TOWARDS A CREATIVE PROBLEM-ORIENTED APPROACH TO URBAN STUDIES

by

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ABSTRACT

The complexity, pervasiveness and urgency of the social and biophysical problems now confronting mankind present planners and decision makers at all levels of human organization with monumental challenges. Undoubtedly some of the most challenging problems are those associated with the process of urbanization and the city itself. Indeed, it could be argued that many of our social and biophysical problems are related to mankind's persistent congregation in relatively small geographical areas. This tends to concentrate and intensify problems considerably, causing such basic and simple activities as the provision of one's own food to become an extremely complex problem, involving vast and interdependent networks of factors such as transportation, economics, waste disposal, etc. These are the problems that currently perplex urban decision-makers.

In order to deal effectively with our mounting
urban problems, individuals must be both knowledgeable about the city and sensitive to its attributes and its problems. But even more important, they must be capable of addressing these problems in an open-minded, intelligent and dynamic manner. They must not be bound by the worn out prescriptions and piecemeal approaches that have characterized past environmental problem solving. It is this last ability, which I shall refer to as 'creative problem solving', that is most often neglected at all levels of education. And it is this ability which concerns me here.

I believe that properly designed and implemented programs of urban-oriented problem solving are of tremendous importance in the education of professionals and the citizenry at large, to prepare them for their respective roles as urban decision-makers. While the actual design of such programs would vary depending of the age level and career goals of those for whom they are intended, I believe that the basic concepts involved in an understanding of the city and the educational approach whereby these may be imparted, would be much the same regardless of the
context. I have therefore attempted to develop in this thesis, a conceptual framework for programs of urban-oriented problem solving. From the volumes of work on problem solving, creativity and education, I have crystallized an educational approach to creative problem solving which is based on the phases of the creative problem solving process itself. Each phase is discussed with reference to the major abilities required by the individual during that phase, and the educational methods whereby those abilities might best be developed. The applications of these methods to urban problem solving are illustrated by numerous suggestions for activities and exercises which involve specific urban concepts, such as transportation, communication and urban growth. I have generally addressed myself, in these suggestions, to a secondary school level of education. However, it should not be difficult for an experienced teacher to adapt the ideas presented to either lower or higher levels of education.

It is hoped that these ideas will generate increased ideation and activity at all levels of education, and in particular at the university level, where
tomorrow's urban decision makers are now enrolled in schools of Planning, Architecture, and Environmental Design.
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I believe that education is the fundamental method of social change.

Bruner, 1962, p.125
INTRODUCTION

Problem Statement

We are living in a period of great social crisis -- domestically and internationally -- a crisis that is becoming increasingly difficult to ignore. It used to be that most of us were able to 'tune out' rather easily whenever we were too depressed by the social dilemmas of our time. ...Those times of aloughing off the problem or blaming others for it seem to have gone forever. There are fewer and fewer places to hide. (1)

It seems that mankind is always in a 'period of crisis'. Wars, depressions, famines, and plagues figure prominently in all historical accounts of man. The current social and environmental crisis, manifest in worldwide political upheaval, resource shortages, and mounting problems of pollution and environmental degradation is, however, of particular significance.
This is not because it is necessarily any more serious than previous crises, but because it is occurring at a time when extensive and efficient communications systems have virtually forced large numbers of people to become aware of the crisis situation. Their awareness is reflected, at the local level, in such activities as 'participatory planning' which allows individual citizens to become involved in the decision-making activities which affect their urban and regional environments.  

Because such a large percentage of our national population lives in urban areas, the city has become a major focus of planning and decision-making activities. Its social and physical development and its relationship to the rest of the environment are a major concern of planners today. But it has become increasingly clear that if effective solutions to urban problems are to be found and if citizens are to have a meaningful role in urban problem-solving activities, both professionals and citizens must become more knowledgeable about and more sensitive to the city. They must furthermore become more capable of dealing with its problems in an open-minded and
dynamic manner.

The need for programs of education to heighten public awareness of broad environmental issues and problems was heavily stressed in the late 1960's by environmentalists such as Menesini:

Our environment and its resources are a major concern of mankind today. That concern can be voiced, legislated for, and exercised, but the one most positive means for creating concern for -- and intelligent management of -- our world is through the environmental education of those who will inherit it. (4)

These authors repeatedly expressed concern over the dearth of educational programs dealing with the natural environment and the problems of resource allocation, conservation, and pollution. Indeed, many of them developed programs of 'environmental education' which stressed a problem-oriented and interdisciplinary approach and extensive use of the field trip method in order to encourage the student's more active involvement in environmental issues.

For example, 'Outward Bound' programs have been integrated into many high school curricula. These are intended to heighten the student's understanding
of the natural environment by involving him in dy-
namic and challenging wilderness or semi-wilderness
experiences which demand his active participation in
the learning process: he must learn in order to
survive.

At the same time, educators and others concerned
with urban problems made a strong plea for the dev-
velopment of educational programs, especially at the
elementary and secondary level, which would deal with
the city and its problems:

Social studies programs...either ignore
cities and urban life, or they stress the
failures of the city and support the rural
values of the past. There are hardly any
teaching programs available today that
take a positive and participatory view of
urban living and the urban environment or
deal constructively with planning and
change. Cities, the very environment of
urban schools, don't seem to exist inside
of the classroom as a topic of discussion.
Yet they shape the life of every pupil
and every teacher in the school. (7)

In response, a number of urban-oriented programs
were developed to meet the demand. Unfortunately many
of these programs fail to deal with urban issues in
the dynamic and challenging manner that characterizes
the ecologically oriented programs. According to
Ward, urban programs often suffer from being descriptive and static, rather than problem-oriented and dynamic. Even when the intentions are enlightened, the result is often wooden and fact-stuffed, with little feeling for the drama of choice and change.

Urban studies programs have tended to make less use of the field trip method, perhaps on the assumption that because students live in the city and experience it daily, they need not be directly exposed to it in the educational context. Thus urban studies courses have generally stressed the student's theoretical knowledge of the city, relying on textbook information to broaden his knowledge.

This is equally true at the university level, in Schools of Planning, Architecture, and Environmental Design, as it is at the high school level. Professors and professionals in these fields have repeatedly called for more problem-oriented and dynamic programs which will challenge and excite both students and teachers.

In response to this need, I have attempted to develop, from the literature in the fields of problem
solving, creativity, education, and the urban environment, a conceptual framework from which one might design programs of creative problem-oriented urban studies at any level of education.

In the field of education, Jerome Bruner is prominent among those educators who stress a self-directed and problem-oriented approach to education. According to Bruner it is only through the 'exercise of problem solving' that one learns how to learn.

Similarly, Torrance and Koestler have exerted a major influence on the field of creativity. While Torrance concentrates on the educational aspects of creativity, developing exercises and tests for use in the classroom, Koestler's work is more rhetorical, attempting to explain the phenomenon of the 'creative act'. Both authors stress the role of the subconscious mind in creativity and the importance of relaxing one's conscious control of the thought process when attempting to consider problems creatively. This apparently allows thought material to pass into the subconscious mind, which reorganizes and restructures the material, finally forming it into a unique and novel whole which is an integral part of the solution.
This spontaneous restructuration is also stressed in the works of Moore & Gay\(^{14}\) and Karl Duncker\(^{15}\), who are primarily concerned with the process of problem solving. While Moore and Gay concentrate on the description of the various phases of the problem solving process and the abilities required by an individual at each stage, Duncker is concerned with the overall nature of the process. He emphasizes the importance of mental elasticity and openness as prerequisites to creative problem solving.

In terms of urban education or urban studies I tended to rely, for the majority of my ideas, on the works which reflected the attitudes and ideas discussed above. These included books by Jones\(^{16}\), Symonds\(^{17}\), Warren\(^{18}\), and Wurman\(^{19}\), all of which attempt to involve the student in dynamic programs of urban education. But whereas these authors have generally addressed themselves to particular urban issues and problems and to specific audiences (eg. elementary school students, professionals, etc.), I intend to devise a more generally applicable approach to creative problem-oriented urban studies that can be applied to the study of a wide range of issues and problems and that can be utilized at any level of education.
Definition of Problem Solving and Creativity

Authors in the fields of problem solving\textsuperscript{20} and creativity\textsuperscript{21} share an interest in the dynamics of human thought, and in particular goal-directed thought. In this process the individual is attempting to reach, through the manipulation of ideas and information, a desired objective. This kind of thinking is called 'problem solving', where the problem lies in how to attain the desired goal.\textsuperscript{22} Problem solving per se is currently undergoing extensive research, however many studies have also been carried out on the nature of the 'product' (or solution) of the process, the abilities required by an individual engaging in the process, the educational methods whereby these abilities might be developed, and the environment most conducive to the occurrence of the process.

It is generally agreed that the problem solving process includes four basic phases:\textsuperscript{23}

1. **Problem Definition**

   This phase involves the identification and articulation of the problem and the establishment of a context or frame of reference within which it will be studied.
2. Information Gathering

This phase involves the collection and analysis of information deemed relevant to the problem. In addition the problem solver reviews the range of possible strategies or approaches which might best suit the particular problem.

3. Solution Finding

In this phase the problem solver decides on the appropriate strategy or approach, applies it to the problem, and thereby achieves a preliminary solution to the problem. This solution is then refined and modified to insure that all of the problem variables have been adequately resolved.

4. Communication & Evaluation

This phase involves the communication of the refined solution to an outside audience. The problem solver chooses an appropriate mode of communication (eg. graphic, verbal, etc.), attempting to maximize the potential impact of his ideas. The communication phase may also include evaluation of the solution, either by the problem solver himself, or by external critics.

Depending on the nature of both the problem and the individual problem solver, this basic process may be considerably altered. For example, certain technical problems such as those encountered in the fields of mathematics, physics, chemistry, etc., might best
be approached by a particular theorem or principle which then tends to dominate the problem solving activity. Thus the principles of linear algebra are applied to a whole class of mathematical problems which would otherwise require rather tedious and circuitous methods of solution. In addition, these problems tend to have unique solutions. That is, they are not 'open ended' and the problem solving activity may be highly linear, working towards a specific objective.

Similarly, an individual might be more disposed to precise analytical thinking than to imaginative or divergent thinking. He might therefore tend to concentrate, for example, on the precise articulation and definition of a given problem than on the consideration of alternative perceptions and conceptions of the problem. Indeed these two factors -- the nature of the problem and the thought patterns of the problem solver -- serve to identify or define the 'kind' of problem solving process that is occurring.

In this paper I am concerned with urban problems which are usually of a complex and open-ended nature, involving both highly technical information and inter-
related issues which defy easy solution. In this kind of problem situation, there may be any number of appropriate approaches and 'solutions', thus 'creative problem solving' becomes particularly important. Whereas the more traditional problem solving processes tend to establish a fairly rigid frame of reference for any given problem and then proceed to consider the problem within that context only, 'creative' problem solving tends to appreciate the openness of the problem, proceeding with a less restrictive consideration of the various alternative solutions which might be applied to the problem.

Creative problem solving is characterized by the same attributes as the creative individual -- it is non-conforming (ie. it varies according to the problem being considered), contains active subconscious and imaginative elements (ie. it appears to be more intuitive than logical), and tends to produce unique or novel ideas. It is therefore particularly applicable to complex and open-ended urban problems which certainly merit a problem-specific and imaginative approach and a serious consideration of alternative methods of solution.
Many researchers have studied the workings of the mind during problem solving, attempting to understand how and why some processes appear to be more creative than others. One of their strongest conclusions is that the process of creative problem solving involves, more than the traditional process, the powers of the subconscious mind and the imagination. Indeed many researchers believe that the subconscious may be better able to retain, analyze, and organize thought material more efficiently than the conscious mind. However since so little is definitively known about the subconscious mind, the exact nature of its role is still speculative.

While it is evident that the subconscious mind has some input during all phases of the problem solving process, it is believed that its greatest contribution comes directly after the phases of information gathering and idea generation, thus modifying the basic process as follows:

1. Problem Definition

(as previously defined)
2. Information Gathering

(as previously defined)

3. Idea Generation

This phase involves the conscious generation of as many ideas as possible regarding the solutions of the problem.

4. Incubation and Illumination

This phase involves subconscious mental activity and culminates in a sudden revelation of a conceptual solution to the problem.

5. Refinement

In this phase, the conceptual solution provided by the subconscious mind is modified and refined to suit the original problem conditions.

6. Communication and Evaluation

(as previously defined)

In the 'creative problem solving process' then, the third phase -- 'solution finding' -- of the more traditional problem solving process is expanded into three separate stages which distinguish the contributions of the conscious and subconscious minds during this phase.
In attempting to teach the creative problem solving process, one must consider the abilities required by an individual engaging in the process, the educational methods through which these abilities may best be developed, and the educational atmosphere most conducive to their development. It is the belief of many educators\textsuperscript{30} that the most effective method of learning a process is through direct experience of it. It therefore follows that the most effective method of teaching a process is through the facilitation of this experience. The teacher, in this context, assumes a more passive role, guiding the student through the self-initiated problem-solving process by helping him to develop the necessary abilities.\textsuperscript{31}

\textbf{Format}

From these ideas on problem solving, creativity, and education, I intend to develop a number of suggestions regarding the design of programs of creative problem-oriented urban studies. My discussion will focus on the educational methods and techniques which might be used to enhance the student's creative problem solving abilities in the urban realm. In keeping with
the experiential approach to education, I will discuss these abilities and methods in the approximate order that they are required by the student as he progresses through the problem solving process. However it will become evident, during this discussion, that all of the abilities are required, to some extent, throughout the process, and furthermore that none of them may be completely or fully developed in the course of a few problem solving exercises, but will develop incrementally over the course of a lifetime of problem solving. Nevertheless it is my contention that the student's ability to utilize the creative problem solving process will be greatly enhanced if he is encouraged to develop the basic skills associated with each phase of the process as they are required. Thus each experiencing of the process enhances the student's ability to utilize it effectively.
CREATIVE URBAN-ORIENTED PROBLEM SOLVING: TEACHING THE PROCESS

Introduction

Before he can engage meaningfully in the creative problem solving process, the individual must acquire some background knowledge in the field of his endea

vour. In the context of solving urban problems (or 'urban problem solving') then, the individual must be­

come aware of the 'city' as a social and physical phenomenon and as the specific environment in which he lives. He must develop his perceptual awareness and objective knowledge of the city. At the same time, the individual must become more self-aware, more sensitive to his interactions with the urban environment — how he perceives, reacts to, and in­

fluences the city as well as how it reacts to and influences him.
To develop this general awareness of the city, the individual should participate in experiences which involve not only an exploration of the city, but also an exploration of self. On the following pages are suggestions for three 'sensiticity' exercises which might be designed to achieve this goal.

The first of these, 'SOUND' (see Figure 1) is intended to shift the student's awareness of the city from one that is visually dominated to one that is auditorially dominated. The suggestions listed under 'sounding' and 'noise' (in Figure 1) encourage the student to venture into the urban environment, to experience it, and to interact with it, on a new level of awareness. Those under 'hearing', 'listening', 'sound', and 'music' encourage the student to use his imagination, to be more creative in his thinking.

Exercises designed around these ideas should attempt to develop not only the student's knowledge of the nature of sound and its role in the city, but also the various influences that sound has on urban man. For example, student might be encouraged to explore the relationship between constant background
HEARING
find out all you can about 'ears' ....
then design an 'urban ear' for people who live in the urb...make a scale model of your 'urbear' ...!

LISTENING
what is the sound of:
a building piercing the sky? the sun as it rises over the city? the city growing? suburbia?

SOUND
try to determine the nature of the relationship between privacy and sound...
design:
1. a new and unusual sound
2. a thing to elicit that sound
3. a use for that thing

SOUNDING
go out into the city and experiment with sound...
try yelling, whispering, whistling, singing...
in...an open plaza, at a highrise, in a cement parking lot, to a lamp-post, in a closet, in someone's ear....!

NOISE
try to reconstruct your city through sound: get everyone to go to a different place in the city and record the sounds of that place.
then....
1. try to identify the places by sound -- make a 'sound map' of your city, using appropriate symbols
2. by editing and joining the various tapes, compose an 'urban sound symphony' around a theme such as --
   'urbasia'
   'wrecker's rock'
   '3pm to 5pm'
   '2120 A.D.'
   'silence' ......

MUSIC
if all of the buildings on the main street of your city were musical notes, what song would the street play?
if you were a musical instrument, which one would you be? ...why?
noises, such as traffic, construction noise, etc., and physical fatigue: which areas of the city do people find most tiring, and what role does noise play in this effect? In exploring this question, students might construct a three dimensional 'soundscape' map of the city, showing the relative intensities of sounds at various places in the city.

An exercise on sound might be designed to provide the student with the opportunity to experiment with various kinds of technical equipment for the measurement, production, and recording of sound and with different kinds of verbal and non-verbal communication. Again the suggestions listed under 'noise' in Figure 1 might be utilized to achieve these objectives.

Exercises focussing on the sense of touch, smell, taste, and sight could similarly be developed. These exercises should incorporate as many aspects of each sense as possible, prompting the student to explore several avenues, to broaden his knowledge base. It might be interesting to construct a series of overlay maps (one for each sense) to describe the sensory environment of the city.
The second set of suggestions (see Figure 2) is intended to focus the student's attention on one element of the city -- in this case the 'wall' -- which he has probably not considered seriously before. It attempts to introduce the student to the many different levels of experience involved in the concept of 'wall' by requesting him to contemplate 'wallness': 'What is a wall?' The student should be encouraged to think about all kinds of walls -- physical, social and personal walls -- as well as their uses -- as barriers, containers, and objets d'art. An interesting project for one or two students might involve a study of the history of walls in civilization. How and why were they built? How have they developed over the ages? Students might even try changing the appearance and/or the function of one of the walls in their classroom.

In conjunction with the concept of 'wall', various related concepts such as space, privacy, containment, and punishment might be discussed. Students might try to design a prison without walls!

Once again the student should be encouraged to venture out into the urban environment and to interact
with it, discovering as much about himself as he
does about his city. Thus, as in the suggestions in
Figure 2, the student might be requested to explore
the multitude of walls in his city (perhaps recording
his observations with a camera or pen and ink), and
then to design a wall for himself which best reflects
his personality and his relationship to his external
environment.

Similar exercises might be designed around concepts
such as windows, roof-tops, edges, chimneys, reflections,
bridges, etc. Because each of these concepts has some
physical manifestation in the city the student can ex­
perience them directly and concretely, thereby gaining
a deeper understanding of their nature and significance.

More abstract concepts -- such as time, space, den­
sity, change, etc. -- are much more difficult to under­
stand. They have only indirect physical manifestations,
yet they are of crucial importance to the city. This
is particularly true of time, which is such an impor­
tant factor in any consideration of the city. The
student should be exposed, through appropriate exercises,
to the hourly, daily, and seasonal changes which occur
in the city. Photographs or drawings of some particular
place in the city at various times of the day or year might be displayed as a mural or collage.

In addition, the city's influence on our notion of time should be explored: why do we feel rushed when we are in the downtown core? how does a windowless environment affect our sense of the passage of time? And of course the long-term influence of time on the city must also be studied, the physical and social changes that have taken place over the history of the city, the changes that are likely to take place in years to come. It is this issue which is addressed in the poem in Figure 3, 'TIME'. The student is requested to explore his urban environment for vestiges of times gone by -- old landmarks, a wooden paving stone showing through the asphalt -- and to attempt to recreate in his imagination what might once have been there and what might be there in the future.

The value of such sensitivity exercises is that they may be undertaken on a number of different levels from the physical or perceptual level through to the cultural and social level. In addition, they may be used to develop such specific skills as mapping, sketching, photography, etc., as well as abilities in
The passage of time reveals itself in nature. The sun, the moon, the tides are all time's minions, but what announces the passage of time in the city? What is the urban clock?

Find an urban 'ghost' - a vestige of times gone by in your city. Determine what was there, observe what is there, predict what will be there.
the communication and presentation of ideas. Once the student has been 'introduced' to the city, he is better able to engage in urban problem solving activities. These begin with problem definition.

**Problem Definition**

As the individual explores the urban environment, he will encounter situations which he finds disturbing or 'problematical'. Hopefully his previous involvement in urban experiences will prompt him to consider these situations more carefully, to try to resolve them. In this endeavour the individual's first task is to identify the problem -- to establish its context, its scope, and its complexity or depth -- to define the problem. Quite obviously this task demands the use of reason: the individual must analyze and evaluate the situation, discriminating between relevent and irrelevent information, in order to come up with a logical and comprehensive problem statement. But apart from the ability to reason, the creative problem solver requires two additional abilities: a tolerance of ambiguity$^{34}$ and 'cognitive flexibility',$^{35}$.
According to the poet Keats\textsuperscript{36}, an individual's ability to tolerate ambiguity may be described as a 'negative capability': he experiences 'uncertainties, mysteries [and] doubts, without any irritable reaching after fact and reason.' In chaotic problem situations, the advantage of this capability is evident. Whereas an insecure individual tends to inhibit the problem solving process by imposing a premature structure on the situation (to provide security), a more tolerant individual refrains from imposing a structure and thus 'keeps the problem open'.

In order to take advantage of this openness, the creative problem solver must also possess 'cognitive flexibility'. This refers to his ability to perceive a situation from a variety of mental perspectives and to shift quickly from the consideration of one perspective to another.\textsuperscript{37} It is believed\textsuperscript{38} that the individual's cognitive flexibility during problem definition is of crucial importance to the overall creativity of the ensuing problem solving activity. If the individual is able to establish, from the outset, a wide variety of perspectives on the problem, he will likely be able to generate more ideas towards its solution at a later stage in the process.
It is my contention that the student's tolerance of ambiguity may best be developed by confronting him with complex and challenging situations. These must be structured in such a way that they do not overwhelm and intimidate the student, but rather stimulate his interest and involvement, thereby facilitating the development of his ability to tolerate ambiguous problem situations. For example, an older high school or university student might be asked to 'survive' in the city for a given period of time and with a limited amount of money (see Figure 4, 'URBAN SURVIVAL'). No additional instructions need to be given, and no specific problem or project need be assigned. Thus the student must deal with both a complex and perhaps confusing physical and social situation (the unknown environment) and an ambiguous problem assignment (to survive). Depending on a teacher's educational objectives and the environment involved, an 'urban survival' exercise might be developed to suit almost any group of students. Even youngsters could be left, perhaps in pairs, in strange urban environments (such as a department store, an unknown suburb, etc.) for short periods of time.
take one $ and your coat and go
down town' for
16 hours... try to
'survive' on one
#... no visiting
friends, no bag
lunches from
home.... use the
resources of the
city. If you find
this too easy, try
2 days (and
nights !) on $5, or
a week on $25....
what do you learn
about your city,
people, poverty,
charity, crime....
try to express
your thoughts
and feelings in
some appropriate
form....
An interesting question which might be considered in connection with urban survival is what similarities and differences exist between urban and wilderness survival: what are the individual's priorities in each situation? The teacher may also wish to have his students consider survival as a way of life, to compare it with the more decadent and luxurious lifestyles lived in various other parts of the city. Or students might explore the concept of survival from the viewpoint of the entire city: how does the city 'survive'? where does its food and water come from? where does its waste go?

A number of exercises have been developed to enhance the individual's cognitive flexibility. The 'figure completion' exercise, developed by Torrance, requires the student to complete a graphic or written idea (eg. a figure, story, poem, etc.) in as many different ways as possible. For example, a sheet of paper printed with 30 identical circles might be issued to the student with the instructions that he should make these circles into as many different and original urban forms as he can think of (eg. a parking meter, stop sign, street light, etc.). Or the student might
be asked to provide a novel conclusion to an incomplete poem or story about some urban incident or phenomenon (eg. the description of a city in 2050 A.D.).

Similarly Torrance's 'uses for things' exercise requires the student to suggest as many original uses as possible for an ordinary object such as a tin can, a brick, a paper-clip, etc. As in the sample suggested exercises on the following page (see Figure 5, 'USES FOR THINGS'), an urban studies class might consider the range of possible uses for empty parking lots, the spaces under bridges, roof-tops, old telephone poles, etc.

Both 'figure completion' and 'uses for things' promote cognitive flexibility by requiring the student to perceive the same piece of information from a variety of perspectives. They are generally intended as short (15 to 30 minute) mental warm-ups, to be used at frequent intervals during the problem solving process and especially during the early phases of problem definition and idea generation.

The student's abilities in problem definition may also be developed simply by requesting him to consider
HOW MANY USES CAN YOU THINK OF FOR...

...empty parking lots?
...used telephone poles?
...rooftops?
...an old bus?
...the spaces under bridges?
...a retired airplane?

Figure 5
USES FOR THINGS
such complex urban issues as transportation, housing, poverty, and zoning. While problems abound in all of these areas, it is often extremely difficult to define a problem because there are so many factors involved in each issue. This becomes increasingly apparent as one explores the various aspects of, for example, transportation. The suggested exercises and projects described in Figure 6, 'TRANSPORTATION', do not formulate or define a transportation problem per se. Instead the student is required to formulate for himself the problems associated with urban transportation (such as the conflict between pedestrian and vehicular traffic), and to try to understand and articulate these problems as he explores the various modes of urban transportation. According to the design of this exercise, the student may be required to solve one or more of the problems he discovers or simply to list the real and potential problems as he encounters them during his explorations. The exercise may also be designed to develop certain skills, such as photography, graphics, mapping, etc., and to encourage original and imaginative thinking.
Figure 6

TRANSPORTATION

PICK 5 PAIRS OF ‘POINTS’ WITHIN YOUR CITY, EACH 2 MILES APART, SUCH THAT THE STRAIGHT LINES JOINING EACH PAIR WILL INTERSECT. SEND 2-3 STUDENTS TO EACH POINT, ASKING THEM TO FOLLOW THE STRAIGHT LINE ROUTE ACROSS THE CITY RELIGIOUSLY. PROVIDE EACH GROUP WITH A CAMERA, TAPE RECORDER, BAG FOR COLLECTING STUFF, ETC. DISPLAY YOUR FINDINGS CREATIVELY.

DESIGN A ½ DAY ‘CYCLING TRIP’ OF SOME PART OF YOUR CITY, INCLUDING UNUSUAL SIGHTS & EXPERIENCES, NOT THE ONES IN TOURIST GUIDES. GO TO PLACES YOU WOULD NOT NORMALLY GO... BE ORIGINAL!

ON A MAP OF YOUR CITY, SUGGEST A HOSTILE NETWORK OF BICYCLE PATHS THAT COULD BE CONSTRUCTED.... SUPPORT YOUR PROPOSAL IN WRITING.

GET A MAP OF YOUR COMMUNITY + OR THE G.B.D. MARK ALL OF THE AREAS THAT ARE CAR-ORIENTED. DRAW NEW MAPS WITHOUT THESE AREAS AND FILL IN THE ‘EMPTY SPACES’ WITH WHATEVER YOU LIKE... COMPARE MAPS.

THINK OF AS MANY WAYS YOU CAN TO CURB INDIVIDUAL CAR-USE... WITHOUT ‘BANNING’ CARS! THINK POSITIVE.


URBAN TRANSIT INVENT A NEW MODE OF INNER-CITY TRANSPORTATION WHICH ENABLES PEOPLE TO ENJOY A NEW EXPERIENCING OF THE CITY.
Information Gathering

Having determined the general context of his problem, the individual commences the relatively straight forward but often tedious and time consuming task of collecting the relevant information for its solution. The importance of this stage to the overall problem solving process is acknowledged by most authors, however there is some debate over the amount of effort that should be expended in this phase. According to Gagne:

One person is better at solving a problem than another because he knows more -- because he has more information of the sort that ultimately turns out to be relevant to the problem or to the process of solving it.

Therefore a prolonged period of information gathering should result in better problem solving. On the other hand, some authors contend that an overabundance of information may stifle creative problem solving by imposing unnecessary restrictions on the problem.

Nevertheless, it is evident that some information must be collected, and in this endeavour the problem
solver requires such skills as are involved in the utilization of equipment (eg. video and tape recorders, cameras, etc.) and techniques (eg. interviewing, surveying, etc.) associated with information gathering. In addition, this phase requires not only the student's powers of logic and reason to conduct the necessary analysis and evaluation of incoming information, but also his more subjective powers of sensory perception to appreciate the social and emotional overtones of the problem.

While traditional problem solving tends to concentrate on the student's ability to reason and think critically, creative problem solving tends to balance this approach by including a considerably greater subjective component in this stage. An exercise which may be used to enhance both of these abilities as well as the student's skills in one particular method of information gathering is 'mapping'. In this exercise the student is required to design a map of his city or some part of it and to articulate certain kinds of information on it.

Some suggested ideas for the kinds of information which might be mapped appear on the following page (see
MAKE A MAP OF YOUR CITY ON THE LARGEST WALL SPACE YOU CAN FIND. JUST A PLAIN ORDINARY MAP.

4. MAYBE YOUR WHOLE SCHOOL NEEDS A FACE LIFT.

UNFINISHED MAPS MAYBE PASSED ON TO FUTURE GENERATIONS.

SEND PEOPLE OUT TO DIFFERENT PARTS OF THE CITY AND HAVE THEM MAKE A MAP.

WHATEVER YOU LIKE.... SMELLS, FEELINGS, NEWSPAPER STANDS, SEWER LINES, PLAYGROUNDS...

TRY TO MAKE YOUR MAP MULTISENSORY AND MULTIDIMENSIONAL....
Figure 7, 'MAPPING'). The teacher may concentrate on developing the student's abilities in collecting, organizing, and presenting such factual information as the location of underground services, the frequency of cars in an area of the city, civic boundaries, topographical features, etc. Or he may focus on the student's emotional and perceptual sensitivity to the city, requesting him to indicate on his map the 'moods' of various communities, the smells and textures most prevalent in certain areas, the least sensitive buildings, etc. The map itself might be a small notebook sketch or a large scale wall map including three dimensional features. Students should be encouraged to make their maps original and unusual, adding informational, visual, and textural variety whenever possible. Over a period of time a classroom map adorned in this fashion could easily become a community attraction as well as a valuable source of information.

While it is not necessary that the information collected during mapping relate to a specific problem (i.e. it might be utilized simply to enhance the student's general appreciation of the city), it is often useful to approach problems through mapping.
For example, in considering the problem of providing more amenable public spaces in a given area of the city, students might map the various activities which occur in that area and then try to determine how these interact with each other. Hopefully, some focal points will be discovered which may then be explored with design objectives in mind. The student’s skills in interviewing, graphing, using recording equipment, etc. could similarly be developed through appropriately designed exercises involving these skills.

Idea Generation

It is in this phase of problem solving that the creative approach differs most substantially from the more traditional approach. Whereas the traditional problem solving approach proceeds with a conventional analysis of information, decision on the appropriate strategy, and solution of the problem according to the format of the chosen strategy, creative problem solving proceeds with what has been called 'lateral' or 'divergent' thinking. These terms refer to an expansive and free-wheeling thought process as opposed to a more focussed and
controlled ('convergent') process. Divergent thinking makes greater use of the imagination as a bridge into the reservoir of ideas stored in the subconscious mind. Its object is to generate as many ideas as possible about the problem, not to find the one idea which satisfies the problem requirements. By using divergent thinking, the creative problem solver increases his likelihood of discovering an unusual solution which, though it satisfies the problem requirements, is not necessarily a 'logical' solution in that it may involve the use of objects and ideas not normally associated with the problem context.48

Authors in the field of creativity have designed a number of exercises to help the individual develop his abilities in divergent thinking. These utilize three main techniques: brainstorming, play, and metaphorical thinking.

'Brainstorming',49 refers to the group process of generating as many ideas as possible regarding a concept or object. Generally this concept represents an integral part of a larger problem. For example, if one were attempting to design a new system of rapid
transit, one might brainstorm the concept of transportation -- how many different kinds of transportation are there? how do they operate? Participants are generally instructed to express their ideas freely, without passing judgement on their apparent relevance or ultimate value as solutions to the problem. This is referred to as the method of 'deferred judgement'. When new ideas are exhausted, the group considers each idea more carefully, identifying its relationships to the problem (eg. common principles and ideas) and how these might aid in its solution. In terms of the previous example, the principles of pipeline transport might be found to be applicable to the rapid transit of individuals -- people pipes?

As illustrated on the following page (Figure 8, 'REUSING'), the problem of re-using objects and events might well be approached by the brainstorming method. The first part of this problem is fairly straightforward. The student chooses an object, such as an old parking meter(s), plastic container(s), gas-station, or firehall, and attempts to think of all of the ways in which this object might be re-used. The second part of the problem -- re-using an 'experi-
ence' -- is somewhat more difficult, partly because of its ambiguity (how does one 're-use' an experience?), and partly because experiences are often more complex and abstract than objects. They are thus less easily visualized and manipulated in the mind. The student must first define the experience he wishes to consider (e.g. shopping, riding on a bus, etc.) and then try to alter that experience in such a manner that its significance or meaning is changed. In effect, a second dimension is added to the experience. In both cases the brainstorming method helps the student to generate numerous and unusual ideas for the re-use of objects and experiences.

During brainstorming even the wildest and silliest ideas should be encouraged if only for their catalytic value. After the brainstorming session, individual students (or groups of students) could develop one of the ideas into a viable solution to the problem of recycling the original object.

The value of play -- physical and mental frolicking -- to learning and thinking has long been recognized by both educators and psychologists. In the process of idea generation, an attitude of
playfulness enhances the powers of the imagination by allowing the individual to escape the bounds of rationality imposed by the conscious mind and to benefit more directly from the influence of the less inhibited subconscious mind. During this phase of problem solving, then, the teacher might encourage the use of games involving both physical and mental activity, which promote an atmosphere of fun and relaxation. Some general ideas for a game which might be used in an urban studies course appear as 'rules' in Figure 9, 'URBAN GAMES'. Any number of games could be developed from this basis, focussing, for example, on the political systems which operate within a city, or on the vast communications networks that operate both within and between cities. The games may be extremely complex, requiring students to develop intricate strategies of play. Or they may stress physical activity within the city, as in a game of urban basketball, where the city is the court!

During the playing of games, students should be encouraged to assume the roles of other people, of animals, and of inanimate objects - to become the thing\(^52\). While such sympathetic role-playing is relatively easy in a game situation, it may be some-
RULES

Invent an urban game that:

1. can be played by 20 or more people at one time (individually or in teams)
2. takes one half to one day to play
3. enhances the player's knowledge of the city
4. requires players to go out into the city (optional)
5. allows for the participation of the 'public' (optional)
6. is fun to play! (not optional)

Try playing the game in your class...in other classes. Invent appropriate prizes for winners...and losers!
what more difficult during the more serious activity of problem solving. Yet role-playing can be of tremendous assistance in the problem solving process. If properly undertaken, it can provide the individual with valuable insights into the essences of inanimate objects, into the thoughts and feelings of other individuals, and into his own thoughts and feelings. For example, the student might assume the guise of an old building, feeling its inner life and form in order to gain some insight into the problem of revitalizing or remodeling the building. The opportunities for using role-playing are unlimited: virtually any problem includes some aspect which may be approached in this manner. Its use brings a welcome element of fun and spontaneity into the problem solving process.

A special kind of game which deserves separate mention is the 'simulation game'. This has been defined by Maidment and Bronstein as follows:

A simulation game, as the name implies, contains characteristics of both a simulation and a game. It is an activity in which participants interact within an artificially produced environment which recreates some aspect of social reality. The participants, termed players, assume the roles of individuals or groups who exist in the particular social system being simulated. Their goals and those
of the actors they represent are the same.

The simulation game is particularly valuable then, in situations where direct experience is impossible or impractical because of time or space constraints, expense, politics, etc.

Simulation games are believed to have some particular educational advantages, such as 'their ability to focus attention, their requirement for action rather than merely passive observation, their abstraction of simple elements from the complex confusion of reality, and the intrinsic rewards they hold for mastery'\textsuperscript{54}. In addition they provide 'a new and non-authoritarian role for the teacher, a more realistic and relevant presentation of learning experiences, and an increase in student motivation and interest'\textsuperscript{55}.

In the mid 1960's the value of simulation games in the education of urban planners and decision-makers became evident.\textsuperscript{56} The increasing complexity of the city and the growing amount of information available to urban decision-makers were making the task of understanding the city almost impossible.\textsuperscript{57} The use of games which reduced the city and its systems to a comprehensible whole allowed both planner and student
alike to develop an understanding of the city. A number of games involving various aspects of the city have been developed, many of which are available for classroom use (see list of organizations at end of paper). Of these, perhaps the best known are CLUG and CITY II, which have undergone, since their conception in the early 1960's, a great deal of refinement.

While commercially developed games may suit the educational objectives of the teacher, it may be more desirable to have students design their own locally based games. For example, in Figure 10, 'GROWTH', students are requested to design a 'civic development game'. This game could help to acquaint the student with the complex decision-making processes that occur at the municipal and regional levels. By 'playing out' the roles of the people involved in such decision-making activities, the student gains an appreciation of the myriad factors involved in civic development. While it is evident that the game designed by the students will have many imperfections, both as a game and as a simulation, it is becoming clear that the greatest educational benefit to be gained from simulation games lies in their design a
what is growth
what 'stage' of growth is your city at...

... teenage, infancy, or senility.

what is progress

**ACCOMMODATING URBAN GROWTH:**

- Assume that the run-away population growth has caused the city's population to triple; city council has decreed that every residential block must triple its present population (estimated at 5.5 people per house).
- Make a map of your block and figure out how you could accommodate this growth without demolishing existing housing.

**CIVIC DEVELOPMENT GAME:**

- Get a group of people to assume 'key' roles in the development of a city -- mayor, businessmen, developers, 'environmentalists', etc.
- Get a large blank map of your city, play money for each player, and 'blocks' or symbols to serve as buildings, parks, streets, etc. Now, develop your city according to real life rules.
rather than in their playing.

The value of metaphorical thinking in the generation of ideas has long been recognized by poets and artists, but has only recently become popular in the educational context. In metaphorical thinking, one utilizes symbols to 'join dissimilar experiences' at some level of meaning. In artistic endeavours, it is most often used to add an extra dimension to a familiar object or idea, to make something more colourful. Utilizing the principles of metaphorical thinking, the Synectics Corporation has developed an exercise called 'Making it Strange' which encourages students to think of familiar objects in unusual terms, thereby promoting more novel perceptions of ordinary objects. For example, the student might be asked such questions as: 'What is a lugubrious lamp-post?', 'How is the city like a camera?', and 'How is walking downtown like playing a musical instrument?'. In his consideration of these questions, as the student draws analogies between the two ideas involved, he may discover novel ideas which, if not of immediate value, may be useful in future problem solving activities.
Incubation and Illumination

It is during incubation and illumination that the subconscious mind makes its greatest contribution to the problem solving process. But because the subconscious still eludes man's complete understanding, the exact nature of its contribution can only be guessed from the outward manifestations during this phase. Of the many explanations which have been offered, one of the clearest is by Kubie:

Preconsciously we process many things at a time. By processes of free associations, we take ideas and approximate realities apart and make swift condensations of their multiple allegorical and emotional import. Preconscious processes make free use of analogy and allegory, superimposing dissimilar ingredients into new perceptual and conceptual patterns, thus reshuffling experience to achieve that extraordinary degree of condensation without which creativity in any field would be impossible.

Kubie's term 'preconscious' refers to that portion of the subconscious mind that is 'open to recall when the ego is relaxed'. Or, if we consider the human mind as a continuum of various states of consciousness, 'preconsciousness' is the liaison between subconsciousness and consciousness: it is the medium through which the subconscious communicates to the conscious mind.
During 'incubation' the individual apparently 'forgets' the problem and shifts his attention to other matters, allowing the previously acquired information and ideas to be transferred to the subconscious mind. Here they are reorganized along with other previously acquired and perhaps long since 'forgotten' ideas, into various patterns and configurations. This activity seems to proceed in a haphazard manner, without regard for the 'logic' of reality, but according to its 'own autonomous laws'. In addition, it is by definition beyond the control of the individual in whom it is occurring, and his attempts to influence it generally have a constipating, rather than catalytic effect.

Finally the subconscious mind arrives at one particular organization of material which 'satisfies' it and ceases its problem solving activities. It is at this time that the individual becomes aware of the 'solution' discovered by the subconscious mind. There is a sudden revelation or 'illumination' during which the vital information is transferred (according to Kubie through 'preconscious' processes). How and why this occurs remains a mystery. However, many descriptions of the event have been advanced. According
The stage of illumination is frequently described as a period of exhilaration, excitement and elation. The long awaited synthesis or insight may come in a flash of clarity, but as often it comes in a swirl of ideas and images, tumbling upon each other in a frenzy of groupings and regroupings that gradually achieves a coherence and order that sparks off implications in all directions.

The experience of illumination is common enough in everyday problem solving -- one suddenly ‘sees’ the solution to a problem. But its intensity is particularly strongly felt by an individual who has expended a great deal of time and energy considering a specific problem.

Obviously neither incubation or illumination can be ‘taught’ in a direct fashion. At best this phase of the process may be facilitated through increasing the student’s awareness of what is occurring within him and through the maintenance of a relaxed, but expectant atmosphere. According to Harold Rugg:

There is emphatic agreement that the flash comes when the person is in a state of relaxed tension; being off-guard seems to be a central condition.

The teacher should therefore refrain from demanding
immediate 'answers' to problems, encouraging students to keep their patience during this often frustrating stage.73

Exercises such as game playing, 'sensiticity', mapping, and 'uses for things', which can be designed to promote an attitude of playfulness and relative relaxation, might again be utilized during this phase of the problem solving process. An exercise which may be well suited to this phase of the process is the construction of a 'LEARNING SPACE' as suggested in Figure 11 on the following page. In designing and constructing an actual environment, students are allowed the pleasure and relaxation of physical activity and handiwork as well as the opportunity to deal, in a concrete fashion, with such abstract concepts as community, privacy, and the nature of learning. To increase the educational value of this exercise a number of limitations could be placed on the basic design problem. For example, students might be requested to use modular construction or to design their spaces according to an appropriate theme. Or the problem might be cast in terms of group interaction: students might be required to work in the context of a larger group, conforming to its standards
A LEARNING SPACE

- Using recycled materials only...
- Working within a given or 'real' environment (e.g. your classroom)...
- Utilizing only 25 sq. ft. of floor space per person; 45 for 2 of you, 65 for 3, and 100 for 4 or more...
- Taking into consideration all of the activities and emotions involved in 'learning' as you define it...

Design and construct a 'Learning Space'

Time: 1 week
of design and construction.

The 'LEARNING SPACE' exercise may be designed to provide a continuing focus of classroom activity, with constant additions, renovations, and embellishments of the basic structure. Thus a whole range of handicraft activities such as weaving, batik, woodwork, pottery, etc. could be incorporated into the larger design exercise. The main value of such an exercise is as an outlet for frustration: it helps the student to 'forget' his problem, to relax, and to allow his subconscious mind to continue its problem solving activities unimpeded.

Refinement

During refinement the individual verifies, develops, and refines the crude pattern provided by the subconscious mind during 'illumination' into a viable solution to his problem. Depending on the intricacy and magnitude of the original problem, the state of development of the pattern supplied by the subconscious mind, and the desired form of communication, this stage of the process may take a great deal of time or almost none at all. If, for
example, the original problem involved the design of a new housing development and the idea provided by the subconscious mind involved using the structure of the honeycomb as a model, then the task of actually applying the idea, adapting it to fit the conditions of site, materials, economics, etc., and of drafting preliminary plans, may be lengthy and tedious.

This detailed and concentrated work requires the mind's powers of analysis, reason, and judgement to analyze the various elements of the solution, to determine the relationships of these elements to the whole and to each other, and to verify the adequacy of the solution. In other words, the individual must be able to think logically and critically about his problem. His activities during this phase then, are not substantially different from those which would occur at a comparable stage in the traditional problem solving process. The 'creative act' is essentially complete.

In teaching for this phase of the process, the teacher should continue to encourage open-mindedness while at the same time helping his students to develop
their skills in idea refinement. A rather fun kind of exercise which might be employed at this time is exemplified in the 'What if...?' questions which appear in Figure 12 on the following page. By considering the full range of consequences of such fanciful propositions as 'What if houses looked like their inhabitants?', the student may develop his skills in logical thinking and idea refinement while at the same time maintaining an attitude of fun and playfulness.

More serious exercises accomplishing similar objectives should also be developed. For example, in Figure 13, 'PEOPLE IN THE CITY', one of the implicit 'What if...?' questions is 'What if more people lived in the city...where would they live?' The student is requested to find a suitable space within the urban core and to design within this space a 'personal living space' for himself. To ensure that the student engages in the process of refining his ideas, a scale model should be required, showing interior space allocation and design features. Once again, any number of restrictions (eg. location, space, materials, cost, etc.) may be placed on the problem to increase its difficulty and to force the
What if...?

Cement did not exist?

The 3 day work week became reality?

Zoning were abolished?

The city were made of food?

Houses looked like their in habit ants?
PERSONAL LIVING SPACE

- find a space in the 'downtown' area of your city that:
  1. you would like to live in
  2. is not now lived in
  3. is being used, part-time, for purposes other than strictly residential

- design within this place a 'personal living space'

- make a drawing or model of your space

AMENABLE URBAN SPACES

- what kinds of 'things' could you invent to get more people into the inner city ... to visit to live?

- include events, building designs, activities, etc. in your considerations

- how could the city be made more amenable to people?

- also keep in mind all of the different kinds of people that live in the city -- young, old, thin lonely, active, weird...
student to refine and modify his fanciful notions to the actual problem conditions.

The ideas listed in Figure 13 under 'amenable urban spaces' suggest avenues of exploration which might also be used to enhance the student's abilities in idea refinement. If, for example, the student felt that cities should be made more inviting to youngsters, he might be requested to elaborate on some of the physical and social changes that could be effected to achieve this objective. Perhaps the student could find a means of integrating child-sized buildings into the urban environment (between high-rises?) or making written signs more meaningful to children (converting them to pictures?).

Exercises and problems may be developed around any number of urban issues to enhance the student's urban awareness as well as his skills of refinement. They must simply require the student to produce an articulate and finished piece of work rather than a series of conceptual ideas.
Communication and Evaluation

The activity of communication occurs throughout the entire problem solving process: the individual receives 'communications' from his environment and undertakes a kind of inner 'communication' with his subconscious mind to develop a creative solution to the problem. But once the problem is solved, the individual must communicate his new discovery to others. Depending on the nature of the original problem and on the problem solver's particular talents and abilities, the final stage of the process may take several forms (eg. a book, painting, film, scientific paper, etc.) and may be more or less refined or 'polished'. In any case, to prepare his solution for communication, the problem solver must choose a format which is appropriate to both his problem and his own talents. Then he must express his ideas as effectively as possible to achieve a maximum impact on his audience.

In order to broaden the student's communications skills, the teacher should expose students to the techniques and equipment associated with various forms of communication and assign exercises which emphasize
some form of communication. Experts in any of the various fields of communication (dance, sculpture, computer programming, etc.) might be invited to give workshops in which students could become familiar with the 'basics' of the given medium. Following (or during) the workshop, exercises based on the particular kind of communication being studied should be issued. For example, if graphics were the focus of a workshop, the teacher might assign a simple exercise utilizing graphics, such as the design of a poster for some part of the city or some event in the city. The student should attempt to communicate in graphic form, his ideas or feelings about the city.

During a more general workshop on the various forms of communication, the teacher might experiment with some unusual 'communications' such as that represented in Figure 14 on the following page. The teacher could simply issue each student with a provocative picture (poem, object, etc.), perhaps identifying it as the week's assignment, and then wait for their response. If the content of the teacher's communication to each student were kept secret, it might be interesting to have the students attempt, at
the end of the assignment, to identify which presentations are responses to which communications. Thus, the entire exercise is involved with communications and counter-communications of various kinds.

Exercises and projects involving different forms of communication should be assigned whenever possible. These may deal with any subject matter and may therefore be used to develop skills other than those directly associated with communication.

An important element in the student's ability to communicate, particularly in relation to a certain field or discipline, is his knowledge of the 'jargon' or 'lingo' that characterizes that discipline. In many cases this will be developed during the problem definition and information gathering stages, as the individual encounters specialists and printed matter in the field, however it often requires a special effort to 'learn the lingo'. During this stage (or perhaps somewhat earlier), the teacher should attempt to make his students aware of the fact that there is, indeed, a language that must be mastered.

A good way of achieving this objective might be to have the students compile a 'glossary' of terms,
including subjective as well as objective comments (ie. the emotional and political overtones of the words), and perhaps illustrating the terms appropriately with cartoons or graphics. At the end of term, a mimeographed copy of the glossary could be distributed to the class and/or kept for the use of future students. A preliminary list of terms which might require definition in an urban studies class is found in Figure 15, 'URBAN GLOSSARY', on the following page.

To encourage all forms of communication, but in particular the student's skills of verbal communication, the teacher might organize, with each problem or project undertaken, a set of formal presentations made by the students to their classmates, to the school, or perhaps even to the whole community. Over the years, such presentations could be developed into a major school undertaking, providing a stronger liaison between school and community.

The presentation method also offers a perfect vehicle for classroom evaluation. After presentation, students might discuss the merits and drawbacks of both the presentation and the student's problem solving approach. This gives the problem solver valuable
‘‘URBAN GLOSSARY’’
(Words I should know)

DEVELOPMENT

DESIGN

ENVIRONMENT

FIVE YEAR PLAN

GREEN BELT

HIGH DENSITY

LOW RISE

OPEN SPACE

MASS TRANSIT

PARTICIPATION

SLUM

UNDERGROUND MALL

URBAN RENEWAL

ZONING

anything bigger than a garage

no meaning. But use it a lot anyway.

umm....
feedback from a number of persons and has the additional advantage of utilizing peer relationships in the learning process. Such discussions should prompt the problem solver to undertake more rigorous and meaningful self-evaluation of the way in which he handled his problem and the conclusions he reached. Throughout evaluation, the emphasis should be on what the student has learned. Problem solving is essentially a subjective activity: the student must learn to establish demanding goals for himself and to evaluate fairly his progress towards those goals.
SUMMARY AND CONCLUSION

The preceding discussion has been summarized in Table 1 (page 68), which includes a consideration of:

1. the abilities required during each phase of the creative problem solving process;
2. the exercises and methods whereby these abilities might be developed; and
3. examples of concepts and techniques which might be considered using these methods in the context of urban education.

This table represents a point-form outline of the creative problem solving approach to education. It is not a course or even an outline for a course, in itself. As an approach, it may be applied to a range of subject areas, from the most simple of objects, such as boxes, to complex issues such as transportation, to whole fields of endeavour, such as urban
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<td>Utilization of equipment and techniques of information gathering</td>
<td>Problems which demand utilization of the techniques and equipment as well as the collection of both objective and subjective information</td>
<td>USES FOR THINGS</td>
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<td></td>
<td>Critical thinking</td>
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<td>MAPPING</td>
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<td>Sensitivity to subjective aspects of problems</td>
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<td>Idea Generation</td>
<td>Divergent thinking</td>
<td>Brainstorming</td>
<td>RECYCLING</td>
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<td>Play (role playing and simulation games).</td>
<td>URBAN GAMES</td>
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<td>Metaphorical thinking</td>
<td>GROWTH</td>
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<td>MAKING IT</td>
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<td>STRANGE</td>
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<tr>
<td>Incubation &amp; Illumination</td>
<td>Imagination and the ability to relax</td>
<td>Playful exercises and physical activity</td>
<td>LEARNING SPACE</td>
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</tbody>
</table>
studies. In addition, it may be employed with various emphases to achieve different educational objectives. For example the teacher may wish to develop his students' skills in problem definition (phase 1) and may therefore refrain from assigning specific problems, instead involving his students in challenging experiences and situations and requiring them to define the problem(s) themselves. Or he might focus on the skills required in phase five, 'Refinement', by providing students with a conceptual solution to a given problem and requesting them to refine it to conform to certain conditions or standards. In this case the student must feel free to move backwards through the problem solving process if he feels that inadequate consideration has been given to the problem at an earlier phase. Thus the creative problem solving approach may be utilized to achieve unlimited educational objectives at virtually any level of education. The format of a program or course developed from this approach will depend on the educational context for which it is designed -- educational objectives, age of students, space and time constraints, etc. I have not, in this thesis, designed such a specific program because it is by definition of such
limited applicability. By presenting instead a more general approach, I hope to make a more effective contribution to the development of educational curricula.

In designing a program which utilizes the creative problem solving approach there are certain general principles which should be kept in mind. First, this approach is essentially a 'self-directed' learning approach: the student should take an active role. The teacher, on the other hand, should assume a more passive role, guiding the student through the process by suggesting activities and problems which will help the student to develop the skills and abilities required during each phase.

Central to the design of any program of creative problem solving is the teacher's presentation of information and ideas. This is crucial to the student's perception and consequent handling of the various problems within the field. It has often been noted that a creative approach yields creative results. Therefore the teacher should attempt to maintain an atmosphere of openness and experimentation, encouraging students to become involved in their work and to approach it imaginatively. This may require a more
casual attitude towards classroom organization: individual students will tend to experiment more with different kinds of techniques for gathering and communicating their ideas. In addition, certain kinds of activities may require physical activity or access to various environments (e.g. a darkroom, city hall, or the community at large). A teacher who wishes to have an effective program of creative problem solving must accommodate the individual needs of students at their various stages of progress.78

In presenting problems and information the teacher may find that more creative work is produced when instructions are kept to a minimum and students are required to collect information themselves. By remaining somewhat non-directive or even secretive about a problem the teacher may capitalize on the inherent ambiguity of the problem to produce diverse results.79 Each student will interpret the problem differently and will therefore deal with it in a unique and individual manner. In collecting his own information the student will become more actively involved in problem solving, will experience it more fully, and will therefore learn how to use it more effectively.80
Finally, it is essential that programs of creative problem solving appeal to the student's imagination and to his powers of subconscious thought. To this end the teacher should try to create an atmosphere of fun and relative relaxation in which students feel free to let their minds wander in their consideration of problems.

It is also believed that visual images are more strongly associated with the processes of subconscious thought than are words. According to Koestler, this is because visual images provide a more fluid medium of thought: they are not bound by the systems of logic that characterize language. It may therefore be appropriate to utilize more visual material in the presentation of ideas, searching for rich and unusual images which appeal to the student's imagination and subconscious mind.

If we are to capture the interest of young problem solvers it will not be with serious, 'fact-stuffed', and didactic programs of education which often serve only to depress and overwhelm the student, but with fun and challenging problem-oriented programs which allow the student to assume a more active role in the
learning process. It is intended that the ideas presented in this thesis will contribute to the development of such programs at all levels of education, and in particular at the university level, where future urban problem solvers are currently enrolled in Schools of Planning, Architecture, and Environmental Design.
FOOTNOTES


2 Here and throughout the rest of this paper the word 'environment' will refer to the physical and social milieu in which man exists. It includes both the natural or biophysical environment and the man-made or urban environment.

3 These include Cook, 1970; Ehrlich, 1970; Fyson, 1971; Schoenfeld, 1971; Stapp, 1971; and Ward, 1971.

4 Schoenfeld, 1971, p.42.

5 For example in Schoenfeld, 1971; Shomon, 1964; and Stapp, 1971.


8 Ward, 1971, p.222.


11 Bruner, 1962, p.94.


15 Duncker, 1945.
24 Wehrli, 1968.


36 Keats, in Noyes, 1956, p.1213.

37 MacKinnon, in Roslansky, 1970.


40 These have been developed by such authors as: Getzels & Jackson, 1962; Gough, in Parnes & Harding, 1962; Guilford, in Cropley, 1967; MacKinnon, in Roslansky, 1970; Myers & Torrance, 1964; Parnes, in Taylor, 1972; Synectics Corporation, 1970; Torrance, in Cropley, 1967; and Wallach & Kogan, in Cropley, 1967.

41 Torrance, in Cropley, 1967.

42 Developed by Torrance, in Cropley, 1967; also used by Goodnow, 1969; Guilford, 1967; and Wallach & Kogan, in Cropley, 1967.


46 For example the works of Black, 1952; Emmett, 1960, 1965; Wertheimer, 1959; and Wilson, 1969.

47 The term 'divergent thinking' was coined by Bruner in 1966; the term 'lateral thinking' was coined by De Bono in 1972. These terms are used by several authors to refer to two distinct modes of thought which occur during problem solving, including Guilford, in Mooney & Razik, 1967; Getzels & Jackson, 1972; Rugg, 1963; and Wertheimer, 1959.


49 Parnes, 1961.


52 Synectics Corporation, 1970.


54 Coleman, in Boocock & Schild, 1968, p.29.


57 Feldt, 1966, p.17.

58 Berkeley, 1968, p.58.

59 Gamson, in Inbar & Stoll, 1972, p.68.

60 Bruner, 1962, p.63.


64 Kubie, in Mooney & Razik, 1967, p.38.


67 Hallman, in Gowan, 1972, p.22.


Wehrli, 1968, p.20.


Rugg, 1963; p.11.


BIBLIOGRAPHY


Gunn, Angus M. *Patterns in Urban Geography.* Vancouver, Canada, W.J. Gage Ltd., 1970.


Merrifield, P.R. et al. *A Factor-Analytic Study of Problem Solving Abilities.* Reports from the Laboratory of the University of California, March, 1960.


Symonds, Hilda, ed. The Teacher in the City. Toronto, Methuen Pubs., 1971.


APPENDIX I: ANNOTATED BIBLIOGRAPHY AND ADDITIONAL REFERENCES ON THE URBAN ENVIRONMENT

Annotated Bibliography

The books discussed in this bibliography are considered central to the concepts developed within the thesis and are strongly recommended to those who in end to design educational programs utilizing the creative problem solving approach.

Education:


Bruner attempts to deal, in this book, with the nature of creativity. He defines the creative act as 'an act that produces effective surprise' and that takes 'one beyond the common ways of experiencing the world' (p.22). He proceeds to describe the various 'conditions' of creativity or, more accurately, the individual predispositions which may be identified that lead to creative behaviour. In the last half of the book Bruner discusses discovery learning (problem solving) as the most effective means of teaching an individual to utilize his creative potential. He also deals at length with the use of metaphor in both the learning and the creative processes. In the learning process, metaphor is used to 'join dissimilar experiences' or ideas in order to gain an insight into their separate natures. In creative endeavours the same procedure is used to add another dimension to an experience or idea, taking it beyond its common level of meaning. The book is a fascinating study of the little understood phenomenon of creativity.
In this book Bruner sets forth his theory on human intellectual growth and on instruction. According to Bruner a theory of instruction must include a specification of:

1. the kinds of experiences which most effectively implant in the individual a predisposition toward learning;
2. the ways in which a body of knowledge should be structured so that it can be most readily absorbed by the learner;
3. the most effective sequence of presenting ideas and information; and
4. the nature and pacing of rewards and punishments.

Bruner discusses these requirements in some detail, stressing the importance of increasing the student's sense of involvement in the learning process. He suggests that student participation is facilitated through a problem solving approach to learning which helps the student to personalize and therefore internalize what he learns. Bruner illustrates his educational methodology by developing, at the end of his book, a course on 'man', aimed at the secondary level student. The book provides a comprehensive statement of Bruner's educational theory which is particularly useful in the design of problem oriented programs of education.

Creativity:


The Act of Creation is a lengthy and well-documented description of the creative process as it occurs in nature and in the human mind. The author attempts to explain the creative act as a 'bisociation' of 'two independent matrices of perception or reasoning' (p.45). In other words, the creative act unites two separate entities into new wholes. Koestler contends that this act is precipitated by the random associations of thoughts and images which occur within the subconscious mind of the problem
solver. All of a sudden there is a fusion of two sets of facts or ideas and the creation is born. In many cases this creation represents the solution to a problem. Throughout his book, Koestler stresses the importance of the subconscious mind as the arena for creative thinking and the necessity of 'relinquishing' one's conscious control over one's thoughts to allow the subconscious mind to operate more freely. He also discusses the implications of his theory on education, concluding that education, especially in the sciences, ought to take the form of problem solving. Students should be presented with the 'paradoxes' that baffled such scientists as Newton, Harvey and Darwin. This will create an atmosphere of greater excitement and involvement, an atmosphere which the author contends is more conducive to creative thinking.


In this pamphlet, Torrance presents a brief but concise definition of creativity and description of research activities in the field. He then discusses the implications of this research on education and the role of the teacher. In the final few pages, the author lists ten guidelines for creative teaching which should help any teacher to develop an attitude which is more conducive to creativity.


This book provides a more extensive discussion of the nature of creativity and its implications on education; Torrance identifies several problems which may arise when the student's creativity is suppressed and suggests methods for rectifying this situation. He also deals at some length with the question of the relationship between intelligence and creativity, concluding that the intelligent child, as identified by current systems of evaluation, is not necessarily creative, and that new tests should be developed to try to identify those students with high creative potential.
Problem Solving:


Duncker describes the process of problem solving as a series of restructurations of the problem which bring it closer to the desired (solution) state. These restructurings tend to unite formerly separated parts of the problem situation into new wholes. (p 29). They are created, according to Duncker, out of an open and 'elastic' mind, one which is not rigid in its patterns of thought. In connection with this elasticity, Duncker describes the phenomenon of 'functional fixedness' in which the problem solver cannot restructure the problem because the problem material is, in his mind, imbued with certain functions or attributes which he has difficulty in separating from the material itself. It is only when the problem-solver can break free of this fixedness that the sudden reformation of ideas, the 'aha' experience, takes place. Duncker illustrates his theories with discussions of several experimental problem solving activities, mostly of a mathematical nature. His article represents one of the first detailed discussions of creative problem solving.


This study attempts to identify, by observing the problem solving activities of architectural students as they grapple with design problems, the discrete stages of the problem solving process and the abilities required by the problem solver during each of these stages. The stages identified by Moore are:

1. Problem Recognition,
2. Problem Definition,
3. Strategy Development,
4. Problem Analysis
5. Solution Generation,
6. Solution Selection, and
7. Evaluation and Verification.
Under each of these headings, the authors provide an extensive list of the abilities required. Many of these are concerned with the notion of perceptual and cognitive flexibility (the ability to see things and think of things in new and unusual ways), and with the abilities associated with logical thinking. This study is of tremendous value to a teacher who wishes to design a program of creative problem solving as it helps to establish the educational objectives which should be achieved at each stage in the process.

Urban Education:


This book is basically a collection of suggestions for activities in the city which will help the participant to view his city in different and unusual ways. Many of these suggestions could be readily adapted to fit the educational context. Most are imaginative and fun, though the concepts they deal with may be somewhat more serious. It is well illustrated, with drawings and cartoons that help the reader to view the city in a more imaginative way.

Symonds, Hilda, ed. The Teacher in the City. Toronto, Methuen Pubs., 1971.

The Teacher in the City is a more serious attempt to provide the teacher with lesson outlines which deal with important urban issues and concepts. Projects and activities are suggested for each lesson, as are possible questions for consideration by the students. The book thus provides the teacher with a substantial framework for a course of urban studies. It is primarily intended for the secondary level of education, however an experienced teacher could adapt the ideas presented to almost any age level. This book also includes an annotated bibliography of references on the city, its history, geography, economy, sociology and design, which is invaluable to the teacher.


This book is primarily intended for use at the
elementary school level. It suggests a number of field trips that students could take to learn more about their city - for example the airport, a bakery, a firehall, etc. The book's format is similar to that of the yellow pages of a telephone book, listing the suggested field trips in alphabetical order for easy reference.


*Making the City Observable* is a compilation of ideas for making the city more understandable to the average citizen. Wurman places a great deal of emphasis on the development of maps and systems of graphic symbols within the city itself to promote an increased visual understanding of the city. The book is illustrated with several examples of graphic and mapping techniques which relay information in a much more concise and effective manner than do the tables of statistics and written reports which one is often faced with in one's attempt to become more knowledgeable about the city. While Wurman does not, in this book, suggest how his ideas might be adapted for classroom use, an experienced teacher should have little difficulty in doing this for himself.


*Studying Your Community* is undoubtedly the most comprehensive and extensive work in the field of urban studies. The book is divided into general areas of concern (social, physical, economic, political). Within each of these areas, more specific issues and problems are considered - for example the structure of the social welfare system in the community. Warren considers these, not by discussing their general nature in most communities, but by presenting a list of very specific questions regarding their nature in your community. In other words, the book enumerates specific questions which should be asked in any community study. It is an absolutely invaluable teaching aid, providing as it does, a lesson outline for almost any avenue of inquiry into the city. It is primarily intended
for secondary school and university students and for professionals who wish to explore an aspect of the city in which they have no expertise.

Additional References on the Urban Environment

Bacon, Edmund. *The Design of Cities*  


Blake, Peter. *God's Own Junkyard.*  


Eckbo, Garret. *Landscape for Living.*  


Goodman, Robert. *After the Planners.*  

Gutkind, E.A. *The Twilight of Cities.*  

Hall, Peter. *The World Cities.*  

Halprin, Lawrence. *Cities.*  

Hosken, Fran. *The Language of Cities.*  


Ibid. Architecture Without Architects.

Saarinen, T.F. Perceptions of the Environment.

Simmons, James & R. Simmons. Urban Canada.


Whyte, William H. The Last Landscape.

Zucker, Paul. Town and Square.
APPENDIX II: ORGANIZATIONS FOR SIMULATION GAMES

The following organizations are currently involved with the production and distribution of simulation games in the urban field. The games available through each organization are listed in brackets.

1. Abt Associates Ltd.,
   55 Wheeler St., Cambridge, Mass.
   (Pollution, Neighbourhood, Simpolis, Manchester & Urbcoin)

2. Applied Simulations International Inc.,
   #900, 1100 Seventeenth St. N.W., Washington D.C.
   (City II)

3. The Free Press,
   866 Third Ave., New York, New York.
   (Simsoc)

4. Interact,
   P.O. Box 262, Lakeside, California.
   (Sunshine)

5. Science Research Associates Inc.,
   259 East Erie St., Chicago, Illinois.
   (Interurban Simulation)

6. Simile II,
   P.O. Box 1023, 1150 Silverado, La Jolla, California.
   (Napoli, Plans, Sitte)

7. LaClede Town Co.,
   St. Louis, Missouri.
   (Trade-Off)
8. Systems Gaming Associates,
   A 1-2 Lansing Apts., 20 Triphammer Rd., Ithica, N.Y.
   (Clug)

9. Urbandyne,
   5659 South Woodlawn Ave., Chicago Illinois.
   (Edge City College)

10. Western Publishing Co. Inc.,
    School & Library Dept., 850 Third Ave., New York.
    (Disaster, Ghetto)