three looks at the nature of curriculum as it can be applied to my curricular study in an art classroom. I analyse the effect of the style of curriculum that is found in my case study. I also look at how the research is to be done and what influence it might have on the classroom research process.
Chapter Three
The Curriculum and the Research

In the first section of this chapter I will comment on curriculum development as a process, looking at ideas that are applicable to this thesis. My purpose, then, with citing the literature here, is to clarify the architectural housing material direction. I wish to share the comments of researchers who support this type of art curriculum, with an explanation of why problem-solving projects are believed to positively challenge students.

In the second section of this chapter I describe the projected research process, by looking at features of action research, before presenting how I applied this research style in the classroom. As I seek to answer questions regarding students and problem-solving, I look at how teachers can mould the curriculum before and during the presentation of the material. Through reflection and cyclical changes, a teacher can reform classroom material, and here, the classroom material is carefully considered with an aim to develop students’ problem-solving skills.

3.1 The Curriculum Development

Chapman (1978) believes a heavy responsibility is placed on teachers to “extend, enrich and sharpen each student’s awareness of what life has to offer” (p. 273). The words “each student” give a teacher reason to wonder how such a complex classroom journey can actually take place.

Also voiced by Chapman (1978) is the complexity of art education and the need for facing its complexity. Gardner (1993) supports her comments by pointing out that, not only is it complex in the topics available as materials, we, also, do not know a great deal about how students actually grow mentally, regarding artistic development. We do realize that this development is complex and “multi vocal”. Therefore, it is not wise to generalise about how students’ learning and development should take place in the area of art (Gardner, 1993, p. 138) by making the process of student growth too simple.

Comments by Chapman (1978) and Gardner (1993), above, touch on the complexities of learning, with each student having her own learning strengths. In the architectural project that I propose for study, a variety of learning styles would be accommodated by the problem-solving designs, with students’ own analysis of how the project should be approached and solved.

My choices are due to Davis, Hawley, McMullan, and Spilka (1997) documented examples of how design projects have a strong capacity to enable students to develop their
latent skills, personalities, and general personal qualities through the design choices they make and work on as models (pp. 20, 23, 25). Through architectural design projects, art students may learn problem-solving skills, and new ideas or knowledge. They may also hone a variety of other abilities, such as manual skills, while seeing architecture from an artistic perspective.

Curriculum, then, should be designed to allow the greatest amount of learning possible, for each student, with some study materials being written to support students as initiators of their own learning. And as the teacher facilitates, what will be expected of the students? Rathbone (cited in Miller & Seller, 1990) believes that children can have a special place in their own education. He comments that each child is "a self-activated maker of meaning, an active agent in his own learning process...a self actualising individual" (p. 146). When students are offered the opportunity to be self-learners they often take up the challenge; and due to their ability to learn as self-directed individuals, students will delight their teachers with new ideas.

Documentation of this self-learning process, as part of a design process, is found among the many examples cited by Davis et al. (1997). There it has been noted that through the use of design, students are led into opportunities of discovery through the use of problem-solving challenges and through the sharing of new ideas with a partner. Chapman (1978) and Gardner (1993) draw attention to the need for intellectually challenging work to build student skills (Chapman, 1978, p. 369; Gardner, 1993, p. 389) and they recommend that teachers incorporate the complexities often found in challenges. These student interests may be found in material focussed on building a model home.

Gardner (1993) also suggests that while curricular materials should be geared for developing students' "multiple intellects", it is also necessary, in order to encourage learning, to consider the interests that are typical for students of a particular age group. Students, with increased interest, will focus on their work for longer periods of time in class, will be more likely to invest a greater amount of their own time and energy into their learning process, and will continue through cyclical processes of learning through sharing with their classmates. For instance, teens have two main areas of interest --- interest in relationships and interest in their future careers (Gardner, 1993, p. 389).

Further supporting the importance of considering students' interests, Gardner (1993) comments that schools could experience more success with their students if they chose to focus more on students' interests and motivations, while giving students opportunities to increase awareness of how to achieve their own learning (p. 246). In Design as a Catalyst for Learning (Davis, Hawley, McMullan, and Spilka, 1997), the authors look, a great deal, at Gardner's
views regarding the interests of students in high school, and in their lives beyond school (Davis, Hawley, McMullan, & Spilka, 1997, p. 35). These authors suggest creating motivating and challenging learning environments through the use of various design projects which teach the students how to tap their own multiple intelligences spoken of in Gardner’s (1993) book (p. 246).

3.2 The Transforming Nature of Problem-solving

Davis et al. (1997) suggest that when architectural projects are arranged to challenge students with problem-solving --- thinking through designs --- they are transformational in nature. Unique and complex learning experiences are created, engendering student discovery through their work as problem solvers, (pp. 46-48).

The transformational capacity of design in school projects is well known to exist, and is supported throughout research presented by Davis et al. (1997) in several sections of their book. Their descriptions and anecdotes clearly parallel the transformational education practices that have existed to varying degrees in education since the 1960s (Miller & Seller, 1990, pp. 144-146). Curriculum materials that support transformation are based on several premises that are alluded to by Davis et al. (1997), and are also found in Miller and Seller’s (1990) writing below:

- Humans have ability to develop their “positive inner potential”. Even though students can behave in a wide range of ways, if the environment is supportive and the conditions are appropriate and encourage their development they will increase their skill capacity to higher levels of operation.

- Students have the ability to initiate their own behaviours. Young children are in need of the support and assistance of a teacher; however, as they mature, they are able to carry increased responsibility for their own learning.

- Teachers through facilitation are supporters of learning. While teachers may sometimes be directive in their approach to learning, in order to create a transformational classroom they will need to produce a learning climate that is conducive to trust and personal development, while they help students to acquire knowledge aimed at their learning goals.
In the transformational classroom student concerns are considered to be valid content by the teacher. The teacher may not have time to respond to every student concern, but generally the classroom environment should support student openness so that students feel free to share their views and ideas.

Self-evaluation becomes a central trait of transformational education. Kirschenbaum (cited in Miller & Seller, 1990) believes that transformationally designed education “tends to move away from teacher-controlled evaluation” and shifts into position for the student to do evaluation of his or her own progress towards the agreed upon goal. (p. 148)

This transformational position presented by Davis et al. (1997), is likely to be visible in a classroom that is using material that teaches problem-solving in design and would have several characteristics, which are listed here, being exercised and experienced in the classroom at one time. Miller and Seller (1990) describe transformational learning in action as:

the essence of education [which] becomes a process of creative, joint inquiry, learning of emergent knowledge and skills, rather than a teaching - learning process. The focus of thought, action, and responsibility is in the learner rather than in the teacher. The motivation to learn comes from sources inside the learner and the process, and from intrinsic rewards ... [and losses] within the very processes of interaction. The curriculum comes from the learner and the requirements of the process of inquiry, rather than from sources external to the learner. (Miller & Seller, 1990, pp. 271-272)

Throughout this architectural project, knowledge can be rooted in a student’s own personal meaning. And learning develops through students ‘turning over rocks’ and looking beneath them to discover and see the world through their own eyes and experiences (Miller & Seller, 1990, pp. 8-11). They also, though, will share in the discoveries of others, further enlarging their understanding of the topic being studied. These learning opportunities offer experiences from which students will generate concepts that they might not think about otherwise. Through shared discoveries students are likely to be encouraged to look at new ways of seeing, through the materials, and will also be in a position to change their perceptions, as they learn from one another.
The architectural housing project taught in a manner that echoes transformational ideals will give the students a great deal of responsibility for their learning and knowledge gained, which is key to the process of transformation. Berlak and Berlak (cited in Miller & Seller, 1990) say that through a focus on the “whole child” developmental changes take place in the student intellectually, as well as emotionally, socially, physically and in other ways (p. 9); thus, there is an opportunity for a wide spectrum of personal development for students working on projects from this approach.

For thought development to take place students need to be challenged beyond their comfort zones, in thought processes. They need to be asked to do work that is more complex, as well as being an interesting challenge to develop their problem-solving strategies (Miller & Seller, 1990, p. 101).

3.3 Inquiry Creates an Environment of Challenges and Supports Student Learning

The process of inquiry creates challenges in the classroom and builds students' abilities in critical thinking. The curriculum material can be developed by the teacher to encourage students to think in-depth about their assigned project. In critical thinking the curriculum focus does not have to be dependent on the teacher's input, but rather on the students' development as they are encouraged to delve into the material themselves (Davis, Hawley, McMullan, & Spilka, 1997, pp. 20-21, 42-43).

In good critical challenges the focus is not on a right or wrong answer, which would hamper students' freedom when answering the questions or probing the material. Instead, it is known that there are many possible answers and many views revolving around the problems that are set. Teachers encourage creative problem-solving and the development of good critical thinking tools in the midst of ambiguity, where trial and error are accepted as a process that develops ideas. Students probe and manipulate their answers or design ideas until they form more carefully created designs (Davis, Hawley, McMullan, & Spilka, 1997, p. 47).

Chapman (1978), Gardner (1993), Davis et al. (1997) and others believe that art teachers should try to incorporate into curriculum challenging projects that innately develop students in many areas of their thinking and personal skills. It is my desire to create such an encouraging classroom environment, while building an accepting, non-critical learning environment with students learning to openly and confidently share their ideas. The above reminders, reflected on and applied to the curriculum will help ensure these qualities exist in this architectural material, and on into further teaching experiences.
3.4 The Research

Action research is an active research process, with the teacher analysing his/her own practice by observing his/her own personal actions and behaviours, and the curricular material as it is being implemented, as well as the students' behaviours and actions in the classroom. During this implementation of the designed material the teacher stops to reflect on and analyse the activities and outcomes of actions taken in the classroom. As the lesson materials unfold the teacher stands back and observes and records the behaviours present, aiming to understand what is actually taking place in the class (Hobson, 1996, p. 2); here the teacher blends his or her analysis of the class activities and actions with the implementation of the curriculum.

In Hobson's (1996) paper it is recorded that action is the cog in the wheel that drives the process of the research as these actions and behaviours affect the quality of the curriculum being used in the classroom. Simultaneously, the eyes of the teacher observe, analyse and record the actions of all participants in the class --- the teacher and the students alike and the experiences of all, in their connection with the study material (Hobson, 1996, p. 1).

"Teachers are continually researching, working from the outside and the inside; looking outward and inward, perpetually moving back and forth between these two higher intelligences: the inter- and intrapersonal dimensions of human knowing" (Hobson, 1996, p. 3). The continual research done by teachers as a normal everyday procedure uses these two types of looking to improve the work developed for classroom activities. Consistent scrutiny and a search for quality in learning material take place during class work for a regular teaching situation. Action research also follows this pattern of development and, therefore, can be a very natural outlet for ongoing teacher analysis and changes.

As research develops, it “should speak for itself, and...should be a portrait” of the researcher (Burnaford, 1996, p. 77); it will be closely associated with the teacher’s desire for self development and/or improvement in classroom practice (Burnaford, 1996, p. 76). One of the main reasons for the research is for the personal purposes of the teacher, who will be looking deeply at events and actions in the classroom while trying to re-organize curriculum to produce the desired learning affect. The desire of the teacher will be to create a fertile learning environment, while looking for ways to further develop students' learning and thinking behaviours as they are affected by the teaching material.

The study of this type of research has been labelled qualitative research, and is often a highly personal look at an area of study (Stokrocki, 1997, p. 39). Due to its personal style it often comes alive as the experiences of the researcher are being described in their documentation.
of their research material. A story is being told through the application and analysis of the research material. Though it is not “legitimised” through the use of statistical data (Wilson, 1997, p. 26), the material does not lose impact through the story telling, instead the researcher creates an account of the area being studied. The research transferability is embedded in the topic and is built up through the written account of how the teacher has proceeded with an area of research. Therefore, the qualitative researcher is not aiming to produce “universal generalisations” but is offering “insights for future use” (Stokrocki, 1997, p. 39) — insights that resonate in the memories and experiences of the readers of the research, perhaps because they can sense similarity in their encounters.

3.5 Research Offers Personal Growth

Although qualitative research is not generalisable, it has one particular and very positive attribute when it is an action research project. Not only are students learning, but the teacher is also learning. Personal growth, for the teacher and the students alike, becomes the key to the process of documenting the co-learning classroom events, and through the written material the researcher clarifies the meaning of the experiences throughout the research project.

An example of this documented personal growth is found in Donnelly’s (1990) paper. In it she describes her unexpected discoveries made by holding back information from curious students. By not having answers to all their questions, students were forced to explore areas of the unknown. They learned new things through seeking answers to their own questions (Donnelly, 1990, p.144). Donnelly’s (1990) case study presents an action research project, where the teacher as a co-learner discovers the motivational technique of feeding and engaging curiosity. Through her documented unit the students learned about self responsible learning which became new knowledge, shared with other students.

3.6 Understanding Develops Through Ideas Discovered

In action research, one finds the idea of praxis, which is the actions moving between the theory and the practice for the teacher. It initiates understanding and knowledge gained by the teacher, which is developed through the action of working with a class of students. An important part of praxis is the “eureka” discovery of an idea or experience not noticed before, but that causes a change in the way the teacher chooses to teach. It takes place through the teaching a particular idea or concept through various means, including through teaching.
students to be self-learners, and thus it becomes an important part of qualitative work (McNiff, Lomax, & Whetted, 1996, p. 8).

McNiff, Lomax, and Whetted (1996) point out that people theorise, as teachers doing research, and they aim to build their theories. Teachers may, however, create a "tentative theory" which they are firmly aware may change with new discoveries. Those who are not threatened by discovering that their theories or beliefs are not quite in line with their new experiences are open to changing curricular materials, their actions or beliefs, to include their new discoveries. The result, then, is that these teachers "change their practice, and their practice changes them" (McNiff, Lomax, & Whetted, 1996, p. 18). Within an action research study, the points of change (or cycles) could be several as the teacher daily assesses the material while working with a particular class of students.

The time frames in which the changes take place are called cycles and within each cycle dwells the germinating question or questions that will develop for the next cycle. In theory, the cycle follows a pattern of the "identification of issue, imagination of solution, implementation of solution, gathering of evidence, evaluation of solution, and modification of practice" (McNiff, Lomax, & Whetted, 1996, p. 107); this neatly delineated package, being linear, is not normally this exact in its actual occurrence. The basic question could begin with "How can I improve..." (McNiff, Lomax, & Whetted, 1996, p. 107).

For instance, the question for my own research, would be: How can I improve the thinking processes and motivation of the students? What must I do to promote the greatest amount of learning and motivation in students, while teaching architecture in an art classroom?

The flexibility in the teacher's style of teaching allows her to be open to "the discovery... [that is] never made, [that] is always in the making" (Dewey, 1929, p. 76). We as people are always changing, in the ways that we think, and in the ways that we do things; and as we push our own boundaries to seek understanding and new knowledge about the world around us, we are affected by these new discoveries and changed by these findings. Allport described this search for knowledge as increased self-awareness. These changing views and ways of doing things dramatically affect the reality of a person's experiences and increases consciousness of one's own thinking and values. Allport (cited in Burnaford, 1996) believes that self awareness is an "intuitive knowing, a sense of rightness and congruity...a growing [internal] sense of what 'wants' to happen" (p. 4).
3.7 Reflection Directs the Research

Reflection is a large part of teacher directed change; and teachers who reflect on their actions and on their beliefs, theories and values, will most often be open to that change. Thoughtful self critiquing remoulds the thinker, building change into the teaching process and into the process of an action research project. By reflecting on, and making sense of their own practice, teachers are able to organise their teaching materials to enable student learning.

The writing down of the research journey also becomes visible through reflection, and pulls together both teaching and research. It is a form of inquiry which can be labelled as reflection-in-action or reflection-on-action. Reflection-in-action is defined by how a teacher responds spontaneously through thinking and acting; it occurs during action and "guides further action" (Hobson, 1996, p. 3) while the teacher is in the midst of the teaching process. Reflection-on-action, however takes place after the actions and events have been acted out in the classroom during teaching experiences. It looks at the actions after the lesson is completed and can be analysed by asking questions --- "What kinds of decisions did I make during the lesson? What responses and reactions from the students affected those decisions? What was I thinking during the lesson?" (Hobson, 1996, p. 3). Through verbalizing and manipulating thoughts as reflections, the teacher will enhance, change and develop their material and skills.

Reflection as a natural ingredient in the development of inventive lesson materials, is part of the planning and thinking in teacher-research; and it helps a teacher view his or her work "from a critical perspective and provide[s] valuable insights" (Burnaford, 1996, p. 34). It can be a tool for the observation and restructuring of classroom activities and behaviours for both the students and the teacher. The teaching components -- patterns, themes and meanings -- become visible in a carefully kept reflection journal (Burnaford, 1996, p. 34). Descriptions of teachers' behaviours and responses to students are defined in the journal's pages as the parallel changes in students are noted and constructed in written form, aiding in the teacher's development of a new and sometimes unexpected clarity.

3.8 Research --- the Written Process

To begin the process of writing the research material VanManen (cited in Jeffers, 1993) suggests that the writer analyse field notes, or in my case, the journal, searching for essential statements that will become themes. This is to be done on a line-by-line basis (pp. 12-17). Stokroki (1997) comments that it is useful to look for repetitive words or ideas that normally may not catch one's attention. The number of times an idea or words are repeated suggests their...
importance and validity to the research. Emotional intensity is also an indicator that the information documented in the journal is meant to be placed among the details of one’s final piece of research (Stokrocki, 1997, p. 44).

Some of the shortcomings of action research are centred in the way a qualitative thesis is produced. Although there is no statistical data that may be accidentally altered or misinterpreted, and which would slant the research, in a particular way, the process of writing a qualitative research paper has a sensitive balance and needs to be approached in a scrupulously honest manner. The descriptive material in the research is carefully written and screened by the writer, and other readers. During the observation period a journal, or written documents within my journal will be kept to record the daily activities, both during the classroom activities and after the classes. All anecdotes and experiences will be considered important for journal entries and the entries will be reflected on to capture other ideas as they are incubated throughout the research process. To help circumvent misrepresentations others who read it, during the writing process will be asked to look for material that seems to overstate the findings or seems to describe the research in a manner that could cause misinterpretation of the observations by future readers (McMillan & Schumacher, 1989, pp. 196-198).

3.9 Summing Up

During the action research process, the teacher designs the curriculum which is implemented as classroom material. Throughout the implementation the teacher stops to analyse the student actions and the teacher’s own actions, as well as the outcomes of these actions on the classroom environment. The research demands a form of standing back, somewhat, to view the class in action and to write down the observed activities and actions. The aim is to try to understand what is actually happening within the classroom. In the midst of this process the ideas of theories-in-use --- active theories --- are described by the teacher-researcher (Hobson, 1996, p.2).

One of the main reasons for pursuing the research process, then, for a teacher, is to look deeply at events acted out in a classroom situation and to look for ways to improve the material taught as well as the ways of presenting it. There is a teaching goal to reorganise curriculum to produce the desired learning affect. And the continual research done by a teacher in normal everyday classroom activities is due to a constant search for perfecting the curriculum.
A description of the sample unit, based on this chapter and previous ones, and as it was run in the class is presented in the next chapter. The action research, as documented, is found in Chapter Five of this thesis.
Chapter Four

The Sample Unit

4.1 Introduction and Rational for the Sample Unit as an Architectural Study

This chapter describes the architectural unit before its implementation in the classroom. The material found in this chapter will describe directions to be taken in the classroom and the following chapter presents the learning situation (the research).

Architecture affects daily life, including its "impact on the quality of living" that humans experience. Designed spaces surround us informing us in some way as we interact with them; and "[a]rchitectural environmental spaces are defined by our movement around them and through them and by the flow of movement that the [designed and built] forms themselves suggest" (Chapman, 1978, p. 333). The physical forms or their sculptural forms are inescapable and will be considered when looking at architecture in the studied art classroom.

According to Chapman (1978), architectural design as well as environmental design are two fields that are "among the most important art forms to be considered in the education of [students]” (p. 334). Throughout this project it is hoped that students will be increasing their sensitivity to architectural design elements and to good design while also working on an understanding of the skills and materials used in the work of architects.

By learning to analyse forms and to make their own design choices, students will learn how designers' decisions can have a dramatic effect on how a particular home is experienced by users and viewers (Chapman, 1978, p. 338). Chapman (1978) recommends giving students opportunities to discover and "appreciate the artistry of architecture and environmental design, from] ... the creative side of these fields, not merely the technical side” (p. 336). In order to enable this learning to take place there is time allotted for discussion and experimentation.

An architectural housing project will be produced in three-dimensions, just as it exists in real life. Chapman (1978) recommends that teachers will benefit students if they present an architectural project as a three-dimensional assignment focusing on functional design and communication (p. 377), which are important factors during the design of architecture. Students will begin to understand the process of actually building a home by producing their own home as a model (Chapman, 1978, p. 330) while they are meeting and solving a large number of problems.

Through this assignment, student discoveries will include the development of their knowledge of the subject, while also making discoveries about themselves — their preferences in
housing, their problem-solving skills, their interests and own abilities to create. Each of these areas will be honed through the project. The problem-solving project is developed in a manner that will allow students to become empowered in as many skill areas as possible.

4.2 Day One and Day Two

Individual research for the architectural project

This project in architecture will begin with students doing a one-page written description of what their “dream home” could look like. The students will be asked to describe as clearly as possible the characteristics and features that they would like to build into a home of their own, in an ordinary neighbourhood. A set of questions will be given to the students to help them identify the areas that could be written about.

Through this exercise the teacher will be informed of the students’ knowledge of architectural housing, or lack of it. The description will indicate the vocabulary facility possessed by the students and will be a source of comparison at the end of the project.

Students will complete day one, through the use of architectural books selected from a local and school libraries (36 books to choose from). A Municipal library field trip would have been of benefit, if time had been allowed.

The books available to the students will be a range of architects from 1900 to present day, in order to allow for the variety of student ideas that may be found in the classroom. To teach students the variety of cultural designs that are available it will be useful to choose books from various cultures, as well as those from North America.

Individual research will begin when the written work is completed. Students will be asked to list their architectural preferences while looking at the work of architects of interest to them. Students have ideas about the designs of their dream houses; but the ideas are often not as clear as they should be in order to produce the houses as models. Looking at the ideas of others will begin the process of clarifying what a student’s interests actually are.

On the second day of the unit, students will look deeper, by continuing with their points of view, but developing them with further study of the architecture of the architect. This will become a research project guided, or facilitated, but not dictated, by the teacher; the students own interests will dominate the choice of the architecture, while the teacher will be available to help those who are needing more input.

Students will think about who their favourite architect might be or what architectural style they might be interested in. There is a good chance that the students will need to do
discovery research to begin to sort through this question. They will be encouraged to look for styles they find particularly appealing, likely the best learning tool for designing the house they wish to call their own. During this research period, they will also be asked to draw plans and elevations of the house they are designing in preparation to share these with others in their groups.

One might be tempted to skip asking the students to do their own individual research, but I would ask the students to begin the process on their own, because often I have found that in group work the more shy students will withhold their ideas and will not work on the project because a dominant leader in the group will direct the group and allow the reticent student to withdraw. I believe that by allowing all the students to do research work themselves, and to draw plans and elevations of their houses, the shy students are likely to take a more active role in the design process due to their own excitement over the project.

Also, by being allowed to look at the books on their own, students will start the process of planning on a more even plane --- more students will have knowledge to offer and though they will look at different housing designs they will have some ideas to contribute for the design.

4.3 Expectations for day one and two:

Students will be given handouts giving them a list of vocabulary words that are likely to be used as they try to communicate about the design process and as they do their analysis of architectural elements and forms. At this time they will be given the criteria that describes how the project will be approached.

Students, during this period of personal research, will sift through ideas and will begin to analyse their own thoughts gaining discretion as they look at the work of professional architects. Through this opportunity, students will refine their ideas, keeping some of their own detail interests and adding new suggestions to build their personal “files” of housing elements.

This process will increase students’ confidence as they reflect on and verbalize the pros and cons of the housing architecture which is found in their research. The student verbalizations will begin the process of student transformation as they practice expressing their thinking and understanding of the work before them.

The students are likely to want to share their ideas with the teacher and with one another as they try to come to an understanding of how a building works --- what the light does to this building’s form? What does the texture and colour do to its appearance and how do these elements work together with the form? What effect does the fenestration have on the
sculptural articulations? Being allowed to converse about their responses to the architecture will aid student understanding of architecture, the ideas will begin to form more clearly as students use the language of architecture with their own descriptive skills, and students will develop a comfort with expressing ideas about architectural spaces.

4.4 Day Three and Day Four

**Group sharing and co-operative organization of the “dream home”**

After gathering ideas on their own for two days, students will be asked to share their ideas with the other students. They will do so by breaking up into groups that they naturally choose and there they will begin to negotiate the most desirable group design for their “dream home”. Their individual ideas and drawings, plans and elevations will be shared with their groups.

The research and design process will continue as together students will share their learning about architectural design elements, fleshing out their points of view, with further study of the architecture and the architects. Throughout this time frame, it is hoped that students will feel free to discuss and analyse the design work before them as they talk about the architecture and its details which they find in the books.

Through collaboration, students design and manipulate space in the manner of an architectural office. All come together with their own expertise and share ideas to provide the design. Generally, the time available to the designers is a great deal less than the design can bear, and co-operative work offers more design possibilities and a more effective use of available time. There is value in students learning to co-operate together, to discuss ideas and to learn to negotiate the areas of disagreement between them.

Students in their groups will, again, produce drawings of the buildings, with their plans and the elevations. These drawings, which will be designed and redesigned as the students work together, will later support the students in their arrangement of the building elements and structure and will enable them to construct the form.

Throughout their research, students will be encouraged to ask questions to try to better understand their design, or a particular piece of architecture. Through a questioning process they will likely make discoveries in the areas and issues found in culture, society, history and will increase their mental “file” of architectural details.

Observing the progress of the students, the teacher will watch for further development of analysis skills, while also looking for holes in student knowledge. If necessary and at an
appropriate time the teacher will fill in the missing concepts, principles of design and gaps in knowledge, leading the student into further learning.

Teacher-questioning will help students know how and from where to gather their information; as well the teacher will be open to offer information that has not yet been covered by the students or, if it becomes evident that certain students have made discoveries that will fill in the spaces, this information will be drawn out in class through questions, causing students to share the knowledge or discoveries with the class. The result will be student-led learning, based on inquiry and this will be the aim as often as possible.

4.5 Expectations for day three and four:

Students will discuss design ideas with one another, in groups of three; and all students will be asked to present concrete evidence of their involvement in their group through sharing their favourite architect and architectural style. The merged ideas of the student groups will project the appearance of their model. Some students ideas may dominate, but the hope would be that all students in the group agree and share responsibility for choosing the building design. The building, as a composite of the students’ ideas, will continue to change as the students work with the ideas, rejecting some, and adding others.

They will now spend time refining their design and working towards the physical design of their “dream home”. By this time they will have a good feel for the three-dimensional form of house design, and should be aware of how spatial manipulation can impinge on the space’s users, evincing emotional reactions to the space. For this part of the unit I will give them verbal or written materials that they will have to consider when doing the applied learning section of the unit. These will be ideas or “rules” that they will be asked to integrate in their designs to help them discover how buildings in real life are actually designed. (For instance, in order to have an appearance of a neighbourhood I will ask students to use the same model scale ---1/2” to 1’. And students will be asked to develop a 2000 square foot plan, with 1000 feet for each floor or a configuration that adds up to 2000 square feet.)

Note: The research project will be guided, not dictated by the teacher and the students own interests will dominate the choices found for the architectural housing, while the teacher will be available to help those who are needing more input.
4.6 Day Five through Day Twelve

Architecture alive --- the house being built

Using their final drawings created in their groups, students will begin the process of producing their house as a model. At this point, students will be challenged in many ways. They will meet the challenge of choosing the best materials for their type of building; and they will learn more about this material as they manipulate it to mold it into the model. A great deal of experimentation will take place as students work to form the design. Students will be encouraged to learn about the value of “trial and error” in their constructions, and the hope will be that they will learn to meet the challenge of “failure” with a new set of answers to their problems --- discovering the secrets of problem-solving.

As the project proceeds it will be evident that each group will solve the design problems from different angles, and each model will vary with the interests, knowledge and learning approaches of the various students in the group, as they collaborate. Thus, clearly, the grouped students’ approaches to the “dream houses” will be very different, creating a neighbourhood that has variety unlike the neighbourhood that would be likely to exist if they studied only one particular design style.

As they work on the building, the students will be drawn into considering the environmental effects of buildings as they are built and exist on land that was once bush and old growth trees. They will be asked to consider the effects of a neighbourhood on the land, with the hope of evoking greater environmental consciousness. They will consider how they can make better use of the natural landscape, and will be encouraged to consider how additions can be made to the land to improve the house if all trees have been stripped from the site.

The final section of the unit will give the students an opportunity to discuss their finished projects and to analyse them in a neighbourhood setting. Lots will be set up of varied sizes to accommodate the housing, and to allow the students to think about what natural environments could look like, by adding some symbolic trees, rocks and other natural symbols of the environment. After setting up the neighbourhood, the students will be encouraged to talk about what they have learned and will be encouraged to critique the houses and neighbourhood in the finished arrangements.

On completion of the lots and neighbourhood the students will be asked to evaluate their own lot and the lots of other students, including their simple arrangements of the trees and other natural pieces. They will grade one another and share comments.
4.7 Expectations for day five through twelve:

During this time it is hoped that students' investment of energy will be increased through experimentation with building materials. They will have worked to produce the plans and elevations for the model, and now students will manipulate their ideas and designs during this "perfecting" process. Can their "dream homes" be built as they have designed them?

At this time, students' discoveries of the complexity of architecture will become tangible. Likely, they will discard ideas that do not work or that their skills can not manage to produce and will create the final product, a compilation of their group’s ideas in constructed form. Students will likely develop an even greater respect for the architectural design process.

Architecture impinges on the natural environment around us, and to encourage students to recognise this situation, if time permits, I will give them reading material that would encourage them to think about architectures’ infusion into nature. Consideration of a number of questions that would promote their consciousness of the environment will be presented. How does your architectural design affect the natural environment that surrounds it? What can you do as you design the home to solve the problem of the destruction of nature that is bound to happen? Is it possible to consider nature and write it into your design?

4.8 An Important Side Issue:

Architects such as Mies Vander Roe and Frank Lloyd Wright looked at architecture from a highly technical position, as they trained young adults as designers; and they felt strongly that the students needed to understand various construction configurations and materials before they could fully enter into the design process (Blake, 1986, p. 230). The type of study that they are supporting, of course, would be during the training of architects, not of high school students who are learning more about critiquing and shaping space as problem-solving.

The views Vander Roe and Wright held were due to knowing that the building forms can not be produced and manipulated, in the real world, without, first, knowing details of construction. Architects, of course, believe that one cannot know how to push or stretch the rules of construction without first knowing what those rules are; and in everyday construction one would need to know which rules can never be bent lest through careless design a building could collapse, with rather devastating effects.

Students of architectural design, in a technology school, when working on projects will need to know an immense number of construction details in order to ensure the users of the building spaces are safe. This same wide range of knowledge would apply to understanding
materials for buildings that would be lived in and worked in. Students would also need to be aware of the needs of the individuals, as well as public safety issues and the comfort of the users being considered.

However, in a high school setting this type of engineering, detail consciousness does not have to take place in every design opportunity, and at intervals the students can be free to enjoy the creative and artistic side of architecture, while they are learning about architecture and the world around them. The high school setting could become a stepping stone for designer preparation and students could begin to learn the artistic forms that make up architecture while they are excited by the thought of learning and applying their new knowledge to a dream home. The project, then, would be a practical form of discovery and learning combined with having artistic license with which a young architect, designing a home for a client, would not be free to experiment. In offering students this artistic freedom in an architectural project in high school one is not suggesting ignoring Van der Roe’s and Wright’s concerns for learning design in the right order. It would be allowing students to play with architectural forms and ideas, in an area of building design that is of great interest to them, in a safe classroom environment while encouraging enlightenment and beginning design consciousness in students.

Even though the art classrooms’ look at architecture would not demand the intricate technological knowledge found in higher education — or of even high school technology classes, the aim of the art curriculum would be to open students’ eyes to the artistic side of housing designs through the past century. It would encourage students to consider their own interests, to consolidate them into verbal descriptions of their design ideas, a design produced on paper and in 3-D form that is an artistic impression of their dream home. High school students tend to prefer rather realistic versions of homes that express creativity and so the house is not likely to be a “far out” design that would look foreign in today’s neighbourhoods, also the process would afford the students the experience of thinking through the development of their home in three-dimensions. Architectural design is a complex system, and so, if intensely technical details can be left for another program it would allow for greater aesthetic, historical, social and environmental consciousness in the students; and it would allow students freedom to test their ideas and skills in the midst of their personal development.

In the next chapter, Chapter Five, I have described the classroom activities in detail and described observations of my own experiences as well as the students. This chapter, is the research in action in a high school classroom.

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Chapter Five

The Research in Action

To work successfully in our world we need to be thinking people — problem solvers and creative researchers; thus, well honed thinking skills are highly desirable (Gardner, 1993, p. 33). Throughout this project, the researcher was seeking ways to exercise and improve students’ thinking skills, through the use of problem-solving, while also increasing the students’ motivation. A problem-solving project in architectural design encourages students to use thinking and manual skills as they work through a design, from the earliest communication stages to the final completion of the three-dimensional model. At the outset, students start with descriptive analysis proceeding to critical analysis; they continue to develop and challenge other skills, until they have completed the model.

*Design as a Catalyst for Learning* (Davis, Hawley, McMullan, and Spilka, 1997), describes a learning approach I was interested in researching, as an action researcher. These writers offer a list of curricular attributes that teachers would likely wish to see as activity in their classrooms, as described in previous chapters. During the research period, I hoped to experience the claims, that Davis et al.’s suggested, lived out with my “borrowed” students and classroom; if learning and motivation took place in a setting where a visiting facilitator worked, then it would seem to support the claims in the documentation.

5.1 The Research Begins Before the Unit in Action

I began the research before I was to present the art curriculum on the topic of architectural housing. The ideas for the unit began through casual conversations with students, based on a set of questions which encouraged them to share their thoughts and feelings on the topic of a “dream home”. When asked about a home, students talked about a building on a lot -- no one made a reference to an apartment or a condominium; regularly students talked about single, detached family dwellings (Gustafson, 1999, np.). It became clear that most students would be highly motivated to think about and pursue knowledge in the area of a designed space, if it entailed producing a model of their plans. For these students, the idea of working in three-dimensions was highly motivating.

The students’ interests paralleled Davis et al.’s (1997) belief that design was a catalyst for learning and that through the use of such classroom material, student learning and intrinsic motivation were increased (p. 94). According to Davis et al., design as a problem-solving
project enthused students and then offered them an array of possible areas of skill development (Davis, Hawley, McMullan, & Spilka, 1997, pp. 20-23).

While considering teaching material for the art class, I was reminded of positive environments in which I had taught as an on-call teacher. My work allowed me to observe and reflect on what seemed to motivate the students the most. The classes I remembered with pleasure, were those in which students were actively involved in learning. I observed that some student activities have qualities that enhance students’ on-task behavior. Generally, I noticed that student behaviours are strongly dependent on the curricular activities; and whether students are motivated or not will depend on how interested they are in the material they are given as learning material (Gardner, 1993, p. 369). If applied to subject material that was of interest to students, one teaching tool that aided students’ interest was a critical analysis and problem-solving project which required thinking strategies.

For instance, I have watched a number of class debates that promoted group behavior, and though these activities were part of a social studies unit, the same dynamics would apply to an art classroom. In these examples, the classes worked responsibly with students in leadership roles, and while being only observed by a teacher (or, as in this case, the Teacher-on-Call). In one instance, I was asked to allow the students to argue their points without interruption from me. The topic was water conservation, with students taking many different positions in the debate. The students were thoroughly focussed, during the debate, while using their critical thinking skills.

The challenge of persuasion in a debate demands attention to detail, for the development of the argument. Students need to think through their ideas, expressing them with confidence and competence, while also listening to the other person’s views, in order to respond. Students focus their thoughts, offering their own ideas, when a class debate occurs in a classroom where students have grown accustomed to intense class discussions. Often there is not enough time for a complete discussion before the bell rings for a class change, and the energy lingers even after the bell has gone. How can this type of focussed energy be engendered in an art classroom?

There are other ways, as well, to encourage students’ thinking skill development. Researchers comment that design projects using problem-solving draw students into flexible, focussed thinking, while they also tend to lead students into being on task as they work together in their groups, learning through creativity (Davis, Hawley, McMullan, & Spilka, 1997, pp. 20-21); if the project has intrinsic value with interesting challenges, students practice
formulating ideas and solutions through various kinds of communication and hands-on activities.

5.2 The Research in Action --- My Own Responses to a Problem-solving Project

As the classroom research began, in order to follow the recommendations in the book Design as a Catalyst for Learning (Davis, Hawley, McMullan, and Spilka, 1997), I resisted urges to influence the direction students took to probe for design elements and details. It might have been easier to present students with an exact pattern of how their houses should appear by the final phase, as was suggested in Knivland’s article on the Prairie style of housing (Knivland, 1999, pp. 71-75). Easy seemed the path to “success” if unknown elements were eliminated from the research and the classroom behavior. If students’ work could be focussed on following my favourite forms in architecture (Frank Lloyd Wright’s “Falling Water”, Pennsylvania), perhaps, the projects would be a “success”, reflecting well on my own teaching skills. However, I chose the challenge of letting the students learn through trial and error.

It was unnerving to imagine the final projects, as they would reflect on how well I had done as a teacher, how well the unit was designed and whether Davis et al. (1997) were correct in their documentation regarding problem-solving. The class was borrowed and the process of the developments would be watched by a few people who knew about the research. I wanted the class to do well. I hoped that students would research, experiment and learn, and that it would be clear that they were applying their learned material to the “perfect projects”. It was also my first written research project; I felt as anxious as a mother before the birth of her first baby. (The mother, wanting the baby to be perfect in all ways, would experience anxiety about its possible appearance and its capabilities.) The process of doing the research carried with it an abundance of unknowns; and created a desire to control the outcome. If the material was to follow Davis et al.’s recommendations, the developments for the students would likely be greater. With these challenges, what would the “end product” of this study be?

A month before the research began in my “borrowed classroom”, I had made posters, with simple headings. The questions related to the direction I hoped to see taken by the students. One was headed “What is architecture?” The students knew we were looking at architectural housing and the images were to be of various types of homes created through the work of architectural designers. Another asked “What does ‘form follows function’ mean?” Each poster contained coloured photocopies of photographs of well-designed housing --- examples of work by leading architects and was to include others that students wished to add.
These posters were guides, in case students did not do their own critiquing and communicating about home design.

I put together many "safety measures" — basic vocabulary lists (from AIBC), introductory materials, and support teaching materials. For instance, I considered an article on self-sufficient home heating that was taken out of a magazine on house building. If students could not develop their own critiquing styles, my aim was to have information available to me, as a guide to discussions; each topic I chose was to help students understand the complexities of home ownership — if there was time.

I put together a small library of architecture and housing books that looked at influential architects from the 20th century and those who were in the forefront of architecture in the last century. As the time available to me with this class was very short, I made sure that the students would not be missing opportunities to read about or to look at the work of contemporary "greats" and their styles.

5.3 The Plan in Action --- the Early Stages

As this research began, I thought of the readings I had done and wondered what would be seen in the classroom activities — both mine and the students'. I reconsidered the questions that had initiated my search, those listed in the first chapter. What learning processes would teach students to think, while also being intrinsically motivational? What problem-solving projects would encourage students to invest time and energy, while they were learning skills that will be transferable to other walks of life?

Other questions encouraged my observation and reflection as the classroom activities began. Would Gardner's (1993) multiple intelligence theories be evident as the class worked on problem-solving in design, and would the research be an extension of Davis et al.'s (1997) documentations? My most pressing question, though, was — would students respond to the material, become more aware and ultimately use their learning outside of school and in the future?

*Design as a Catalyst for Learning* (Davis, Hawley, McMullan, & Spilka, 1997) contained ideas that guided the research, as I tried to put into action the open-ended classroom atmosphere that encouraged students to share. The teacher, they state, may be knowledgable in the area of study and so could be very capable of guiding the students through a particular unit of study, with detailed steps drawn up and followed. However, in order to watch the unique, design-oriented learning environment develop, the teacher would need to step aside from the
position of authority to become a facilitator (Davis, Hawley, McMullan, & Spilka, 1997, p. 42). The point would be to encourage students to be responsible for their own learning and to do special research into the topic to be studied. The teacher would listen to students communicating, rather than tell them what they needed to do.

As I watched the class, the students intrigued me as they talked about issues in the building field that concerned them now, and which could one day, in reality, affect what their own homes would actually look like. Students defined their interests, critiqued the buildings they saw in books, chose the design elements they wished to borrow, and applied ideas that energized them into doing their own work. They grew and taught others as they shared their ideas in class. These activities may be seen in the descriptions below (Gustafson, 2000, np.).

5.4 Individual Research by Students — Looking at Architects and Their Work

On the first day, students were given an introduction to the research about to take place. They were told about the aims of the research in which they were taking part --- 'students learning through problem-solving'. They were given a clear description of the research boundaries. Due to time constraints and the ethical issues for research, there would be no tape recorders, no quoted comments from students, no photographs of students in class and no video cameras. The students heaved a sigh of relief (though I sorrowed somewhat) and looked forward to the package of details that would start them on the path to building their housing models.

The project they were about to embark upon was described. The plan of the month ahead was outlined on a handout which gave projected dates for the work to be completed. I informed them of my position as support and facilitator, while they pursued their learning. The project's criteria were spelled out and they were given an idea of how the final grading would be done, with a student critique and an evaluation which was to be joined with mine for their final marks.

The class was asked to think carefully about the future and what designs they would be interested in for a home. As a journal assignment, (produced with some misgivings, on the students' parts), the class wrote about their hopes for their dream homes. For many it was a laboured process as they struggled to put their ideas into words. They expressed a desire to avoid writing the journal in full sentences and rather preferred to shorten the process by writing in point form. They were quite unused to writing journals in an art class. However, they wrote some form of description and communicated some ideas about a future home.
My research aim had been to have the students journaling their process, though I was also aware that from the onset it would likely be difficult to have them follow through with the journal from the beginning to the end of the month. Earlier, I had decided that their writing would be pursued at intervals instead of as a steady process, and that the journal might be left out altogether, because they were unused to doing one and time was so short. Had there been more class time, the idea of a narrated project with students telling the stories of their development and their models' development would have been a valuable approach.

After the students had followed the request to write down their ideas or their hopes for their homes, they began pulling out the books to see what architects they wanted to further pursue. As they were generally, a quiet group of students, there was initially not a great deal of discussion about the future tasks; however, they went about doing the research, with what seemed to be enthusiasm. For the first two days, students worked on their own research. It was satisfying to watch as most students pulled out more than one of the books that had been brought to the class.

For the first two days, I struggled with the inquiry approach. I was aware of my place as a facilitator and not as a 'teacher of all things'. Reluctantly, I realised that sharing too much with the students could influence them in ways I might regret, and that the innate qualities of the inquiry in design could be lost or at least measureably affected by my own views.

Bringing in the posters I had made would announce to the students that in my opinion the houses on display were architecture and this could cause students to draw the conclusion that nothing but these buildings were acceptable for the final project. It was not physically possible to display all the varied housing designed by architects on two or three posters, so I let them continue to use the books as their references. I wanted to know what the students would do to design buildings that were architecturally designed by analysing the housing they found in the books and by learning through talking about their discoveries.

In Davis et al. (1997) it says that students willingly mull over design directions with a facilitator who knows that there are no “right answers” (pp. 42-43). There is an environment of openness developed between students, and the teacher, which is supported by facilitation rather than by an authority figure. When facilitation takes place, the students are more likely to use their own set of developmental steps — based on the non-linear design approach — as they work out a personal design process. Throughout this development, the teacher listens and looks for ways to support the students further.
5.5 Problem-solving and Design Projects Have Their Own Set of Attributes

This type of teaching does not depend on textbooks or previous and overused lesson plans. Each adventure with inquiry-based design projects is new, fresh and motivating because it is full of unknowns and unexpected twists and turns due to not having every detail planned and controlled. The process itself has a tendency to be motivational because it is new each time --- new students and new groups take inquiry in unexpected directions. New “students ask different questions and invent new solutions” (Davis, Hawley, McMullan, & Spilka, 1997, p. 43). According to various teachers, even they have their own creative needs met in the working out of the project as Davis et al. (1997) suggest. The authors state that inquiry helps a teacher grow in his/her field by continuing his/her interest in the subjects taught; and he/she tends to be confirmed as a teacher as he views his ability to present his subjects from the best perspective possible (p. 43).

In the classroom where a teacher is a facilitator a new freedom occurs; one of the students, during the first two days, spoke candidly with me about a desire to become an architect. We had not spoken about this openly before the architectural unit, even though I had been in the student’s class as a Teacher-on-call during periods of the teacher’s absence --- sometimes a week at a time. The sharing was part of the decision making process that would direct future studies and I was honoured to take part in the planning. The student shared thoughts while perusing the research materials and seemed eager each day to start up a new conversation about architecture and designed housing.

5.6 Group Work Increases Student Skills in Communication and Decision Making

Other students worked on their ideas by expressing them to their classmates as well as to me. During the first days, through idea sharing and home design critiquing, they clarified their design element lists before joining their classmates in their groups. The communication that began to take place by the second day was preparation for the work they would do in their groups.

When the students teamed up with chosen group members they seemed more able to explain and defend their preferences regarding architectural elements and designs, than they had been on the first day. By this time, they had opportunities to practice talking about their views and they were more comfortable in discussions. The sharing had begun slowly, but the students came to understand that their thoughts about design were valid and educational to
share with others. Their ideas, when shared, sparked ideas in other students and the design conversations enabled the process of learning together.

Students were becoming self learners, questioners, researchers, and were daily motivated, just as was described in the book, Design as a Catalyst for Learning (Davis, Hawley, McMullan, & Spilka, 1997). Most groups worked together and worked out their differences of opinion, drawing and redrawing their plans and elevations. The teachers’ quotes from Davis et al (1997), began to come alive in “my own classroom”.

5.7 Discipline Problems are Fewer When Approaching Learning with Design Projects

Another advantage to the design approach may be found in the smaller number of discipline problems in the classroom. Most students are interested in working on the project and are engrossed in the research and problem solving connected with their project. More personal interactions plus greater student interest in the problem-solving process produces greater on task behavior from the students (Davis, Hawley, McMullan, & Spilka, 1997, p. 43). Due to their interest in their work, they are sometimes willing to work on the projects after class time. In our class, many times students displayed this urge as they were dedicated to finishing their models before the end of the research period.

5.8 Intrigued with Student Analysis

I was uneasy at first with the lack of sharing. Students were too quiet, seeming to be absorbed in the material they found in their chosen books. However, once they began to express their views about the design elements — sharing first between themselves, and then with me — the flow of sharing increased.

The verbal communication of the students reminded me of how Chapman (1978) had described language use and development. For Chapman, language is an important side of the interpretations we describe as our experiences. The interpretations, though, are also dependent on our perceptions and our understanding and alertness to our perceptions (p. 72). Practice exercises the language use of students and causes their own thoughts to be more accessible. It is through the possession of a “rich vocabulary [in the areas] of colour, line and other sensory qualities...[that we will]...discover clues to the expressive meanings of things we see” (Chapman, 1978, p. 72).

The second day, two students began the process of unravelling why they did not appreciate certain design elements that existed on a particular style of building. They wanted to
tell me why, and to my delight a discussion ensued. It became clear that the students were indeed involved in the work and were doing the questioning and critiquing. I had originally thought that we would have to “make discussion happen” through a “designed” class critique, which was against the “rules” of good design projects according to Davis et al. (1997).

As each new day began, students were again engrossed in looking at architects’ works, and were learning to appreciate the good points of designs that they might want to emulate. I watched and listened to them question, do research and critique in just the ways that I had hoped for, as students used language to build their understanding of the field of architectural design. Their actions and communication reflected that they were gaining new knowledge and learning about its application.

Students were involving me, as facilitator in their discussions, and were trying to work out what buildings worked for them and why. They were engrossed in looking at the finer details of architectural housing as well as the building’s form and other qualities. The time was rich with student analysis and learning, as detail by detail, students confronted forms they were not necessarily accustomed to. The housing in the books was not “far out” in the design field, but when students thought of their models, the design elements seemed to take on a new dimension and the students began taking closer looks at what they believed were good designs; they worked to describe them, working out their design interests as they defined the elements verbally.

These decriptions were common details that the students had not likely previously looked at as useful design elements. The process of seeing detail seemed to change with the students working to invent their own views of home --- they were becoming more alert to existing details and design elements in architecture. It seemed that students were experiencing the kind of personal development that Chapman (1978) describes:

Perception cannot be reduced to sensory experience alone. In full perception, we organize our impressions so that we can understand what they mean. Full response depends on our ability to interpret the things we see, hear, touch, smell, taste and do as sources of our feelings. Unless we can interpret the meaning of our perceptual experience, it has but momentary significance. When we examine our experience, we can better appreciate the value of heightened awareness. Our efforts to interpret experience are aided by adequate vocabulary to describe our perceptions, a balance between
objectivity and subjectivity, a willingness to speculate on alternative meanings, and an attempt to synthesize our impressions. (p. 72)

Through the process of interpreting their visual experiences, and through verbalizing what they saw and thought about when analysing the visual design elements, these students were learning about architecturally-designed environments. I was interested in how quickly the students focussed on dissecting aspects of homes designed by architects while deciding what to use for their projects. Through their work, they were learning to use language to express themselves. Only as they began to verbalise their thoughts and feelings would they be able to piece together their reactions to the buildings being analysed.

The process of learning to communicate about a field needs time and experience; work and activities that are devised to allow students to try out their descriptive powers, until they are comfortable with using them, will enhance the learning process. Thus, allowing students to interpret what they were looking at in the architectural design books gave them an opportunity to describe and to reinvent the buildings they most appreciated.

As I watched them work, I reflected on the observations by Davis et al. (1978) that verbalised thought processes and critiquing would happen naturally, as students design. This was evident during important parts of the planning process --- the students analysed and planned their homes, and they were intent because the study material interested them. Directional intervention from the teacher would have been distracting and could have created a feeling of an “authority in control”. Destroying the creative development of the students’ own design ideas could have led the students to produce their buildings in a likeness of what was suggested by the teacher.

The students’ critiquing was simple analysis, about the building element shapes, designs, and colours, that were used to accent areas of buildings. In spite of the simplicity, it helped them to verbalize what they thought was good design. One student pointed out a home that was designed with a combination of rectangles in a vertical position, fused together. She worked hard to describe the shapes that were used for this housing design. It was different, so it seemed difficult to describe; but she tried, by considering the visible shapes and how the different shades of beige, brown, and off-white affected the overall appearance. There were subtle colour changes (and no, they were not shadows) that the student recognized and talked about.

This project’s personal side was enjoyed by the students; they could relate to it and could formulate views that were shared with their partners. As the students talked they were
involved in their own learning about building forms — cantilevered rectangles, towers, curved walls, fenestration, colours, and textures. They looked at how various design elements were created, or whether they were visually acceptable. In error and due to my delight, I let the students know how great it was to hear their analysis. After our one-on-one discussions, I asked them to bring ideas focussing on critiquing the buildings they were looking at to class for an all student discussion the next class. (For my research, this became a cycle that had to be readjusted.)

If students had not been shy, it would have worked perfectly, as the next day was to be a sharing day in their groups. But by making a request that they share with the whole class I pushed them too far into the open, and one key student, who had proven to be the best analyst, did not come to class the next day. When I asked those who came to class to share their ideas about the building designs, with the whole class, students openly stated that they preferred to communicate in their own groups only.

It was disappointing to me that I had not left the plans as they had originally been written up — having the students sharing only in groups. I considered this my lesson to refrain from pushing a group of students who are shy and not accustomed to talking to the whole class. The students first needed to develop trust and a willingness to work with a large group of people accustomed to listening with respect.

The small group activities were working well, as interpersonal, student to student, and student with teacher experiences. Thus, I allowed students to continue working in their groups. Small group sharing, also, offered opportunity to learn new ideas as students shared with one another. In fact, a large amount of work was being done in many of the groups as they established the direction of their final project.

5.9 Students Learn to Apply Their New Discoveries to Real Life Analysis

A student mentioned that as she studied the architectural history books, she became more aware of how the buildings in her neighbourhood were built in a particular era. She had found her neighbourhood housing styles in the books, and was beginning to analyse and apply her new understanding and knowledge to real life situations. She also conveyed that she now saw her neighbourhood in a different light; her awareness of house design had begun to be heightened through her discoveries in our classroom.

Other students brought up their dislike of the bylaws found in districts. Students seriously questioned them — why should anyone have the power to tell anyone else how they
must build their own home? Isn’t that an invasion of privacy? Why would anyone have the right to bar the expansion or the building of any type of building desired by the builder? Why are monster houses allowed in some neighbourhoods and not in other neighbourhoods? One student responded very strongly and expressed that she felt it was a violation of her rights to be told how to build, where the building should sit on the lot, whether it could or could not be built out of logs, etc. It was the owners’ money that was being spent — why did they not have greater freedom of choice? These questions and conversations became ripples throughout the class as students brought up their concerns in this area. Any kind of outside control was too uncomfortable for the students to fathom and for them, it seemed to be totally unjustifiable. This particular concern became one of the main action research cycles that are common to this type of research.

I tried to help the students’ understanding by encouraging them to share their disgruntlement with the whole class. It would have created a good class discussion. However, they were not comfortable with this idea. I then decided to discuss it with them individually to help them to see how it would feel if someone built beside them a home that did not work into their neighbourhood. I asked questions about their preferences and tried to lead them to think about the neighbourhood building process and the fact that one person’s decisions affect others, sometimes adversely. I invited them to consider whether bylaws help to alleviate the stresses that could become major problems between neighbours. To further their learning I encouraged them to telephone the local bylaws office to find out what restrictions apply in their neighbourhood and why? They preferred to discuss it with people at their tables and with me.

5.10 The Issue of Bylaws Becomes a Critical Discussion

This topic was a valuable teaching tool for me and I wanted the whole class to become part of the conversation in some way, as it could become a powerful area of student learning. I wanted the students to be involved in the process — to try to introduce this issue to the class, I decided to add it to the curriculum on the spur of the moment. I came into class the next day with a sheet that described a couple of bylaws for our classroom neighbourhood.

The class, at the beginning, had been told about the scale to be used to build the houses, but there had not yet been ceiling height limitations placed on the buildings. I decided to teach the class about these restrictions by giving them bylaws, this one would be an eight foot ceiling height, except under uncommon certain conditions, when they could use eleven-foot ceiling heights, perhaps for a sunken livingroom. It was still early in the project’s development, so
students had time to adjust their thinking and to apply this restriction to their facade drawings and model plans. Thus, the full circle of action research was experienced by me and for the students who worked with me, as I put into action the issue brought up by a student, changing the curriculum to accommodate the new and valuable material.

The students’ responses to bylaw restrictions were very positive, even though the full impact of the issue was not felt by all students in the class, or to the same degree. At this time, the students were asked to discuss the bylaws with their group members. A number of conversations on the topic could be heard throughout the class --- particularly when the students began to assemble their models. It likely would have had more impact if we could have discussed the idea as a whole class. However, it was exciting to see how a topic such as architecture could naturally bring up personal responses combined with legal and other issues, while encouraging the students to think about the issues and so become more aware. The value of an architectural study, for me, became very evident in this situation and others.

Our classroom bylaws which defined the building’s size, and confined the structure to a two-level neighbourhood height caused students to realize that in real life this type of project had new complexities that they might not have otherwise thought of. A scale of one-half inch to a foot for their plans and for their model, making this scale the common denominator of each of the homes, would regulate the model size and make the proportions similar throughout the neighbourhood. Thus, when seeing the houses all together in the neighbourhood, it would be less complicated to do the final critique and evaluation at the end of the unit, and it would draw the neighbourhood together, giving it a semblance of reality.

The students’ brushes with reality, as they considered how design happens and how it is also formed by regulations, enhanced their understanding of the world they live in, and the world that they will one day have the opportunity to affect. “The future is not some place we are going to, it is one we are creating. The pathways to it are not found, but made, and the making of these pathways changes both the maker and the destination” (Davis, Hawley, McMullan, & Spilka, 1997, p. 85). The students would not be making real life pathways in their communities with this design project, but they were experiencing more about the life around them and the areas of life over which they will one day have influence.

5.11 Students Learn to be Comfortable with Uncertainty — a Trial and Error Encounter

One of the primary learning experiences for students during this project would be coming to the realization that design can be a complex way to express oneself in three-dimensions. It
was easy to think about and to visualize, as plans and elevations, but how much more difficult to be convincing in a manual approach, while producing a model. It took confidence to try and then to discard a design element, and to try again, without becoming discouraged by “failure”. Students’ experiences with trial and error and their determination to continue and complete the work showed the artistic maturing process that Chapman (1978) has described in her book *Approaches to Art in Education* (pp. 58-59).

Through the process of learning to control their building materials, the students used their judgement skills and continued to develop them. To refine their work through trial and error, students used thought, judgement and experimental problem-solving (Chapman, 1978, p. 59), continuing the reworking until completing their model. When a particular element could not be adapted to the material use or to the design, sometimes the forced change of plans would take my borrowed class in a new direction. In light of this change of direction, Chapman (1978) describes student’s experiences in these words: “Many works are created from unforeseen qualities that inspire new ideas and enable artists to salvage apparent failures” (Chapman, 1978, p. 59).

Students worked at “purposeful experimentation” (Chapman, 1978, p. 61) with materials and with design elements. Chapman (1978) talks about this trial and error process as a path to maturing artistically and mentally (pp. 59-60).

One student I was working with, for example, began to push personal boundaries of comfort by looking at housing elements that were unusual. To begin with, the student pointed out a particular wall that was felt to be impractical. How could the owners of such a house organize their furniture or belongings in a space defined by wiggly walls? It seemed completely unrealistic to the student and so the undulating wall was rejected as a design element for the group’s house ... yet at the same time the group was intrigued by it, and even though the discussion began with the general view being negatively skewed against the design, they continued to wrestle with the idea while the group began to solidify their plans.

An undulating glass wall creates many difficulties and questions when considering house designs — particularly if you analyse how it can be produced in real life, or for a model. What product would be used in a house to produce a wall that would have serpentine movement? Would it be made of glass bricks? But the wall visible in the book was clear and the bricks would break up the crystal clear effect; however, glass bricks would allow in light, and would likely be easier to build in reality. Could it be made of a large sheet of thick, heated and moulded plexiglass to create the form? What caused this wall’s wavy shape and now that it
exists in the building, in the research book, is it a good design feature for this house project, or any other house?

The student began to reconsider it. The more they talked about it, verbally articulating its attributes and its pitfalls, the more she liked it. Her group decided to try to produce it for their own house design. Using a sheet of acetate adhered to an undulating form cut into foam core and glued to a base, the students began building the form. They experimented with it in other materials, working to try to find the material that pleased their sense of quality and reality. It became a challenge to make the materials support the wavy wall. It was difficult to make it stand firm and upright.

As it began, the wall came to an end; they discarded the undulating wall of glass as an impossibility, choosing instead to create a curve that was designed into the outer skin of the house. Their new wall was based on a portion of a circle, supported by mullions, with inset acetate for the window. This was an easier task for them; and the new challenge became the completion of the roof — how would they make it look well designed?

As a teacher, it was interesting to watch the students experience the design’s difficulties and its positive qualities as they continued to manipulate their ideas for the final projects. Even though they discarded the more difficult design element of the undulating wall, setting it aside for a simpler curved wall with its exposed mullions and inset “glass”, they had been learning things through the process of trial and error. This group seemed to show that they were honing flexible thinking. They moved easily from their original decision of the undulating window to the large curved window and did not give up without trying different things to support the wall. But when it appeared to be time to move on with their ideas, they made that decision and turned the page. In this case, Dewey might well have believed that their “gut” response was correct as it let them know that manipulating the design idea further was futile and they were better off discarding it (see Chapman, 1978, p. 74).

The flexible thinking skill, which enables students to set aside an idea, seemed to be an important offshoot of dealing with uncertainty in creative ways. For me, the above group defined, through their actions, the meaning of flexible thinking. They had an idea, but they were able to let go of it in order to continue with their work. I saw students working this way many times throughout the month, as they attempted different methods of construction to acquire the appearance they desire.

In *Design as a Catalyst for Learning*, according to Davis, Hawley, McMullan, and Spilka (1997) those who learn to think flexibly will be better prepared for the work-a-day world that
exists for them in their futures. The authors (1997) remark that due to the complexity of our world, people need to have thought processes that are elastic and that can change with existing circumstances.

This type of problem-solving art project necessitates classroom conditions that encourage the building up of flexible thinking as students use both "convergent and divergent thinking skills" (Davis, Hawley, McMullan, & Spilka, 1997, p. 27) to solve problems relating to building their model house. Through these exercises the students were learning to accept and deal with ambiguity as they "suspend[ed] judgement in the early stages of problem solving" (Davis, Hawley, McMullan, & Spilka, 1997, p. 27). While students free themselves to make discoveries about the decisions they are experimenting with, they are suspending judgement, at least until they can see a need for a change in direction.

Flexible thinking as it was visible in our class is a great asset in the world of decisions facing people every day. Sometimes errors can play a part in improving the appearance of a building, if the designers can be quick to think of a rectifying solution — which of course demands flexibility and confidence — and this is something that students learned about while doing their architectural project.

In the earlier mentioned trial and error situation with the undulating wall, the students had a clear idea of what they wanted to make happen with the material; but they found the process of making it happen in foam-core and acetate very difficult, and after a great deal of experimenting were uneasy about what they considered to be their errors in judgement, thus discarding the design element they were experimenting with. Persistence might have won them the triumph of having the desired undulating wall in their completed project, but the material gave them problems that were too ambiguous and so they changed direction and tried a new solution, all the while dealing with uncertainty and listening to their interior suggestions.

5.12 Student Ownership of Designs

In each and every class, students were engrossed with pushing their building materials to form their own designs — the homes may not have been designed after Frank Lloyd Wright, but they were certainly designed with intentional experimentation and student ideas — their own group dreams, with individual’s dreams intermingled. The more I watched them work, the more I wanted to support their creative experimentation and advancement.

The projects being built before my eyes, wall by wall, were an expression of learning experiences, an expression of students in the process of learning how to design and problem-
solve. They were learning to focus their creative energy to produce a version of a home they had corporately created and a project they could still own with an energy that made them want to defend their ideas and their reasons for making particular decisions. Even though it was a group effort, they had ownership of the project — a priceless motivator on its own.

For some groups, the houses were not perfectly formed and craftsmanship was not always as refined as it might have been, perhaps due to our burden with a tight time frame. However, remembering the deadline, I became willing to set aside my graphic artist’s tendencies to perfect details to a hairline, and allowed the students to continue to create in their own ways, also remembering to not interfere with their design and construction process.

This does not mean that I did not show students easier ways of doing things when I was asked. If I could see the necessity in their requests I showed students easier ways to cut foam core, for instance. One group had some difficulty with this; so I showed them tricks that supported their work. But generally, I watched as students pushed the materials themselves to find ways of bending it to their wishes. Ownership was deeper with students making the discoveries on their own.

5.13 An Example of Student Ownership and Invention

The building itself was a simple form with a deeply cut-in entryway similar to those of ancient and present day Greek homes. Before the entrance atrium, the students had built the Mediterranean feature of the arched entry wall that masked the front of the building, producing an effect of privacy, so that the atrium was semi-enclosed.

The home had other interesting and student invented aspects. One of the girls in the group had worked hard to manipulate building materials to try to produce rounded “corners”, to replace the square corners we see on buildings. She did so by experimenting with making slices in mat board that would then willingly bend as the builder chose, but it did not suit her needs; then she tried bending light weight card only to find it was too unstable; finally she sliced foam core, vertically to create the curve and found that it was too clumsy. Finding it difficult to produce the curved corners they had originally planned, they rejected them altogether and tried cutting back the corners instead, and seemed satisfied with the outcome. Their decision gave the house a different appearance than it would have had with typical corner articulation — more expensive to build in real life, but that was not their concern at this moment.

To complete the house they produced a hipped roof system that was strikingly complex due to the way it reflected the form of the building. Each cut-back corner was echoed in the
roof. The overall appearance was of a simple form, which was complicated through added elements — the deeply cut-in entry way, the three-sided corners, and rounded balconies, the complex hipped roof and the Mediterranean privacy wall.

This particular group had wanted to produce a cladding of off-white stucco, through the use of built up layers of gesso. As did almost everyone in the class, these students found that there was not enough time to produce the finer finished details on the exteriors nor to work on the interiors (as some students had desired to do). Already these particular students had taken their model home in order to be sure details that were most necessary were completed, including the roofing system. The final form needed to be clear for the group evaluation; they were finished with the “sculptural” design, building production and natural environment — this made the project ready for assessment.

The house was well-crafted with an appearance that suggested the students had boldly met their own challenges and had most likely learned a great deal. Perhaps it could have been more experimental in its form — more sculptural — but the students had obviously invested time and energy, building their thinking, inter-personal and manual skills, together with their creations.

5.14 Group Work Echoed Ideas of Student Members

After completing the classroom research and after seeing students' work completed and set up in our neighbourhood, I went over past write-ups by students to compare what they had talked about with what they had finally produced. I noticed that some students made reference in one of the first journal entries to architectural elements that their groups used in their final projects. For example, one of the students from the house last described, wrote that the idea of textured cladding, as well as curved balconies and arches were going to be in a personal house design. The written material about these elements suggested careful absorption and thought about some of the research material that had been read, and some of the in class talk at the beginning of our research.

In the reading material, the importance of simplicity was noted, and attention was called to the use of architectural elements with combinations of elements considered as they develop the essential look of the home. When I looked at the home this student's group produced, I noticed the building traits that reflected the ideas that had been written about in the journal writing — the curved balconies, the archways, etc. Either the
student had been able to persuade the group to follow these suggestions, or other group members had also been interested in these details.

When looking through other journal entries it was interesting to see how many ideas were formulated at the beginning of the research and carried through in some way to be applied to the final projects. Most often they were altered in some way, but still an echo of the interest first expressed, on paper, existed there.

Two of the students in this group came to me at the end of the unit to express their appreciation for the time given them to research and produce the model. They told me that they were excited about their learning and desired to continue learning about building a home. This response was what I had hoped for from at least one student in the class. Earlier I had decided that if one student (or a few students) could make useful discoveries through working on this unit the architectural material was worth the invested energy.

5.15 Teachers Make Informal Connections with Their Students

Teachers using design-based teaching strategies tend to allow time for a greater number of individual connections than are available to a teacher who lectures regularly. One-on-one teacher-student conversations about the projects are common and increase in number due to less time spent lecturing (Davis, Hawley, McMullan, & Spilka, 1997, p. 43).

More opportunities to communicate with students on a one to one basis helped the students to trust me; they learned that I would not discourage them from sharing their ideas with me, or with others, and they learned that there were no “right” or “wrong” answers (Davis, Hawley, McMullan, & Spilka, 1997, p. 42), but that they could wrestle with their projects and think through the design elements through vocal verbalization with the teacher and the classmates or through personal reflection, without being judged for their ideas. There was an energy caused by the exchange of views and design ideas that was interesting to watch and to experience.

5.16 Summing Up

When I look back over this experience as a researcher, I am interested in how closely the project paralleled the work of Davis et al. (1997), and how the project also reflected the information I have read regarding action research. It also became evident to me, after some thought, that much of the project and research reflects my own values and enjoyment of architecturally designed homes, and my own interest in students making discoveries through
on-task work. Finding ways of leaving freedom for student choices, giving them space to express their creative inclinations, and giving students leadership in their learning, are also issues of importance to me. In this research project, the students and I shared common interests, in home design, as we learned together --- the students learned about thinking through problems and I learned about how problem-solving projects can engender this learning while also increasing motivation.

The teaching material developed out of my appreciation for designed homes, which had some facet of sculpture embedded in them. And as I thought about the reading materials and their suggestions about learning, it seemed sensible that student skill development would occur for more learners in a project such as this. It offered flexible support for the differences in their interests, personalities, and learning styles while ensuring class-wide development.

During the classroom research I worked to not interfere with or to control the outcome of individual groups' projects. Yet this was sometimes a challenge, because though I was called a guest teacher, I was a Teacher-on-call doing research and so had an interest in seeing that this class ran well, from beginning to end. My own interest in "success" could well have suppressed the qualities that were meant to operate in the students, through their work on the design, but reflecting on the comments in the readings became my main form of support. The authors' documentation had stated that the only way for this project to be a real problem-solving design unit was for me to facilitate only --- many other teachers had, and the result was active learning. To let the truly design-based problem-solving study happen in the classroom I needed to ask questions, not to offer prescribed steps of development. If I wanted problem-solving and inquiry to dominate, and tried to force this to happen, then I would be overriding their progress to insert my own views, likes and dislikes or step-by-step instructions. In the end, due to only facilitation, the class in action provided a window into the variety of views the students had and the interests they held in experiential discovery.

Throughout this research period, the students' self-motivated activities reflected the many qualities that Davis et al. (1997) deliniated in their writings. Most students in the class reworked their designs, trying for the best plan and use of materials. The students decided on their own design steps which demanded energetic problem-solving and experimentation on the part of the groups.

I was fascinated to see the time and energy they willingly gave to their projects, staying after school to work, or taking them home to complete a stage. One group of students took their project home to assure its completion and to add the details and colour for which the rest of the
class knew they lacked time. As the class learned, they displayed mutual support for their

group members and responsibility for completing the task. At the beginning this had been a

care for me — I had seen many group efforts from the past where students had left one or
two members doing the whole project for the group. But, just as the book had said, they were
interested and willing learners because they had found a project in which they could invest
themselves — they had pride in its completion and quality, and all the while they were learning.

Action research commonly displays the interests and values of the researcher. I saw this
in action in my own case study. These interests and values had encouraged me to think about
ways to draw students into the learning about designed homes as “architectural sculptures”.
And my main value, which helped me decide on the research direction, was my interest in
focussed learning and enthused students. Due to this interest in students hard at work I found a
learning style that I hope to use again in the future.

As previously mentioned, as a class, we touched on a topic that is of great interest to
me — what can we do to preserve nature while also building our shelters? What can we do to
sustain our natural environment by becoming more self-sufficient and more able to operate on
fewer resources than those we generally manage on today? How might we have to give up
“dream homes” in the future? Or do we need to change our ideas regarding what “dream
homes” actually are? What are they, must they be large and fuel inefficient?

Other issues or architectural topics could focus on the fuel shortage — what can we do
to be more self-sufficient and less dependent on fuel? And what can we do to conserve the
resources that we now have, so that others at a later date can have our advantages as well?
How can we train ourselves to share what we have?

An architectural study identifies well with issues such as these, and I had made a
mental list of ideas we could discuss, but I did not use these ideas, as students generated talk
about various issues without my prodding. Each day new ideas and issues were introduced by
the students, which meant that conversation involved design and ideas that existed in
surrounding environments.

It was sometimes difficult to watch students experiment with their ideas and materials
and at times it might have been easier to correct the ways in which ideas were being
approached. It might have sped up the building process, but what would this do to the
students’ development of critical analysis skills; what would this “intervention” do to students’
self esteem? This behaviour on my part could have had a critical and negative influence and
likely would have stopped students from making some of their own discoveries that only experimenting to a conclusion can promote. Interference might have blocked the learning process, slowed the learning curve and discouraged some of the students from discovering the wonder of the design process. They might have learned considerably less about materials and manual skills.

During the research for this project I found myself feeling a deep satisfaction with the student involvement and activity and experienced a strong interest in presenting more units after this fashion of teaching. The level of student activity helped me to believe that using problem-solving projects that are based on student interest certainly does have an affect on the level of activity that one would see in a classroom.

For the time space available, this project was a challenge, and many times I wondered how we would finish. But, in spite of the highly pressured time frame the students did not give up --- they worked with me and finished. I am grateful to them for their willing flexibility and to their teacher for giving up her class to allow this journey of discovery.
A problem-solving project in housing design was used to produce a neighbourhood. The following photographs are the housing designs created by several groups of students in a high school art classroom.
Chapter Six

Conclusions

6.1 What Do I Feel About this Unit?

When architectural design is studied in an art class, in the form of problem-solving and design studies, there are observable developmental opportunities available to the students. According to Davis et al. (1997) the challenges students find in such projects will innately contain useful learning opportunities and motivational attributes combined. These were the learning qualities that I wished to see in my research classroom.

As I reviewed the readings, I wondered — if design of all kinds promoted and taught problem-solving and thinking skills, what could architectural housing, as art, do to challenge this borrowed class of high school students? I hoped to ensure that students had opportunities to solve an architectural problem that would motivate them to think and sift through new knowledge which they would then blend with their previous knowledge, applying it to a three-dimensional model. Perhaps students would also carry this knowledge away and apply it to life in the city, after their schooling was completed.

When the research actually began for my unit in architectural design, it was exciting to experience our learning environment as the students worked together. As I facilitated the students’ work, I reflected, at intervals, on the comments made by Davis et al. (1997); and sometimes, in the busy classroom, I had opportunities to stand back and watch the students probe for answers. I was intrigued with how clearly this class was an example of the way in which a design project could spontaneously provide a framework for students’ constructive learning activities.

This was so when they looked at the history books and talked about what they saw, when they analysed it for good design, and when they tried out various building elements or forms. Experimentation with communication, ideas, and material was commonly visible throughout the unit, while students determined to solve the project’s architectural design.

6.2 Important Ingredients for a Problem-Solving Project

What were the ingredients that helped this project unfold in a manner that seemed to follow Davis et al.’s (1997) descriptions of design projects, and in the manner that I wished to observe in my own future classes? One probable answer would be that I tried to leave students free to make choices. The literature suggested that an open-ended set of possibilities for problem-solving would generate an open learning environment, giving students a place to work
on their thinking and problem-solving skills without uneasiness, sharing their ideas and views, with respect from students and teacher alike. Out of this freedom, there were changes in the roles of leadership, with students being allowed to take on learning leadership, and so the projects developed with student to student teaching, and teacher support.

A second ingredient would be that, in this project, students were not hemmed in by boundaries that suppressed their creativity — they were asked to plan and create their own views of “dream homes”, not a prescribed model of the teacher’s choice that they would replicate. Had the project been a simple replication of my own chosen model, the students’ wide range of skills would not have been exercised. Students’ skills were challenged and stretched through the process of thinking about their building descriptions, their critical analysis, and the synthesis of these ideas as they applied them to the production of their models.

The challenge was complex, as students were asked to produce the physical, three-dimensional house based on their plans. The process demanded focus, thought and organization. Through this process, students had opportunities to increase their ability to apply their previous and new knowledge to projects that foreshadowed experiences in the world outside of the school classroom. Their enthusiasm was evident.

As the students worked, I was able to observe their personal investment of energy in their projects; and so, for my own personal file of information, I was able to verify, just as various writers and researchers had said, that students will be motivated by working on a task in which they are interested, and their on-task behaviour will be supported by that interest.

6.3 How Was the Learning Observable?

Throughout the research, the learning was observable in many ways. Students, in my borrowed class, worked intently because they were interested in their own “dream homes”. At times their regular teacher would come into the class and comment about how on-task they were.

I was fascinated with the way the students worked as they thought through the examples of architects’ buildings in the history books. Even when students worked on their own, at the beginning of the unit, they shared ideas with other students and with me to clarify their thoughts. Sometimes this discussion helped them rework their plans as they critically analysed the designs in the books and drew their housing plans. They verbally analysed the spaces and finalized their choices, reworking their plans as they found flaws.
Some students made the work immediate for themselves by looking at the history books, and then beyond the doors of the classroom into their neighbourhoods, classifying the housing that existed there according to their discoveries in the books. They looked for ways of applying their learning to reality, and then returned to the class to share their discoveries with me and with others.

Other students made the application a very personal one, as they talked about their interests in design and building. One person for several days in a row came into the class with a deeply expressed desire to pursue a career in architectural design. This student spoke about sorting through the details of pertinent decisions, and was highly motivated to come to a clear conclusion in the near future. Others talked about being from building backgrounds with fathers and family members working as construction workers, and they commented that this area was to be their future career.

This application, of our classroom work to their neighbourhoods and beyond, suggested that students appreciated working with projects they could experience in the world outside of school. Their interest in the topic was also part of the motivation that helped them stay enthused throughout the project. The focussed research, analysis and critiquing continued in the group work, perhaps even more intensely as we progressed with the projects.

Davis, et al. (1997), believe that design promotes student investigation, and that through their own research, students can also learn how to communicate persuasively and clearly (p. 110). A quality of negotiated communication that is natural to an architectural design project, (and in other design projects) when group settings are well developed, can be seen to enhance responsible group work. These students collaborated, to work out their differences, with their design ideas until they completed the project.

Students shared their ideas and plans, and due to the individual study time, they had an understanding of the style of design that they wished to see in the final piece. Some talked about emulating the work of various architects, but as they came together in their groups, their ideas were adjusted and blended to produce the model.

In their group work, students observably searched for answers to the design problem, looked for workable plans, and energetically used thinking skills as they made multiple choices through experimentation. Their shared ideas sparked thoughts in other students and the design conversations enabled the process of learning and sharing during the building of the model, just as they would have on an architectural design team. A quote from Davis et al. (1997) describes the work as most students seemed to experience it:
Design activities ... involve students in a process of choice, usually as members of teams focus on solving a single problem. The design process guides their work, introducing structured critique and collective judgement throughout the process. Through such experiences, children learn team work and strategies for participation in issues and labour that involve differing points of view. The design process provides a clear structure for generating alternatives, making choices, and resolving conflicts of opinion.

(p. 122)

For me, due to the flurry of on-task activity, the class presented evidence of self-motivated learners and explorers of the historical research material, users of a meld of new knowledge and of previous knowledge. Learning from books was talked about and applied to the building materials, which were manipulated over and over again until the project took on the appearance that satisfied the students --- at least to the point where they could say that the task was completed to the best of their ability.

Students' housing plans were corporately decided on, but they changed these ideas if they could not be worked out. New decisions perfected the original ones, with each change indicating the students' courage to use the trial and error process which is a common part of problem-solving in design, a process which operates in the experience of professional designers at work in the world of design.

Though the working out of the design ideas was visible in my research classroom, not every group operated with shared responsibility. However, the majority of the class did --- most students seemed to learn the value of expressing themselves and hammering out ideas in order to make quick decisions corporately.

I believe that the shared responsibility visible in the class was aided by the short time that students had to develop their own ideas at the beginning of the unit. The two days in class during which they looked through the books on their own and wrote about their ideas for their "dream homes" helped the students put together design ideas that gave them each something to share in their groups. Therefore, though the preliminary individual research appeared awkward in the planning stages, it was likely a positive factor in the final research stages, where the group members shared their individual ideas and began to work on their projects.

Students brought their concerns to class even when they revolved around questions about active city neighbourhoods. In one instance, one student brought to class a question regarding city bylaws. The issue of control on the part of the city and other neighbours defied
this person's imagination. For me, this became an example of how working on projects such as this brings up issues that exist outside of the school realm. Through these exercises, students are given challenges that encourage them to seek to learn about, and to understand, design in its societal context and as a cultural context (Davis, Hawley, McMullan, & Spilka, p. 122).

The project also allowed students to learn in their own learning style. Design as a multi-sided learning approach does indeed offer many ways of connecting with learning for the varied student population (Davis, Hawley, McMullan, & Spilka, p. 121).

6.4 Teacher Advantages in a Problem-solving Project

In our class, over time, it became clear that as Davis et al. (1997) had pointed out, teaching architecture as design has advantages for the teacher as well as for the students. There were fewer lectures, and thus more time for a greater number of personal interactions between the teacher and the students. This is not to say that one should not use information sessions or lectures, generally, when teaching art. However, when working on a project such as this one, the lectures can be kept to a minimum, allowing students to share discoveries with students and with the teacher. In this case, due to my choice to not lecture every class, it was observable that this tended to work to my advantage.

In the reading material, Davis et al. (1997) comment that in a problem-solving project, due to fewer teacher lectures and to the interest of the students, a class would function with unusual independence. This independence could be seen developing in the research classroom. Perhaps this was due to the production of the architectural model being inherently motivational, but it was also likely due to support time available from the teacher. The on-task behaviour of these students reflected comments made by Davis et al. suggesting that teachers have found that they do not have to spend a great deal of time conceiving of motivational ideas or discipline processes because students tend to be more on task with projects presented in this manner (Davis, Hawley, McMullan, & Spilka, 1997, p. 43).

6.5 What are the Implications for Further Practice?

Each of the following implications could be used with a problem-solving approach to housing design, with the use of suggestions made by Davis et al. (1997). Students in other classes and subjects could also gain skills while working on the project offered in this study.
However, this research study could be further extended by making the following additions, or other additions where architectural issues blend:

The development of a study using green space interwoven with architecture
(The following projects could teach students more about blending housing and the natural environment. The first example is a less extravagant look at how this topic could be extended --- the following suggestion is a larger project on the same topic.)

When using architectural design as curriculum, teachers could gain by tapping design's unique characteristics to encourage students to learn problem-solving skills, which in turn enable development in making critical choices "that affect the quality of the environment [built and natural], efficiency of products, and effectiveness of communication (Davis, Hawley, McMullan, & Spilka, p. 107). Design should take students beyond a perfect plan or a beautiful picture to a place that involves students in analysis of important issues that are affected by design (Davis, Hawley, McMullan, & Spilka, p. 107).

For instance, when considering issues important today, it is possible to develop material that would teach students more about the natural environment interwoven with the built environment. This is the area I most wanted developed with my own research project. Our lack of time for this project prohibited a full look at how the natural environment could play an important role in projects on housing. During the research as a class, we touched on the natural environment. I had been determined to do so, as I believe we need to be more aware and that we can increase our quality of living with more carefully used or designed natural areas adjacent to our homes. As a class we thought about it and discussed some ideas regarding the losses we are seeing in our green spaces. Students, then, added "trees" and natural elements, but we did not have enough time to really do this subject justice.

I would like to run this project a second time, by looking more closely at architectural housing combined with a green environment. With a couple more days added to the design process, students could have time to develop the homes' surrounding natural environment. It would be interesting to encourage students to become more aware of how it is possible to preserve our natural environment even while building homes. Students could also learn about the value of adding vegetation to the flat lot, that in reality would increase the absorption of run-off water while also improving the appearance of our neighbourhoods. This they could learn by working in the manner which we did in this project, but with more time to develop the natural surroundings.
What would a home look like if it was interwoven with the natural environment — how could this take place? Do we need to work harder at melding homes with green spaces that already exist, or will we always need to destroy the vegetation on the lot in order to begin the building? Somehow, the Japanese seem to be able to leave some natural growth when they build their homes --- but they have a different attitude towards nature than we do.

**How can we develop students' consciousness of nature co-existing with home building?**

During our last class, in the research period, I had invited one of my fellow teachers into the classroom to view the students’ work. On seeing the neighbourhood set up with students working with the final pieces before the written critique and grading, he commented that the environment could have been created before the homes were designed. For instance, a papier mâché hillside or rolling landscape, could have been arranged with a number of lots available for the students to use --- more “real” than our flat green corrugated cardboard lots. I had seen likenesses of a hand built landscape in geography lessons and could envision how this could fit into a unit on the natural environment and home designs.

This supported my initial ideas --- as previously, I had hoped that the students would connect with architects who considered the natural environment as they designed their homes. Frank Lloyd Wright was known for the consideration of homes woven into the natural plant material. His own home in Arizona (Taliesin) and the Kauffmann house, called Falling Waters (Hitchcock, 1980, p. 445) are good examples of this type of design. Both of these houses were adapted to the natural environment, with the aim of leaving nature as unaffected as possible. They were built to blend with the surroundings, to improve the visual beauty of the buildings and the lives of those who lived within the spaces.

Architecture itself is like a multi-dimensional tapestry, a highly creative process with endless areas in which to find artistic expression. Woven into nature, architecture not only stands on its own, with its own physical appearance and characteristics, it is also affected and changed by the natural environment that surrounds it. Various views of a building’s sculptural form are set against the surrounding natural tapestry, and one part of the architectural picture imposes its creative forms on the other, so that it may be said that architecture and the natural environment change one another’s forms in some way. Within the building, the tapestry continues as each set of windows allows a new view of the natural surroundings outside; the structure’s own personality is directly imposed on its surroundings. New portions of the tapestry can be seen as an observer moves through the building, connecting with the colour filled
visions offered as the exterior and interior spaces blend together—the natural and the built environments. Architecture, as housing, then, can be woven together with its surrounding natural vistas—one three-dimensional tapestry, with a wide variety of views.

Giving nature a part in improving students’ homes, in a manner described above, would have demanded more room in order to set up the hillside and to leave it for continual development. Each new day the landscape could have evolved until we had a complete version for building the housing designs. What would students learn through doing a project of this kind? Does it have a place in an art class? I believe it could.

A study using human proportions would help students understand building size.

During our work, I noted that some students still wanted to produce the monster houses that we see more often built in our neighbourhoods. There are drawbacks to these houses, in that they are actually quite inaccessible to most people. These houses are affordable when occupied by more than one family, as generally, multiple salaries are necessary to maintain them.

Also, in an older neighbourhood, these houses can appear very heavy, due to their size and scale, but more to the point, they physically overshadow the housing of the general public. The existence of a large scale house beside a smaller one forces adjacent homeowners to grit their teeth due to the loss of sun or the feeling of encroachment on their space, because the new building is taking up a great deal more space on the property than was once allotted to a much smaller house. To these new neighbours, maintaining breathing room does not seem to be an issue, while older homeowners are feeling the stress of living with new and looser spacial bylaws. These are issues that could be discussed in other classes where architectural housing is a project. The creation of bylaws, in a class situation, tends to help students keep their housing smaller and gives them a small taste of reality.

Due to some students’ desires to build very large homes, I believe, in the future, I would place greater emphasis on helping students to understand human proportions and building proportions, and the effects that various proportions have on the user of the space. To do this, I would probably look at the work of Frank Lloyd Wright during the time period when he worked to create homes for “middle income buyers”. The work of other architects could also be used as teaching tools. Also, the Philadelphia Program (Abhau, Copeland, & Greenberger, 1986) and the AIBC Program (1998) could be referred to in order to develop information on teaching about proportion. It would not need to take up a large amount of time, but could be an
An alternate way to look at proportion once the unit is completed.

In our case study we created a neighbourhood, and talked about it when we were finished with the projects. While teaching proportion, if students still insisted on creating large, heavy appearing homes, it would be possible to insert a model of a home that is low and varied in plan, such as Wright’s designs. During the final evaluation, adding to the neighbourhood the more well-proportioned house could spark conversations about why bylaws exist, and what effects massive houses would have on smaller, lower houses. One could discuss the experiences of feelings and neighbours in various scenarios. One could also ask students to imagine being the owners of each housing style — the larger building and the lower building, asking, what would it be like if...? What would your feelings be if...?

The study of architecture as a flexible and fascinating topic.

The variety of entry points available, through the use of various topics related to architecture and architectural housing, make the teaching topic flexible and fascinating. One could study architecture in ancient history, and as suggested by Guilfoil and Sandler (1999) the focus could be on the preservation of ancient buildings; this could mean experiencing how our world is a global village and could teach about aspects of our world that could help students realize that, even here, we could have impact on the existence of buildings many thousands of miles away.

Closer to home, students could study city planning, but with a strong architectural emphasis. Additionally, they could study individual design elements, as recommended by AIBC (1998) and the Philadelphia Program (Abhau, Copeland, & Greenberger, 1986), giving them a stronger design background in preparation for the final project. This, however, would be a longer project than our one month unit.

The material could be designed to explore information and experiences that students will encounter as adults, in society, and in the culture surrounding them. For example, the maintenance costs of owning a home could be woven into the lesson material (Abhau, Copeland, & Greenberger, 1986, p. 91). The various avenues in architectural studies are endless. If students are given opportunities to learn in this manner, their knowledge will be applicable to
decisions made at home and at work, making students better prepared adults for the world before them (Davis, Hawley, McMullan, & Spilka, 1997, p. 122).

6.6 What are the Remaining Questions?

Davis, et al. (1997) comment that in order to offer a stronger position for curriculum containing design components or units, there is a need to teach school administrators, school boards, and teachers the value and use of design and problem-solving in art classes (p. 110). Human characteristics listed by these researchers include the capacity to use and manipulate information, aptitude to use resources that are conveniently at hand, ability to use existing technology, capability to understand and to use existing systems, and finally the skills to communicate as necessary for good interpersonal skills (Davis, Hawley, McMullan, & Spilka, p. 123).

When reflecting on these comments by Davis et al. (1997), a question is suggested regarding how this type of education can be offered to leaders in the educational field. How would the educational opportunities for the leaders be presented in the first place; and how could educational leaders be enticed into seeing the value of taking courses that would delineate the value of this type of study?

The value of architecture in art classrooms is visible to a number of art educators, but some seem to lack the confidence to present this material, due to its complexity, and its cloak of being presentable only by the professionals. What type of course would encourage classroom teachers to believe that they could use architectural design materials in their classes without the input of a professional? On the other hand, what courses could be offered to teachers that would teach them more about design, giving them the confidence to produce design materials? An architect associated with the work of the Philadelphia program, (Architecture in Education), Alan Levy (cited in Abhau, Copeland, & Greenberger, 1986) believes that teachers have the capabilities and knowledge which would support them while planning and presenting architectural design material (Abhau, Copeland, & Greenberger, 1986, np.).

According to Davis et al. (1997), problem-solving through design, if used for teaching material in successive years of students’ lives, will continue to build skills and knowledge that they can one day use to influence the directions of neighbourhoods and cities. For example, if students have received more than one unit of curriculum in this area and have studied it year after year in various configurations at a high school level, they should be able to extend the use of their knowledge by analysing structures and the shapes of cities. They may be able to predict
what could take place in the future regarding transportation, population and economic activities, using their developed knowledge to communicate influentially with the public (Davis, Hawley, McMullan, & Spilka, 1997, p. 63). Which leaves us with the questions: how do we implement a program that allows students to learn in successive years? Is it feasible to consider implementing it in our schools? Would there be enough support from school administrators or teachers to make such a program work?

Looking at housing alone does not teach students enough to affect their capacities to make predictions. But the learning process in problem-solving could begin with architectural housing, satisfying the students' curiosity and interest in building a home.

My journey into architectural curriculum has been in search of art curriculum materials that would draw students into critical thinking and problem-solving while also encouraging the development of manual skills. This has been a very real challenge, and I find myself going back to articles in journals that make suggestions for art education in forms other than architecture. I have done so due to the quality of information written about thinking and general skills development that could apply not only to drawing and painting, but also to architecture. Chapman did this in her recommendations for the critiquing styles of housing, in her book, *Approaches to Art in Education* (Chapman, 1978, pp. 80-90). This suggests that more needs to be written about architecture in the art classroom. Will there be a time when architecture is a common element in the classes of high school art students? If so, then there will be a need for more written material on the subject. And considering the difficulties that I have experienced with my search for supportive material in the area of architectural housing, it would be useful to have more written about this topic.

6.7 Summing Up

As I did this research and read through the material on architectural approaches, I was continually aware of how exciting this area of study can be for students and teachers alike. Even though there are few journal articles or developed programs, the ideas associated with architectural housing are particularly significant and multifarious; and the subject, when studied as design, allows teachers diverse choices from which to approach architecture, while giving students optional entry points for their varied learning styles. Through its study, students would discover architecture's flexibility, seeing it from some of the many perspectives that surround them in the real world.

Chapman (1978) brings to the attention of the teacher the complexities that exist in
discussions of values, when teaching architecture in the classroom. For instance, there is the need to remember and to teach the “interrelationship of life styles and environmental design. [Yet the] teacher must serve as an interpreter of values, not as a judge of others’ beliefs and conduct. Value clarification is the governing principle in this area of teaching, not value judgement” (Chapman, 1978, p. 242).

Continuing in this vein, Chapman (1978) remarks that we need to teach students that our environmental order appears as it does due to our beliefs and our values, and that when there are changes in the environments that surround us, this becomes historic information that states that this basic belief system has been altered (Chapman, 1978, pp. 242-243). The application of issues such as these could further increase the value of a study in architectural housing. How often do we think of how our homes speak of our values; and do we want to say to the world surrounding us, the words that our homes generate?

Guilfoil and Sandler’s (1999) book describes fascinating materials which I would like to one day use in a classroom of my own. But still there is a great deal of work that could be done with architecture as a focus, to bring its multifaceted nature to light. The multiple views should be evident in the combinations of written materials available to teachers as they look at the issues in our world. For instance, it could be looked at from a contextual position while looking at housing from a social perspective. Can students learn to produce home designs through the process of discovery centring on contextual analysis, while developing housing for our neighbourhoods? How would one develop material that would enable students in this area?

Though I am aware that one unit in housing design will not change the world, I believe that over time it can make a difference to teach in the fashion that is described throughout this thesis. Through this work, students would develop their skills, as facilitation and problem-solving offer students opportunities for thinking through solutions to design problems while they also analyse issues that surround them. For instance, Chapman (1978) has expressed some deep concerns about the need to teach students natural environment consciousness through the study of architecture (pp. 242-243). I believe we have the capacity to make changes by teaching even at intervals --- from the design perspective, as described by Davis et al. (1997). What if students learned to think through home design in a way that could improve the decisions that are made tomorrow, regarding our living spaces? Would teaching in this manner make a difference to future home designs, and in turn to future neighbourhoods?
References


