DOCUMENT RESUME

ED 303 155 IR 013 625

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TITLE	Problem Solving Interactions on Electronic Networks.
PUB DATE	Apr 88
NOTE	19p.; Paper presented at the Annual Meeting of the American Educational Research Association (New Orleans, LA, April 5-9, 1988).
PUB TYPE	Viewpoints (120) -- Reports - Evaluative/Feasibility (142) -- Speeches/Conference Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	*Class Activities; *Computer Networks; Environmental Education; Foreign Countries; Global Approach; Higher Education; *Instructional Design; Instructional Innovation; Interaction; *Learning Activities; *Problem Solving; Water Resources
IDENTIFIERS	InterCultural Learning Network

ABSTRACT

Arguing that electronic networking provides a medium which is qualitatively superior to the traditional classroom for conducting certain types of problem solving exercises, this paper details the Water Problem Solving Project, which was conducted on the InterCultural Learning Network in 1985 and 1986 with students from the United States, Mexico, Japan, and Israel. The paper begins by explaining the problem solving strategy used, which is referred to as receiver site transfer, and points out that it shifts the emphasis from attempts to brainstorm possible new solutions for a local problem to comparing and analyzing solutions to similar problems in other locations, and attempting to adapt those solutions to fit the local situation. Results obtained from analyses of the message interactions which occurred during the project are then presented for each of four analytical techniques, i.e., InterMessage analysis, Message Flow analysis, Message Act analysis, and Semantic Trace analysis. Network versus face-to-face interactions in the classroom are compared, and the advantages of using an electronic network as a medium for students to conduct problem solving activities are discussed. Several other types of projects that would be appropriate for the receiver site transfer technique are discussed, and three other problem-solving strategies that have been used in network-based activities are briefly described. The text is supplemented by four figures and one table, and a 14-item bibliography is provided. (EW)

Problem Solving Interactions on Electronic Networks

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A paper presented at the Annual Meeting of the
American Educational Research Association
New Orleans, LA
April, 1988

The purpose of this paper is to describe the results of our analyses of a specific network-based problem solving activity using three of the analytical techniques described in the paper by Levin, Kim & Riel (1988) and a fourth technique, semantic trace analysis, developed by Miyake. Levin, Kim and Riel found that the nature of the instructional interaction among students involved in electronic networking is different than that exhibited by students engaged in typical classroom instruction. Similarly, we have found that the nature of students' problem solving efforts in this medium are also quite different than typical classroom-based problem solving efforts of students. In our view, electronic networking provides a medium which is qualitatively superior to the traditional classroom for conducting certain types of problem solving exercises.

The water problem solving project

The analyses of the problem solving activity discussed in this paper concern a project known as the *Water Problem Solving Project* (Levin & Cohen, 1985) which was conducted on the InterCultural Learning Network in 1985 and 1986. In this project, students in the United States, Mexico, Japan and Israel jointly tackled the problem of shortages of drinking water. In the initial phase of the project, the students conducted research and developed a description which detailed how drinking water was obtained in the area where they lived. Next, these student-generated descriptions were sent via the Network to all project participants, and each of the groups of students were asked to analyze the techniques contributed by the other groups of students for acquiring and distributing potable water in order to identify patterns of similarity and difference. For those techniques used in other sites but not their own, students were asked to determine why the techniques were not used locally. In the final phase of the project, the students were asked to collect any additional information needed and then to make a judgement on the feasibility of utilizing one or more of these different techniques to help solve the water problem in their own location.

Receiver site transfer

We refer to the problem solving strategy employed in the *Water Problem Solving Project* as "receiver site transfer" (Levin, Waugh, & Kolopanis, 1988; Waugh & Levin, 1988). This strategy allows students to tackle "real-life" problems without becoming overwhelmed by the complexity of the problems. We feel that this kind of activity helps students understand that very often there are many possible solutions to common, practical problems. Through working on these activities, students come to realize that a particular solution which has been implemented locally will embody both significant advantages and shortcomings. Therefore, the problem and the solution should be periodically reevaluated in order to accommodate new data and to ensure that the advantages outweigh the shortcomings associated with that solution. Our perception is that the students who have been involved in these activities have experienced that there are **different** ways to do things, and that sometimes there are even **better** ways to do things!

Throughout their problem solving efforts, we want students to deal with real-world problems. However, the nature of many of the significant problems which face us today is that there are no simple solutions to these problems--no answers in the back of the book. Our dilemma, then, was how to propose that students work on these real-world problems yet avoid becoming discouraged by the fact that they might not be able to invent unique,

workable solutions for many of these problems. Our solution to this dilemma is the receiver site transfer technique. Using this technique the emphasis is shifted from simple attempts to brainstorm possible new solutions for a ' al problem to comparing and analyzing solutions to similar problems in other loca ns, and attempting to adapt those solutions to fit the local situation.

Receiver site transfer involves students in the process of acquiring information from diverse sources concerning the solution of some problem which is common among the various locations. The students then analyze the information in order to identify how the information might be applied in their location and share their analyses with the other network participants. The primary advantages of receiver site transfer are that it: 1) enables students to work on "real world" problems; 2) requires students to clearly articulate their thoughts in writing; 3) is interactive; 4) embodies the concept of peer tutoring; and, 5) requires students to analyze facts and synthesize new ideas. In addition, the technique seems to be highly motivating.

Through engaging in activities which embody the receiver site transfer technique, students gain experience in using a practical method for solving "real" problems. In addition, because this technique is readily applied to a wide variety of specific problems, students can experience using the same technique in numerous problem solving activities. The flexibility of the technique provides students with a ready mechanism for acquiring multiple points of view concerning the nature of and solutions for specific types of problems. This in-context experience should minimize the students' difficulties in transferring the technique for use on other "real world" problems.

InterMessage Analyses

This section will present the results we obtained using three of the analytical techniques described in the paper by Levin, et. al. (1988) to examine the message interactions which occurred during the *Water Problem Solving Project*. These three analyses are the Intermessage Reference analysis, the Message Flow analysis, and the Message Act analysis. The results of a fourth analysis developed by Naomi Miyake, the semantic trace analysis, will be presented in the following section.

Applying the Intermessage Reference analysis to the messages exchanged during the *Water Problem Solving Project* generates a graphic pattern which indicates that the nature of the interaction is not "simple" (see Figure 1). The interaction was not dominated by key individuals but rather was a free exchange of questions and responses among all participants. This may be due to the fact that the messages were exchanged as electronic mail (in non-real time) rather than through conversational (real-time) methods or it may be due to the fact that each of the participants was fully committed to participation in the activity. There are certainly other possible explanations for this widespread involvement. However, the key point is that this medium allowed for a free interchange of expression which is very often not seen in the traditional classroom.

The Message Flow analysis of the data from the *Water Problem Solving Project* generates a graphic pattern which indicates that the problem solving activity "evolved" much as do the other types of activities conducted in this medium (see Figure 2). The level of activity began from a single message which triggered extensive interaction among participants. This initial information exchange shifted to off-line data analysis, and the final messages exchanged concerned student interpretations of the shared data.

The Message Act analysis of the messages generated during the *Water Problem Solving Project* reveals a pattern which indicates that the activity was composed of a single initiation with numerous responses and formative evaluations (see Figure 3). According to Mehan (1978), this pattern is not typical of "traditional" classroom interactions. In addition, several of the sites exchanged summary data for cross comparisons among themselves.

Semantic trace analysis

Miyake developed the semantic trace analysis as a technique for analyzing the network-based student interactions because the other types of analyses which we had previously employed focused very specifically on syntactic or quantitative characteristics of the students' messages. In effect, the semantic trace analysis is an attempt to focus on the nature of the content of the student interactions. What content were the students experiencing during the interaction? What was the purpose of their communication? In order to answer these questions, we needed a method of tracing the pattern of the development of students' ideas over the course of their project-oriented discussions in order to identify what contributed to the growth of the activity.

Miyake applied this technique to the message interactions which were generated in the *Water Problem Solving Project*. She began by constructing a collective overview, or framework, consisting of all the ideas which were contributed by the students and other related concepts that have been established as important to the problem of obtaining drinking water. On this framework, she traced the course of the development of the students' ideas and graphically represented that pattern in chart form (see Figure 4). Using the chart as an activity map, one can identify information such as where a particular part of the interaction arose, how it became integrated into the previous discussion, and how the focus of the discussion shifted as a result of a particular communication.

Our analysis of the activity map for the *Water Problem Solving Project* reveals the seeming importance of involving divergent groups of network participants. Whether it is the diversity among the participants or the nature of the activity or these characteristics in combination with others, this network-based activity resulted in significant contributions to the problem solving activity from multiple points-of-view. Whether or not the contributions were made because the activity compelled them to occur, or because the natural differences among the participants made it easy for each participant to contribute a unique and interesting observation remains a subject for further study. However, bringing multiple points-of-view to bear in problem solving efforts is highly desirable (Miyake, 1986) yet the practical difficulty of providing for these multiple viewpoints in functional settings in "typical" educational practice is significant.

Another valuable attribute of the semantic trace analysis is its ability to serve as an evaluation mechanism for a network-based problem solving activity. By using the activity map of the *Water Problem Solving Project* (see Figure 1), one can easily see the large number of ideas contributed to the ongoing discussion. In comparing these data to the summary message generated from any given site, one can gain a better perception of the influence that the activity has had upon the students in that location. For example, a class of 8th grade students at Lincoln School in San Diego, California participated in the water project and twenty of those students contributed a summary message (see Table 1) in which the students mentioned 71% of the ideas for solutions to the water problem which had been contributed by all of the network participants from around the world. Among

those ideas mentioned by the San Diego students, 66% had been contributed by sites other than San Diego. Each student contributed between 0 and 4 ideas concerning techniques for water acquisition which might be used in the San Diego area. The mean score of these data was 1.7 ideas per student and the mode score was 1 idea per student. However, almost half of the students (9 out of 19) contributed more than one idea on the topic. Although these figures do not assess how much each individual student may have profited from the interaction among the network participants they do indicate a significant impact on the group as a whole.

Network versus face-to-face interactions

To compare these two media it is necessary to draw the distinction between what can occur and what typically occurs in classroom settings. To be sure, many of the characteristics which we feel are strengths of the electronic networking environment could in fact be incorporated into the classroom without electronic networking. For example, the emphasis on student writing and expression of ideas can be accomplished without electronic networks. Within the classroom, an emphasis on word processing can be pursued without the need to telecommunicate the documents that are produced. However, these dimensions of the activities are ones which will or will not occur in the classroom as a result of decisions made by the classroom teacher or the educational institution.

Electronic networking **requires** that certain dimensions of the problem solving activity be present. First, it requires that students express their ideas in writing preferably using a word processing program (someone has to use a word processor eventually). Second, it requires that students use the computer in a meaningful way (as a tool) to accomplish the acquisition, modification and integration of various types of data.

By comparison, the classroom teacher may decide to conduct an activity similar in nature to our water project without students' being required to word process their questions, analyses and conclusions. The summaries of the students' work (paper copies or diskettes) **might** be shared with others through first class mail if "partner" classrooms are available. However, these components of the classroom-based activity are by no means **required** because of the nature of the content of the activity. Therefore, an activity similar to one which might be conducted on the network could be conducted in the classroom or an activity which covers similar content could be conducted in the classroom, but in a qualitatively different manner.

Beyond these differences, electronic networking **provides** additional dimensions for the problem solving process which would be extremely difficult (although possible) for the classroom teacher to acquire outside of this medium. Electronic networking provides a meeting place for like-minded teachers and students from all over the world. Without the network medium how else would the classroom teacher be able to make contact with so many other individuals interested in exploring cooperative educational ventures? Electronic networking provides an idea bank for teachers and students. Our experience has been that most teachers are always looking for new ideas to incorporate into their curricula. Electronic networks provide a means by which teachers and students can share ideas with a broader audience. Further, it allows for cooperative endeavors to flourish. The network allows for a large group of individual participants to continually form numerous smaller groups of collaborators with specific interests.

By comparison, in traditional classroom settings problem solving activities tend to be more structured, less open for students to explore "what if" possibilities. There are pressures on schools and teachers to cover all the topics in the "curriculum" on a fixed time scale. Therefore, because creative problem solving can be time consuming, it is rarely pursued.

When problem solving is conducted in schools, the problems addressed tend to be those which are limited to specific solution sets (often a single correct answer) calculated by some preferred algorithm, i.e. mathematics, chemistry, physics problem sets. Network-based problem solving activities across the spectrum of curricula are potentially less restrictive, more discovery-oriented (subject to the teachers' perceptions of the value of the experience), and yet frequently can be scheduled in conjunction with or in addition to more traditional curriculum topics.

Other ways that problem solving activities in the two media differ are that in the classroom students typically work with homogeneous or "pat" data sets which lack natural "noise" and contain information concerning only local variations in a concept. Students also tend to experience less interaction with people who possess potentially more divergent viewpoints. By contrast, students who experience the network-based activities come to realize that there are many real-world problems without simple answers and that there are many problems which have many possible "correct" answers. They gain experience with real data which are rich in geographic and cultural variations, rich in patterns for interpretation. And, they experience more interactions with the people who are the sources of the data in order to clarify misunderstandings about the data sources and data collection procedures. They will also have a wider audience for the results of their analyses and interpretations.

Why should schools consider using electronic networks? Why not have the students simply do library research? These questions focus on the essence of a justification for electronically-mediated communications. Often the information required in an activity is simply not available in a library! If the question of interest concerns a scientific phenomenon, students can find an explication of the phenomenon in the library, but their library research will not enable them to collect the raw information that they will need to examine the phenomenon for themselves. Where in a library is one likely to find information about the boiling point of water at the top of the tram in Snowbird, Utah? Where would one find descriptive data on the angle of the crescent moon or the angle of the noonday sun at given times in various locations around the world? Where would one be likely to find information about the range of viewpoints held by students from around the world concerning the issue of nuclear power? As a tool for exploring scientific phenomena and many real-world issues of this type, the Network becomes a means for searching a real-world data base of uncollected or possibly unorganized information.

Different approaches for delivering instruction

Using an electronic network as a medium for students to conduct problem solving activities provides a different kind of experience than that which is often confined inside the walls of the classroom or within the city limits. By using the semantic trace analysis, we can see that students can be exposed to a much wider range of possible solutions for common, real-world problems. Of course, this exposure in-and-of-itself does not mean that the students will automatically be generically better problem solvers. However, it does ensure that students will be exposed to the types of problems that they will surely encounter after their school years have ended and they have become voting citizens.

Further, activities of this type ensure that the students will engage in the thinking processes needed for solving many of these real-world problems.

To illustrate some of the differences between what is possible through the medium of electronic networking versus what commonly occurs in the classroom, we make one rather large assumption and then present you with a list of "typical" curriculum topics for comparison with the San Diego students' summary comments from the *Water Problem Solving Project*. The assumption is that our school curricula are textbook driven and that a typical teacher would in all probability not be able to bring to the classroom sufficient experience on all possible problems which would be equal to the "collective wisdom" available through the network.

How is the topic of water covered in precollege science curricula in the United States? To answer this question, we examined five Earth Science textbooks commonly in use throughout the United States. The publishers of these texts were: Heath, Houghton-Mifflin, Merrill, Prentice-Hall and Silver-Burdett. The prototypical content covered in all of these texts is the following: water cycle, sources and flow of water in the biosphere, erosion and deposition, and oceanography. In two of the five texts, there was very minimal treatment of the types and causes of water pollution. In addition, we examined samples of local curriculum supplements for California and Illinois. In California, the textbook material is often supplemented by material on aqueducts, problems of water management and water conservation practices. In Illinois, the textbook material is often supplemented by laboratory work with stream tables and material on the origin and formation of Illinois rivers.

The problems faced by people in acquiring their water supplies is largely overlooked in all of these textbook treatments of water. Although sources of water are discussed in the texts they are discussed in a rather generic and elementary manner, i.e. all bodies of water are sources of water for use by all living creatures.

With regard to curriculum supplements, it appears as though teachers tend to augment textbook material with instructional materials concerning specific, local topics of interest. At least such is the case in our very small sample of supplementary materials on water. Yet, while the local materials are relevant and potentially valuable in helping the student relate to the problems of water acquisition, they do not necessarily help the student appreciate the many different dimensions of the problem and the many possible alternative, workable solutions that have been put into practice throughout the world. In order to provide this experience to the students, teachers would need to possess vast background experiences with this specific topic. Or, the teachers would need access to some mechanism by which their local experiences (and curriculum supplements) could be easily shared--an electronic network.

In this section, we have presented some data and some arguments in support of network-based problem solving experiences. We have also attempted to illustrate how these experiences differ from "typical" classroom-based curricular approaches to a specific topic in science--the acquisition of drinking water. Although the classroom-based and network-based approaches are simply different approaches to teaching the same concept, they are not necessarily mutually exclusive. In fact, our feeling is that the network-based activities work very well to complement a traditional treatment of the instructional content. However, we will leave open the question of the appropriate curricular niche for a network-based learning strategy.

Generalizing the use of receiver site transfer

Is receiver site transfer a generalizable problem solving strategy? We feel that it is a readily generalizable problem solving strategy and one that functions particularly well when used with data sets which contain significant variation such as those which can be generated on an extended electronic network. To illustrate, we will provide short descriptions of four other network-based projects (Levin, Waugh & Kolopanis, 1988; Waugh and Levin, 1988) which make use of the receiver site transfer technique.

Receiver Site Transfer Projects

In a project called *Stormy Weather* students at each location describe the most severe weather conditions that they face during the year. They describe how they can tell when the severe weather is coming and what they do to prepare for and survive it. These descriptions are then shared across the network, and students asked to consider whether or not detection techniques or safety procedures used in other locations might work in their own location. As before, students will be asked to justify why they think that a particular technique would or would not work in their own location.

In another project called *What a Pest!* students at each location are asked to describe common pests (using both scientific and common nomenclature): animal, vegetable, or microbiological, and how they typically deal with those pests. They then send their descriptions across the network, and analyze the descriptions obtained from other locations, to determine whether the pests in other locations are similar or different. At a given location, students first identify which other locations have similar pests. Then, the students attempt to determine whether those locations with similar pests have similar or different ways of dealing with their common pests. As with the previously described projects, students are asked to use this "receiver site transfer" technique to try to develop plausible new solutions to this real-life problem in their location. For example, we have rabbits in Illinois that eat up our gardens, and there are also rabbits in San Diego. In Illinois, people spread blood meal around in their gardens in an attempt to discourage the rabbits from feeding. What do gardeners in San Diego do? How about elsewhere? How effective would these different techniques be here in Illinois?

Another project is called *Pollution and You.* In this project, students at each location describe their air and water pollution problems, toxic and other waste disposal procedures and problems. Students at each location first determine how these problems are handled locally, then describe their local procedures to other students across the network. When descriptions from the other locations are available, the students at each location are asked to analyze the descriptions and look for policies and procedures which are implemented elsewhere that aren't being used in their own location. How do the waste disposal policies in other locations differ from our own? Do the other policies seem better or worse than our own? Why do we do what we do and not what they do? Are any changes in our waste disposal policies being considered? Why or why not?

Another receiver site transfer project is the *Power Problem Solving Project.* Many sites have a similar problem: the soaring costs of electricity. In this project, students start by researching the solutions to this problem which are practiced in their own location, writing up their research and sending it to other sites, and then analyzing the descriptions from other sites to find those not used locally that might be plausible solutions. They can use the network to gather more information about these alternate possible solutions, and

then as a medium for publishing their reports. We are currently carrying out this project with several schools in Illinois as another test of this receiver site transfer approach.

Electronic networking as a means for solving problems

Electronic networking is a robust medium for conducting problem solving activities. In addition to receiver site transfer, activities which use other problem solving strategies can also be conducted in this medium. As examples, we will share short descriptions of three other problem solving strategies which have been employed in network-based activities.

Observation projects

We refer to another problem solving strategy as simply observation. Observation projects involve the students in pattern recognition and interpretation activities. As examples, two observation projects are described below.

One project is called the *Crescent Moon Observation Project* (Levin, Waugh, & Kolopanis, 1988). First, we asked students to draw (from memory) what they thought a first quarter moon looks like. Next, we asked them to observe the first quarter moon at 7 pm on three successive nights. Then, each class was asked to compare their expectations with their actual observations (which differed in many cases!), summarize their class' data and send it on the network to other locations. When each of the network locations had completed this part of the activity, the next task was for each classroom to compare the data collected from each of the other locations to their own data. How did the various data sets agree or disagree? Why did the data collected at some locations vary from the data collected at other locations? This exercise is particularly good for having students brainstorm on the nature of an effective measure for the phenomenon in question. It was also effective for reinforcing the need to make accurate measurements and for illustrating the frequent need to average a group of observations. Best of all, it gives the students an opportunity to develop (and attempt to explain) hypotheses which might account for the systematic variations in the data which will occur as a function of a simple variable (latitude, in this case).

Another project is called *Boiling Hot*. In this project, students at each location write down their expectation of what they would find if they put a thermometer in boiling water. Then, they conduct an experiment to test their expectations. In most cases, their expectations will cluster around 100 degrees Celsius because this is how the Celsius scale was defined. However, their observations of the actual boiling point will vary depending on the altitude of each location and on the purity of their water sample. As in the *Crescent Moon Observation Project*, the local data is combined (averaged), and transmitted to the other locations. The shared data sets will then be examined for similarities and differences and students encouraged to develop and test their hypotheses concerning the variations which occur in the data. If there are competing hypotheses, then students can propose that new data be collected to distinguish between the competing hypotheses.

Universal/unique projects

Another problem solving strategy which works well in focusing an otherwise unfocused observation project is the universal/unique strategy. This strategy is actually very simple to employ. Instead of students simply giving details concerning some phenomenon in

their location and asking the other network participants to relate details of the same phenomenon in their own locations, the universal/unique strategy has students being asked initially to predict how the phenomenon in their location will be uniquely different from the phenomenon in all the other locations, and also how the phenomenon at their site will be similar to the phenomena as manifested in all of the other participating sites.

As one example, in a food activity which was recently conducted on the Network, students were asked what kind of food in their location was unique to their location, and what kind of food would be universal to all of the participating locations. In order to make accurate predictions, students were required to research the foods available in all the other locations and then examine their own location for foods that would be considered unique to their area. To extend the concept a little further, using the universal/unique strategy, the students task is to establish how all of the participants are similar in one respect and also how they, themselves, are unique in comparison to all other participants. This type of activity requires significant analytical thinking.

Post Problem solving publication

We are calling another problem solving strategy post-problem solving publication. This strategy involves the written preparation of project summaries for sharing with other network participants. The essence of this strategy is to focus the students on the importance of articulating the results of their project for wide spread dissemination. This kind of activity is very similar to that engaged in by practicing scientists. The project is not complete until it has been published.

An example of this type of activity is the TeleScience Chronicles science journal. The TeleScience Chronicles is an electronic science journal that is organized and maintained by students. It is composed of multiple sections which cover a wide variety of scientific interests. Regardless of the type of writing--project report, book review, laboratory write-up, description of phenomena--the TeleScience Chronicles is a forum for students' written expression about their specific scientific interest. Through practicing their communications skills in this manner, students are solving the problems associated with learning to communicate effectively about issues and problems in science.

Another example of this type of activity is the TeleScience Fair. Once traditional or distributed science projects have been completed, the next step would be for the participants to present their results to others. We've been developing the notion of TeleScience Fairs as an extension of traditional school science fairs, as a way for students to present the results of their work to a broader audience. In a TeleScience Fair, the projects would be judged on-line by teachers and scientists with a variety of background experiences. The best student projects would remain on display as exemplars for other interested students.

To participate, students would use a word processor to write their project reports, and then submit them to a central bulletin board system. Then, others interested in science would be free to "visit" the telescience fair, viewing the projects and their ratings and sharing their perceptions concerning the students' work.

Summary

In this paper, we have presented data from four separate analyses which characterized the nature of the water problem solving activity which used the receiver site transfer problem solving technique. Based on these data, our conclusion is that the nature of students problem solving efforts in this medium are different, largely because the medium provides unique opportunities for collaboration among diverse groups. Also, the data provided by the network are rich, and the opportunities for meaningful communication among mutually interested groups is high.

We have attempted to describe some of the differences between network-based problem solving activities and typical classroom-based activities. We feel that it is possible that classroom-based activities similar to the network-based water problem solving activity could be conducted. However, the network-based activities require that certain aspects of the project be conducted using the computer (word processing of communications, data analyses, data syntheses, post-problem solving expression) and the wide diversity of data contributed by the other network participants, whereas classroom-based activities would neither require the use of the computer nor necessarily be able to provide the richness of data sources. In this sense, the network-based activity provides a unique problem solving experience for the student.

We have also described the generalizability of the receiver site transfer technique and the suitability of electronic networks as a medium for conducting various problem solving activities. We described several additional projects that embody the receiver site transfer technique, and we described several different problem solving techniques which are well suited for use in activities conducted through the medium of electronic networking.

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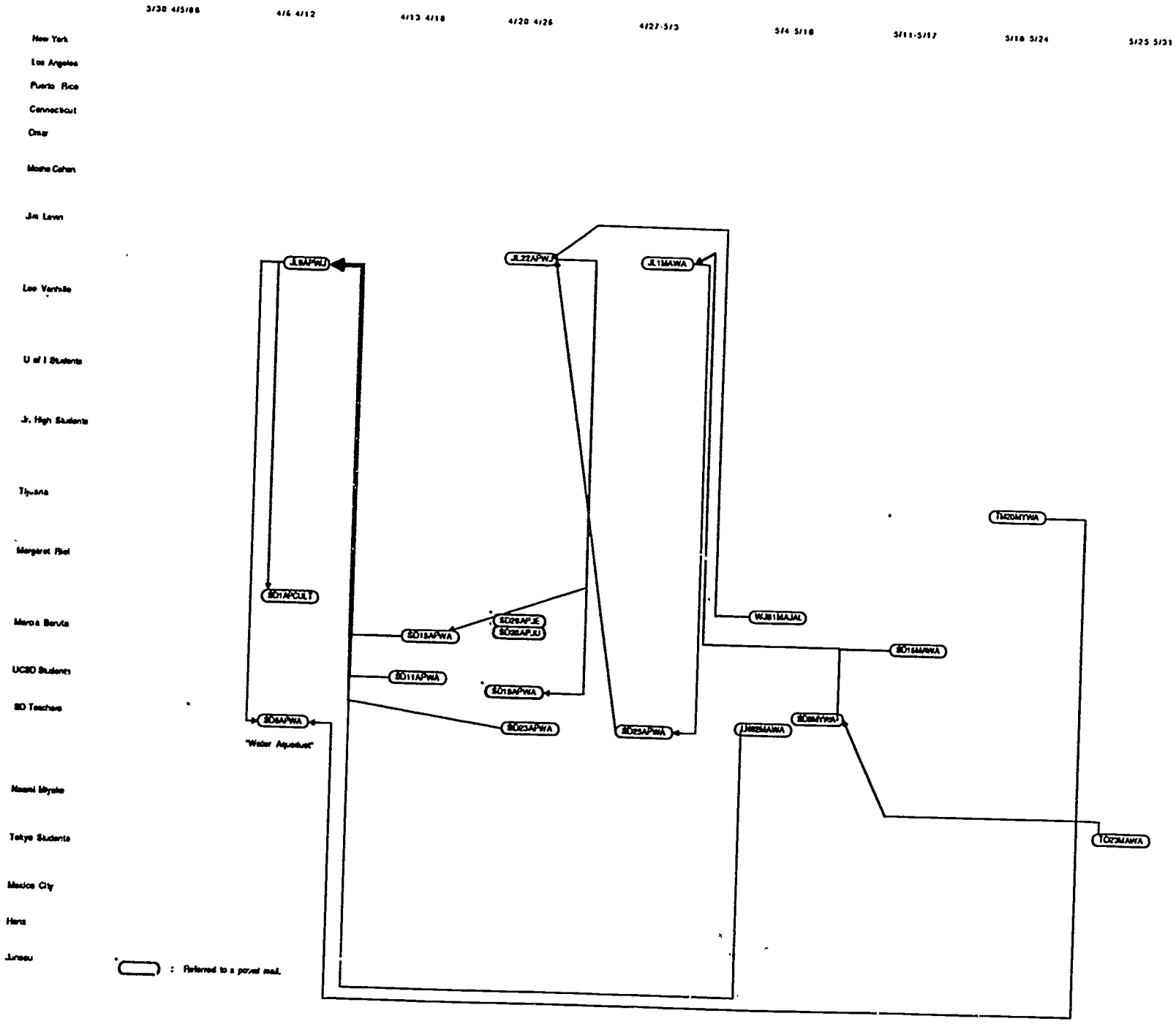

Figure 1. Intermessage reference analysis graph of the message interactions on the water problem solving project.

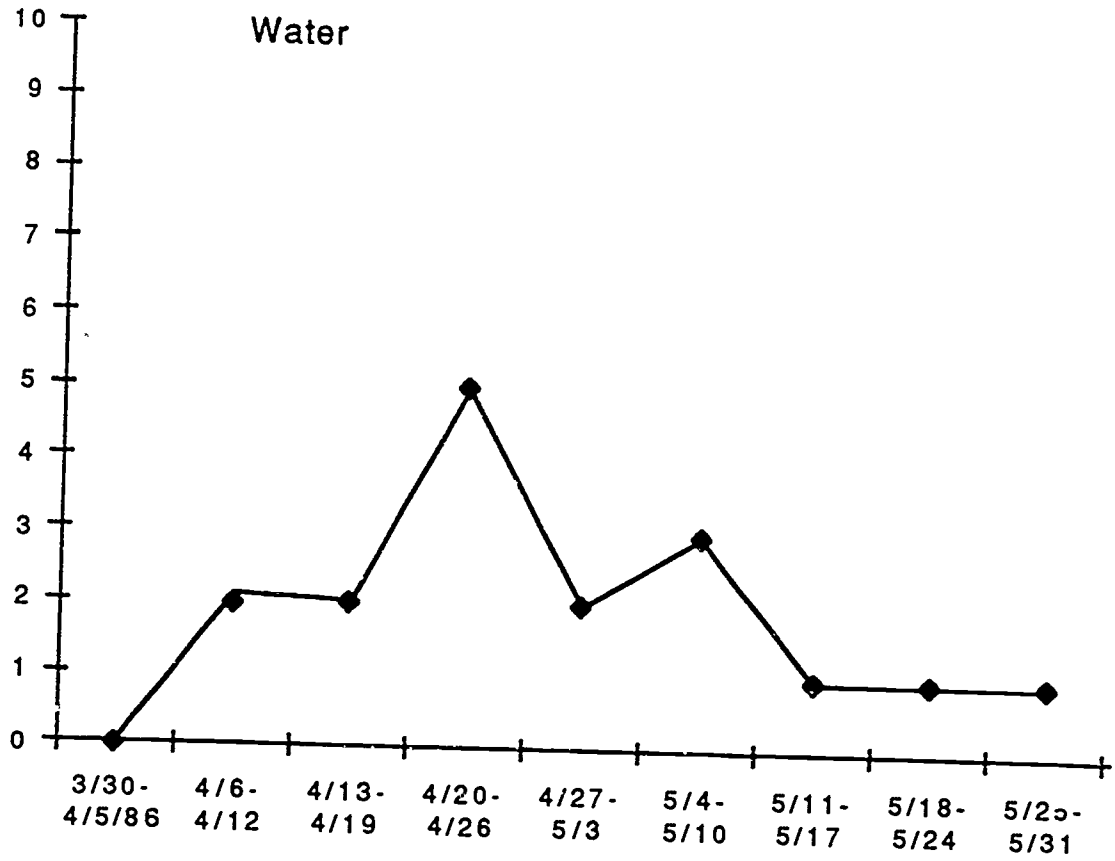

Figure 2. Message flow analysis graph of the water problem solving project.

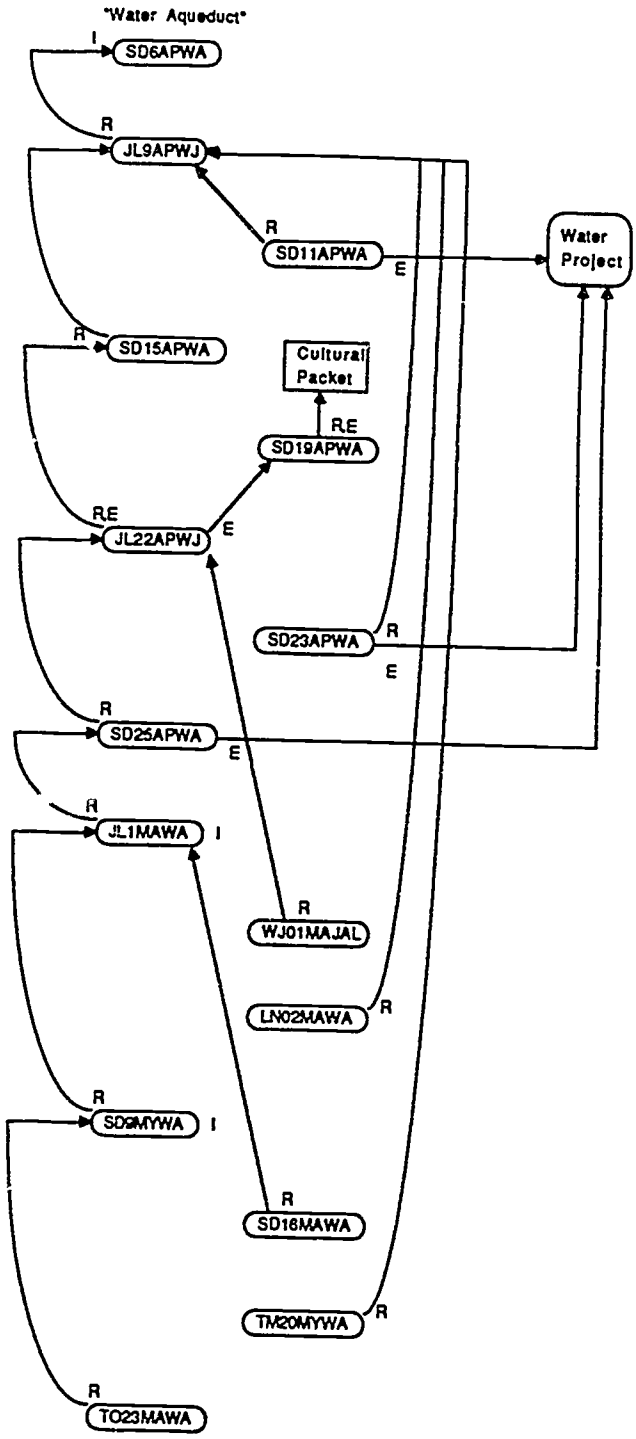

Figure 3. Message set analysis graph of the water problem solving project.

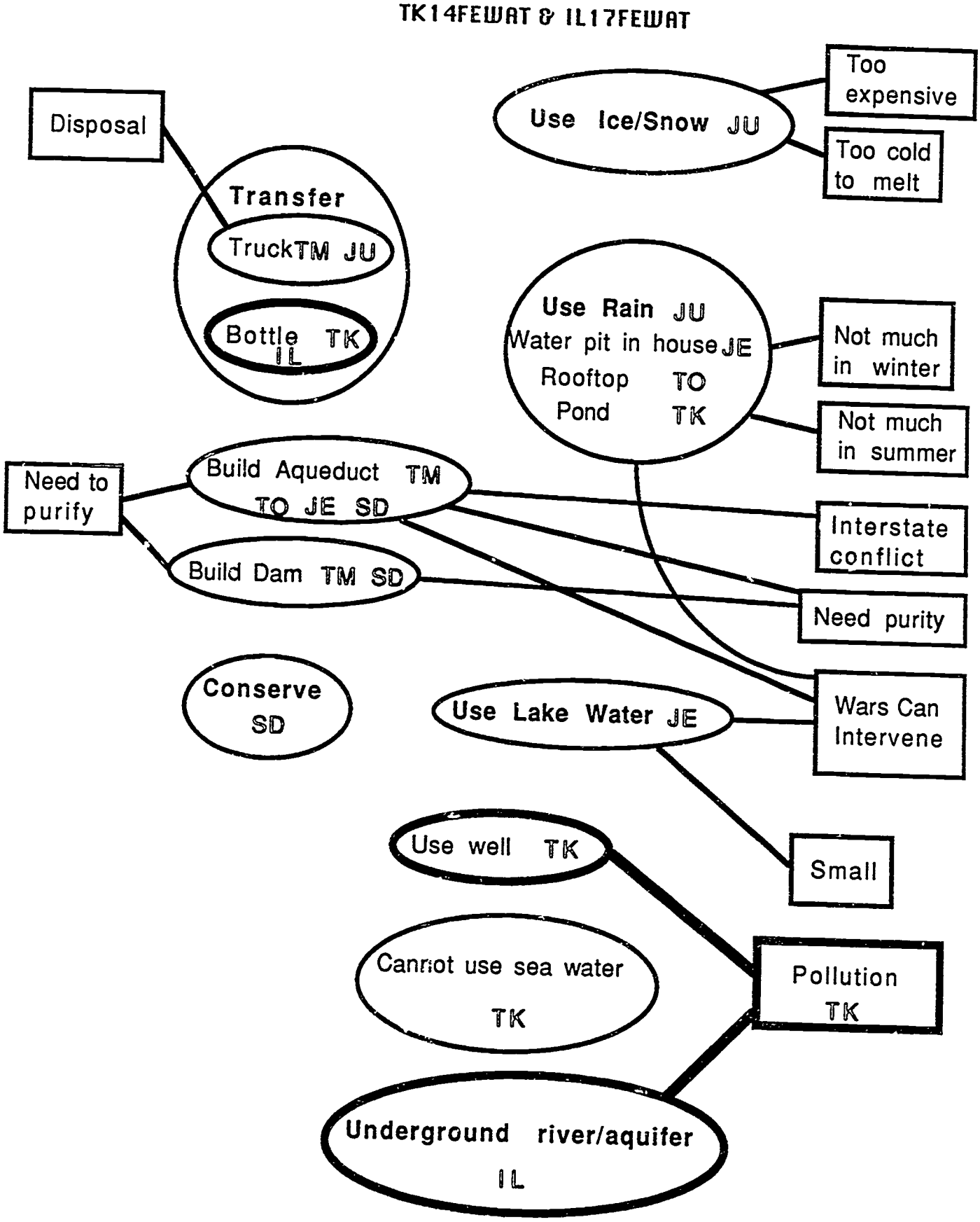

Figure 4. Semantic trace activity map of the water problem solving project.

From: STK148 (SANDIEGO) 79-Lines
On:19 MAY 1986 At: 23:40 Copy: BC
Subject: SD 16MA WA (LINCOLN STUDENTS COMPARE ICLN WATER CONSERVATION TECHNIQUES)

Dear Jim,

Hi! How are you? The students [8th grade] really enjoyed getting your message today. Here are the answers to your questions about how Vista, California could use some of the techniques used by Tokyo, Jerusalem, Juneau and Tijuana to use and conserve their water resources. Thanks for everything!

Always,
Welda

Scott	Some ways we can use water is to truck it or bottle it.
Tara	Roof storage.
Cinnamon	We could start building aluminom roofs on our houses to store rain water. We do bottle our mountain water and bring it down in trucks.
Jeff	I. Pipelines 2. lakes 3. wells
Lisa P.	I think that we could store water on our roofs, as you do.
Hector	Pipelines, lakes, wells
Jason D.	We already use truck bottled water. and I don't think we can use any of the techniques in the other places
Tracy	I wasn't here for most of the water program. But I know alot about the water. I think we can use some of the other states ways. In Florida they used sea water cleaned and Barrels that are Planted underground were rain wate could go. I think sence Vista is a small city it will help. I think we should try to help. Oh, I'm a straight A's student and I know a lot about water cause I've been in a lot of projects. We should as little people help.
Adam H.	We can do or built a project that sits up on your roof to get rain water as pure drinking water
Sarah	1. Save the rain water 2. Melt ice 3. Save water from roof
Chris N.	1. We can build storage containers on the roof
Terri D.	I really don't think that we use any of the techniques that the other sites do. But we could start to try some of them. I don't think that we can use rain water for awhile though it has radiation in it. And isn't very safe. We could store the water easily and conserve it. How will we get the people to do it though?
Rachel P.	We already use trucked bottled water. And I don't think we could all put aluminun roofs on our houses. And we don't have any ice to melt.
Senta	Don't use rain water because of radiation.
Jason H.	In Juneau they have plenty of ice and snow. There problem is it is to expensive to melt it. You should try a solar heating technique. Use solar cells in a heating system that will melt ice and snow. Use the energy for like a huge oven. this way the snow might be melted.
Kevin M.	How is Peru doing in the water conservation. Write back soon. I need to know for my grandma and grandpa live about 60 miles from a aquaduct.
Mary	Yes we can use rain water but it gots radition. When do you think we can use rain water again?
Michelle	I think we could use are roofs for water. You know like putting junk on the roofs and let it run into barrols.
Jeanna A.	Rain water falls down on a house top and collect it from each side of the house and clean the water and get all the minerals and dirt out if there is any and use that for some water. It dosnt have to be drinking water but water to wash dishes in and stuff like that. Do you think that would work.
Jason H.	I was thinking if somebody invented a process of splitting the atom and reusing it over and over again you could power cars, schools etc. with a single glass of water. Therefore you would not need water to make gasoline. We made a filmstrip about the water cycle.

Table 1. Summary message from Lincoln School students