



1-16-1997

Demand for Science Training in Olympic ESD Schools

Carl Simpson

Western Washington University

Jessica Hargis Simpson

Western Washington University

Linda D. (Linda Darlene) Clark

Western Washington University

Follow this and additional works at: https://cedar.wwu.edu/surveyresearch_docs

 Part of the [Educational Assessment, Evaluation, and Research Commons](#)

Recommended Citation

Simpson, Carl; Simpson, Jessica Hargis; and Clark, Linda D. (Linda Darlene), "Demand for Science Training in Olympic ESD Schools" (1997). *Office of Survey Research*. 594.

https://cedar.wwu.edu/surveyresearch_docs/594

This Report is brought to you for free and open access by the Institutes, Centers, and Offices at Western CEDAR. It has been accepted for inclusion in Office of Survey Research by an authorized administrator of Western CEDAR. For more information, please contact westerncedar@wwu.edu.

Demand for Science Training
in Olympic ESD Schools

(Report 1997-01)

Prepared by

Carl Simpson
Jessica Hargis Simpson
Linda Clark

January 16, 1997

INTRODUCTION

Between the end of August and November, 1996, the Western Washington University Office of Survey Research conducted a survey of school principals and superintendents' offices in the Olympic ESD. The survey was initiated by Western Washington University Extended Programs with the goal of exploring the kinds of inservice training needed by science teachers in the Olympic ESD. This report presents the findings of our survey.

METHOD AND SAMPLE

Telephone and/or mail surveys were completed with 68 principals and superintendents. Our initial telephone interview attempts were hampered by the timing of the study--just prior to the Fall opening of school. Each site received an announcement mailing, up to ten telephone calls and up to four survey and reminder mailings, as necessary. Even so, some did not respond, as is usual. The final response rates are sufficiently high to assure the validity of the study.

We completed surveys with 34 (64.2%) of 53 elementary school principals in the sample. Interviews were completed with some principals who were just joining the school. Most brand new principals preferred, however, not to answer questions about the schools staff. If we compute a completion rate based only on schools without new principals, the completion rate for elementary schools rises to 72%.

Of 34 Middle Schools and High Schools in the sample, we completed surveys with 25 (73.5%). We also interviewed the district superintendent or the appropriate representative from the superintendent's office in 12 of the 15 districts represented in the sample. Three of these were very small districts where a principal and superintendent were the same individual.

In all, then, we completed 59 interviews with principals and superintendent interviews with an additional nine district staff. To be meaningful, however, figures must be separated by level, since the nature of the science curriculum and the need for training differs dramatically by level. We judged that there are too few high schools in the sample to merit separation of high schools from middle schools, so we present results for two groups: elementary schools and middle/high schools.

Error terms for samples this small are very large, although they are reduced somewhat by the fact that we have completed interviews with about 70% of all schools in the ESD. For elementary schools, the 95% confidence interval (the standard 5% error term) in this sample is about 10%. For high schools and middle schools, the error term is about 11%.

Some questions in these surveys call for principals to estimate value for or preferences of their faculty. It is primarily for that reason that several new principals declined to respond. The requirement that principals report on behalf of teachers threatens the validity of the data. In hopes of strengthening the data, all principals and superintendents were sent an initial mailing announcing the study, indicating the nature of the questions and suggesting that they might wish to consult with others in order to answer accurately.

FINDINGS

Nearly all findings in this report are from the Principal survey. Schools in our sample vary widely in size. Elementary schools are relatively large, varying from 14 to 70 faculty, with 68.0% employing more than 25 teachers and 32.0% employing over 30 teachers. The majority of elementary school teachers, but not all, have science as a part of their teaching assignment. The number of teachers in each school who teach science varies between 12 and 40. Half (50.0%) of all elementary schools in the sample have at least 20 teachers involved in science; 23.5% have at least 25 in science.

Middle and high schools are, of course, larger than elementary schools. Again, there is wide variation within the Olympic ESD, with a low of 20 teachers and a high of 120. One-fourth (24.0%) of the sample reported 25 or fewer teachers, with 28.0% between 26 and 40 teachers, 28.0% between 41 and 60, and 20.0% above 60 teachers.

All middle and high schools in the sample have at least one person assigned to teach science "as their major assignment." About half (52.0%) of schools, primarily middle schools, employ four or fewer such "science teachers." The remainder employ from five to nine teachers as primarily science teachers. The number of faculty who teach science part time in these schools varies from zero (among 32.0%) to thirty-one, with 40.0% employing one or two, 12.0% employing between three and six, 8.0% employing six to ten, and 8.0% employing over ten. Combining those for whom science is the major teaching assignment with those for whom it is "part of their assignment," we have 28.0% of middle and high schools employing 3-4 teachers in science, 28.0% employing 5-6, 24.0% employing 7-9, and 20.0% employing 10 or more.

The differences in school faculty size means that any precise projection concerning the probable faculty demand for inservice training needs to differentiate schools by size. A figure such as one-third of elementary schools could involve as few as 240 teachers if only the smallest schools were involved, or 540 if only the largest were involved. The presentation of findings in this report is made much easier, however, by the fact that the types of services principals say their teachers may want does not, except in rare cases, vary by faculty size. The strategy taken here is, therefore, to report findings in terms of percentages of schools and to then conclude with a section commenting on how those percentages transform to numbers of teachers.

Directions for the Future

Our first question to principals asked them to set the stage by describing "...the major directions you see your science program heading in the next five years or so." Responses by elementary school principals are displayed in Table 1; those for middle and high school principals appear in Table 2. The questions were asked using an open-ended format and then coded into the categories shown in each table.

Elementary Schools. Elementary school principals display a marked tendency to envision serious changes to their elementary science programs, about three-fifths of which now consist solely of science kits or "tubs" supplied by the ESD. Two-fifths of principals frame these plans explicitly in terms of meeting the new state and district Essential Learning goals. While just over one-fourth of principals emphasize continuity--saying they will continue to use the ESD science kits, usually in combination with refinements to their instruction--most emphasize change. The most common directions, aside from meeting mandated Essential Learnings, are to make science instruction more experiential and to improve upon the science kits. In addition, substantial numbers of elementary schools see themselves moving toward integration of science with other subject matter, giving greater emphasis to science, raising the intellectual level to which science instruction is pitched, and incorporating methods to assess their performance. (See Table 1.)

Emphasizing the change theme, the majority of elementary school principals indicated that their schools are either currently reviewing their science curriculum or have just finished doing so. Several principals in one district mentioned that their elementary school science kits will be updated to coincide with the district's new science curriculum by next year, and to coordinate with the district's secondary school science programs. Two other elementary school principals, each in separate districts, mentioned that their science programs were currently being reviewed, and in a third district a curriculum of "science adoption" will be implemented during the next five years. At least one elementary school has already received district-provided inservice for their new Essential Learning-calibrated science curriculum. More commonly, however, principals speak in the future tense concerning change induced by the Essential Learning standards.

This flurry of curricular movement may be logically attributed to the new demands of the state Essential Learnings; each of the principals who mentioned curricular changes also stressed the state-imposed goals. However, at least two principals stated that they foresaw no change in their "kits" or science curriculum for at least the next five years.

Table 1. Major Directions Elementary Schools See Their Science Programs Heading Within the Next Five Years or so

	Percent*
Meeting State and District Essential Learning goals	40
Adding more hands-on activities (rather than textbook)	30
Continue to use ESD science kits	27
Revamp ESD science kits	24
Integration of science into other classes	18
Involve higher order thinking skills	15
Strengthen science emphasis	15
Emphasize scientific process/concept development	12
Incorporate environmental education	9
Structure student performance assessment	9
Currently in process of reviewing curriculum, deciding on directions	6
Incorporate current technology	3
Strengthen teacher scientific foundation	3
Expand science curriculum	3
Receive new materials for classes	3

*Percentages add to more than 100% because participants were invited to provide multiple responses (n=34)

Middle and High Schools. Middle and high School principals echo their elementary school colleagues' emphasis on the mandated Essential Learnings as a driver of change in the science curriculum. Ten of the 25 principals in this sample state as their primary focus for the future to meet the state and district Essential Learnings goals. Many others at least mention the role of Essential Learnings as one element of their change efforts. About one-third of these

schools emphasize the incorporation of current technology into their curriculum, an area of felt weakness for some of the more rural districts. The same number say they are planning to expand and improve their science curriculum, with varying degrees of specificity at this time. Over one-fourth wish to integrate science into other classes, while one-fifth say they want to move science instruction away from texts and toward hands-on experiential activities. Also about one-fifth emphasize the relevance of science to life and to work. (See Table 2.)

Table 2. Major Directions High Schools/Middle Schools See Their Science Programs Heading Within the Next Five Years or so

	Percent*
Meet State and District Essential Learning goals	40
Incorporate current technology	36
Expand/upgrade science curriculum	36
Integrate science into other classes	28
Add more hands-on activities (rather than textbook)	20
Incorporate environmental impact education	12
Make science relevant to daily life	12
School-to-work emphasis	8
Structure student performance assessment	4
Strengthen teacher scientific foundation	4
Currently in process of reviewing curriculum, deciding on directions	4

*Percentages add to more than 100% because participants were invited to provide multiple responses (n=25)

Principals also offered commentary at various points throughout the interviews that add specificity to some of the summary categories in Tables 1 and 2. About one-sixth of elementary principals and one-third of middle and high school principals emphasized the integration of science into other classes. Four principals specifically mentioned English and Language as fields with which science would be integrated. The Fine Arts and Mathematics were each suggested twice, and social studies once.

Principals who report planned expansions of their science curriculum sometimes mentioned new classes their schools have recently added or will soon add. Classes mentioned by nine middle and high school principals include horticulture, botany, two applied science courses, four courses in Earth science, and six counts of marine biology (including a fisheries program and a shellfish program). One principal also plans to implement the "Globe program," and another to initiate a wetlands preservation course. New AP classes were also mentioned, most frequently biology (eight times), chemistry (five times) and physics (three times).

Environment concerns were also frequently mentioned, with three elementary principals (9%) and three secondary principals (12%) counting environmental awareness among the new directions they foresaw for their science programs. One elementary school has implemented a recycle program, another offers environmental impact classes, and a third is in the second year

of a state "Model Link grant" which seeks to integrate environmental education with the new state Essential Learning goals. In total, environmental programs were mentioned at least once in the course of the survey by six elementary school teachers(17%) and four secondary school principals (16%).

Types of Training Most Valuable to Science Teachers

When we asked principals "What inservice training or other courses or seminars do you think would most help meet your school's needs in the science area?" responses varied considerably by grade level, as would be expected. Elementary schools emphasized the need for assistance with lab and hands-on science activities and training that would support the new Essential Learnings (see Table 3), while middle and high schools emphasized relatively more technical training (see Table 4).

One half of elementary school principals recommend training that would help teachers use their science kits (32%) or to run other "hands-on" lab activities (18%). Another 12% say their teachers need training broadly in how to teach elementary school science, typically with an emphasis on getting the children involved, making it real to them, and the like. In addition, various comments offered informally throughout the interviews reinforce the view that "hands-on" "how-to" training is foremost in the minds of most principals when they consider their elementary teachers' needs. Five of the 34 elementary school principals said the training their teachers most need concerns the theoretical core of science, the scientific method. While this at first appears very different from the hands-on approach, the goal typically is to ensure that the experiential instruction offered by teachers properly illustrates the scientific method--learning by doing, but with an emphasis on doing the right thing.

Table 3. Inservice Training That Would Help Meet Elementary Schools' Needs in the Science Area

	Percent*
Training supporting new Essential Learning curriculum	35
Ideas on how to work with kits	32
Ideas for (how to manage) hands-on lab activities	18
How to integrate science with other classes	18
Scientific Method/Concepts	15
Updates in field (what's available)	12
How to teach elementary science	12
How to connect science with real world/careers	9
Curriculum planning	9
Environmental	6
Assessment skills	3
How to work with Internet	3
*Percentages add to more than 100% because participants were invited to provide multiple responses	
	(n=34)

One-third of elementary principals want training supporting the Essential Learnings curriculum, with 12% wanting help with curriculum planning or assessment, both related to the Essential Learnings. The goal for the future, to integrate science with other classes, is also reflected in training requests. Nearly one-fifth of elementary school principals choose this area as the most valuable for their teachers' training. Another kind of integration, integration of science with the "real world," is also a theme in several schools.

About half of middle and high school principals reference technical issues as the most valuable training for their teachers. Thirty percent point to the need for training in new technologies and another 17% emphasize lab safety. Beyond these themes, the remaining ideas for training reflect the themes in schools' visions for the future: integrating science with other subjects, supporting the Essential Learnings curriculum, and connecting science to the "real world."

Table 4. Inservice Training That Would Help Meet High Schools/ Middle Schools' Needs in the Science Area

	Percent*
How to work with new technology	30
Ideas for (how to manage) hands-on lab activities	17
How to integrate science with other subjects	17
Lab/chemical safety course	17
Specific courses	17
Training which supports new Essential Learning curriculum	13
How to connect science with real world/careers	13
Updates on field (what's available)	9
Curriculum planning	9
How to include community	9
Time management	4

*Percentages add to more than 100% because participants were invited to provide multiple responses (n=23)

Topics or Skills Most Valuable During the Curriculum Transition

Recognizing the centrality of the state-mandated curricular changes for schools and for trainers, we asked principals to indicate what "topics or skills you think would be most valuable to your science teachers during the curriculum transitions of the next three years or so," and then during the period "4-6 years from now." The longer horizon limited vision, but two-thirds of elementary and 80% of middle/high school principals offered their views of the coming three years. Their responses reinforce patterns seen in earlier tables.

Again, the most common response by elementary school principals refers to meeting the Essential Learnings mandates, first by integrating them into the curriculum (30%) and then by developing assessment skills (17%). These concerns are followed by the polarity we observed earlier: ability to use hands-on techniques to teach science and an improved general

background in science and the scientific method. More specific concerns address the integration of science across the curriculum, greater capacity to instruct in the area of environmental science, and work with new technology. (See Table 5.)

Table 5. Topics/skills That Would Be Most Valuable to Science Teachers in Elementary Schools During the Next Three Years or so

	Percent*
Ability to integrate State Essential Learnings	30
Ability to teach elementary school science (hands-on)	26
General background scientific knowledge	26
Assessment skills	17
Ability to integrate science into curriculum	17
Environmental sciences	17
Ability to use new technology	9
*Percentages add to more than 100% because participants were invited to provide multiple responses (n=23)	

Middle and high school principals again emphasize the use of new technology, followed by concerns with the reintegration of the science curriculum, both into other fields and also to meet Essential Learnings mandates. Concerns with hands-on lab instruction and connecting with the world of work are expressed here as in Table 4, along with skills to assess student performance. (See Table 6.)

Table 6. Topics/skills That Would Be Most Valuable to Science Teachers in Middle/High Schools During the Next Three Years or so

	Percent*
Ability to use new technology	35
Integration of science into other fields	30
Ability to teach science (hands-on management skills)	25
Ability to integrate State Essential Learnings	20
Assessment skills	15
School-to-Work emphasis	10
Lab/chemical safety training	5
*Percentages add to more than 100% because participants were invited to provide multiple responses (n=20)	

Few principals offered forecasts concerning most valuable training "after the transition, in the range of 4-6 years from now." Most simply said needs would be the same as in 1-3 years or are unknown at this time. The few elementary principals who offered long-term observations stressed the need for ongoing training and assessment for the programs that are put in place, training in use of the new technologies that will be available to schools, and moving to project-based and real life-integrated instruction. At various points in the interview, some principals made it clear that a major issue is staff turnover and the resulting needs for re-education of new staff. Schools facing high turnover are no doubt more likely than others to emphasize ongoing training in the basic needs of science instruction rather than training that builds on previous training to create a sequence.

Half (13 of 25) of middle/high school principals responded to the longer range question. Again, their top concern was with instruction in the use of new technology. Other themes were the ongoing integration and assessment of Essential Learnings and ways to integrate science into "real life" and career paths likely for students.

Practical Issues: The Structure and Arrangement of Inservice Training

We approached the question of what arrangements for inservice training work best for schools in the sample by asking two types of questions. First, we asked the open-ended question, "What particular arrangements work best for inservice at your school? For example, what times of days, days of the week, locations, individuals vs. group, etc?" Second, we asked principals to evaluate the value of six different types of training activities for their science teachers. Tables 7 and 8 display responses to the open-ended question.

Table 7. Arrangements That Work Best For Inservice Training in Elementary Schools

	Percent*
After school (4-7 usually specified)	32
Summer/August session	26
Full days with substitutes ("Teacher days" provided by district)	24
Group/Grade level work	24
On-site preferred	21
Friday evening through Saturday	18
Tuesday/Thursday	15
Early release	15
Half day	12
Mornings before school	12
Mondays	6
Full weekend	6
*Percentages add to more than 100% because participants were invited to provide multiple responses (n=34)	

As is typical with open-ended questions, responses reflect the frame of reference of the respondent and therefore vary widely. Even so, some themes dominate. For both levels, but especially for middle and high schools, the most common preference is for the hours soon after the close of school on school days. Most principals specified the 4-7 time frame; two specified 4-6. Also for both levels, one frequent preference is for Summer training, with most specifying the month of August. A close third for elementary schools and the second most frequent preference for middle and high schools is all day instruction during the week, with paid release. Options of meeting for a full weekend (or a partial weekend running from Friday evening through Saturday evening), before school, during late arrival or early release are also preferred by a number.

In addition to specifying various time preferences, about one-fourth of elementary and one-fifth of middle and high schools report preferring group training by grade level. Some middle/high schools also prefer individual training, however.

Table 8. Arrangements That Work Best For Inservice Training in High School/Middle Schools

	Percent*
After school (around 4-7)	45
Full days with substitutes ("Teacher days" provided by district)	35
Summer/August session	30
Group/Grade level work	20
On-site preferred	20
Full weekend	20
Early release	10
Mornings before school	10
Mid-week	10
Individual	10
Friday evening through Saturday	5
Half day	5

*Percentages add to more than 100% because participants were invited to provide multiple responses (n=34)

We also asked how valuable each of six types of training activities would be for each school's science teachers. The types varied in length and included both courses taken by individuals and inservice training sessions. Responses are displayed in Figure 1. In the figure, types of training are sorted by relative evaluation among middle and high school principals.

The patterns of preferences for elementary and for middle/high schools are somewhat different. Among middle and high schools, two of the options shown in Figure 1 stand out as most valuable, in the eyes of principals: "single brief inservice sessions on focused topics" and "an integrated series of brief inservice sessions, running throughout a semester or year."

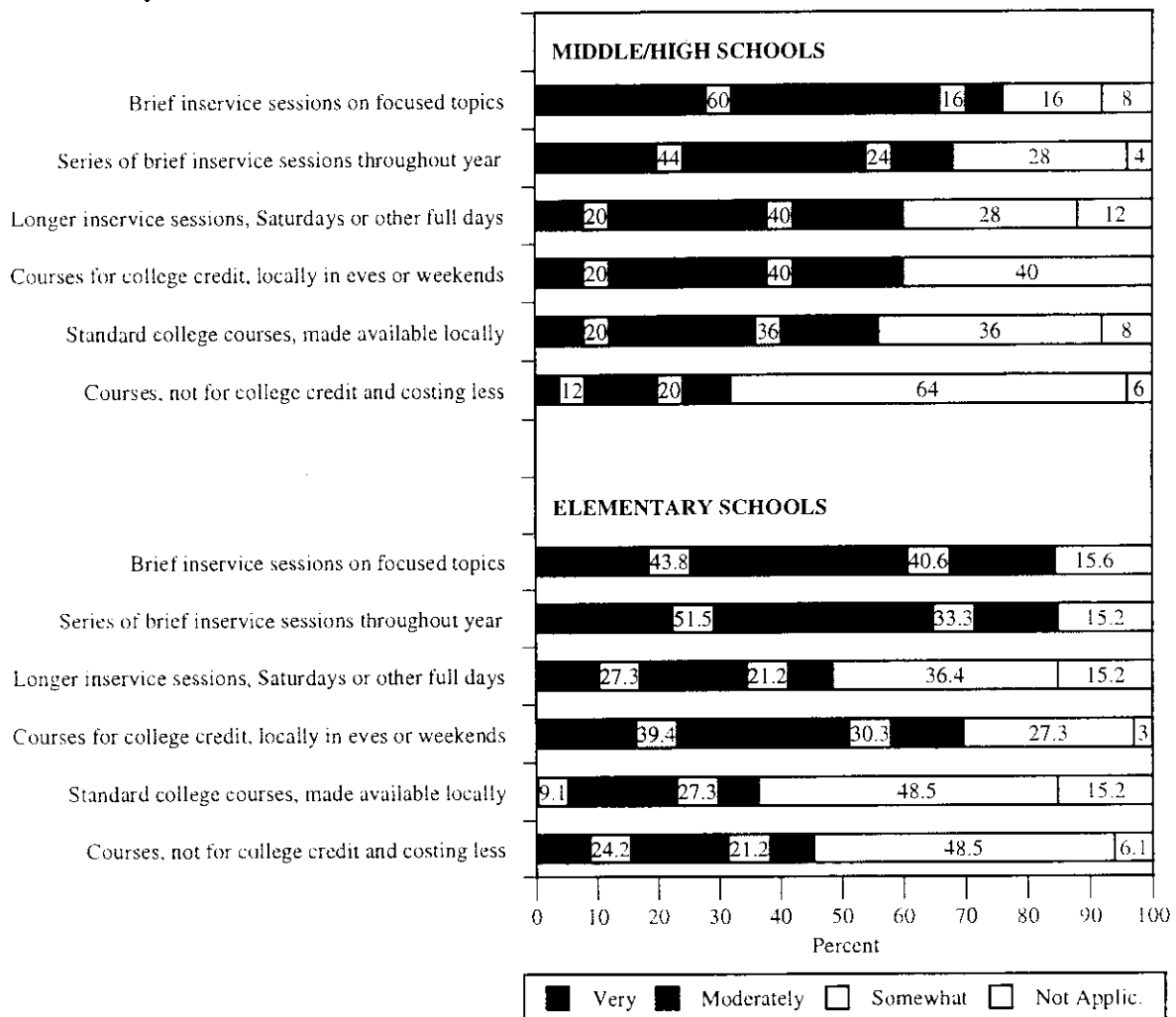
These two are seen as “very” valuable by about half of these schools, whereas the other four types were given that rating by only one-fifth or fewer. On the other hand, more than half of middle/high school principals said that five of the six types of training would be at least “moderately” valuable.

Middle and high school principals also see college courses for credit as “very” or “moderately” valuable in just over half of cases. Interestingly, they gave only slightly higher evaluations to “courses for college credit available locally in evenings or weekends on topics coordinated with your school’s goals” than to “standard courses from colleges of education made available in your area.” Apparently, the tailoring of courses is not as important as the college credit. Indeed, if tailored courses were offered for lower cost but without carrying college credit, principals much less often think they would have value for their faculty.

1996 Olympic E.S.D. Science Training Survey

Over the next five years or so, how valuable would each of the following types of training activities be for science teachers in Middle/High Schools and Elementary Schools:

Figure 1



For the elementary school principals in the sample, brief focused inservice sessions and an integrated series of brief sessions are also seen as most valuable, but by a less marked margin. The remaining four types are evaluated very differently by elementary school principals, as opposed to the very similar evaluations by middle/high school principals. College courses coordinated with the school's goals are seen as "very" valuable by two-fifths, twice the rate for middle/high schools. On the other hand, standard college courses for credit are very seldom seen as valuable. Although some principals listed them as good options in response to the open-ended question, only one-fourth of elementary and one-fifth of middle/high principals saw "longer inservice sessions on Saturdays or other full days" as "very" valuable, although about two-thirds find them at least "moderately" valuable.

Also on the practical front, we asked principals "How do you go about deciding how much and what types of inservice training to invest in each year?" Elementary schools split almost two-to-one between site-based decisions (65%) and district level decisions (35%) (see Table 9). For middle/high schools, the split is among three options: site-based decisions (41%), the district office (25%), and teams of district administrators and teachers (33%) (see Table 10).

Table 9. How Elementary Schools Go About Deciding Types of Inservice Training to Invest in Each Year

	Percent*
Site-based/school staff	65
District office	35
Must align with building/school goals	26
According to District Plan	18
According to SLIG goals	15
*Percentages add to more than 100% because participants were invited to provide multiple responses (n=33)	

Table 10. How Middle Schools/High Schools Go About Deciding Types of Inservice Training to Invest in Each Year

	Percent*
Site-based/ School Staff	41
District/Teacher team	33
District office	25
According to SLIG goals	21
Must align with building goals	21
According to District Plan	17
Eisenhower money	13
*Percentages add to more than 100% because participants were invited to provide multiple responses (n=24)	

At both levels, principals make reference to the need for training to align with school goals, district plans, and SLIG goals. In at least one case, the district makes the decisions but does so only after surveying teachers, according to the superintendent's office. Another district reports that it does all its own training, a report echoed by individual schools in the district.

Projected Use of Interactive Television Training

While few functioning interactive TV facilities exist at this point, it is important to estimate how much they would be used if they were available. We asked principals to estimate likely frequency of use if such a facility were built within five miles of the school and if it were built "25-30 miles away." While some report that they would make use of such facilities, the response is not overwhelming, in particular among elementary schools. (See Tables 11 and 12).

Table 11. Projected Frequency of Using Interactive Television Training if Facilities existed, Elementary Schools

	<u>If 5 miles away</u>	<u>If 25-30 miles away</u>
Frequently (twice a month or more)	14.3	2.9
Occasionally (about once a month)	17.1	11.4
Rarely (less than once a month)	28.6	40.0
Never	0.0	28.6
Don't Know/Not Applicable/No Answer	40.1	17.2
TOTAL	100.0% (n=35)	100.0% (n=35)

Table 12. Projected Frequency of Using Interactive Television Training if Facilities Existed, Middle Schools/High Schools

	<u>If 5 miles away</u>	<u>If 25-30 miles away</u>
Frequently (twice a month or more)	32.0	4.0
Occasionally (about once a month)	32.0	32.0
Rarely (less than once a month)	20.0	28.0
Never	8.0	28.0
Don't Know/Not Applicable/No Answer	8.0	8.0
TOTAL	100.0% (n=25)	100.0% (n=25)

Clearly, distance from the facility has a very large impact on projected use. For elementary schools, demand is very low for a facility as much as 25 miles away. When the facility is closer, two-fifths of elementary school principals do not feel able to estimate use. Among those who do so, more estimate rare use than frequent use. On the other hand, among middle and high schools, a close facility is projected to have considerable use--more than twice

a month by one-third and about once a month by one-third. If the facility is 25-30 miles away, however, projected use drops considerably.

If we extrapolate from those schools where principals felt able to offer an estimate of use patterns to all schools in the ESD, we can project possible total use of interactive TV facilities assuming every school had such facilities within five miles and assuming all had them about 25-30 miles away. These estimates are likely to be much higher than actual use because they assume many expensive facilities and because it is easier to muster the quick sentence to express intentions in answer to a survey question than to mobilize the planning, funding, and personnel interest to carry through on such intentions. We present the extrapolations without adjustment, but would caution that actual projected use should probably be estimated at half or one-third of these figures.

Based on the use estimates given by principals in our sample, our projections for elementary schools assuming facilities within five miles are that 24 schools with 501 teachers doing some science instruction would use the facilities rarely (less than once per month and most often once or twice a year), 15 schools with 290 teachers would use them occasionally (about once per month), and 11 schools with 260 teachers would use them frequently (twice per month to weekly). If the facility were 25-30 miles away, the parallel projections are that 25 schools with 481 teachers would use facilities rarely, seven schools with 112 teachers occasionally, and two schools with 48 teachers frequently.

If we arbitrarily assign exact frequencies to the categories rarely, occasionally, and frequently, we can estimate how many school*sessions might be desired monthly, on average, among all schools in the Olympic ESD.¹ These estimates are likely to be rather high and to include much error, but we offer them as a heuristic, useful as long as taken for no more than they are. We calculated these use estimates based on twice per school year for schools who say they would use such facilities, but rarely, seven per school year for those who would use the facilities occasionally or who estimated about once per month, and twenty-five times per school year for those who estimated frequent use. The result is about 47 school*sessions per month if facilities were close to each school and about 16 per month if facilities were 25-30 miles away.

We can calculate the same set of estimates for middle and high schools, again with the same provisos and warnings that such an exercise builds in too many unknowns to be interpreted as reliable or accurate. Our projections are that if facilities were within five miles, eight schools employing 99 science teachers would use interactive TV facilities rarely, twelve schools employing 43 science teachers would use them occasionally, about once a month, and twelve middle or high schools employing 88 science teachers would use them frequently, more than twice per month. If facilities were 25-30 miles away, projected use falls to eleven schools employing 106 science teachers using them rarely, twelve schools with 75 science teachers using them occasionally, and one school employing 15 science teachers using the facilities frequently.

Assigning the same meaning to the categories, rarely, occasionally, and frequently as for elementary schools, we can estimate that middle and high schools would wish to hold about 44 school*sessions per month if facilities were close to each school and about 14 per month if they were 25-30 miles away. Once again, these figures are likely to be considerably above the reality that would emerge realistically if interactive TV programs were put in place, unless further planning and marketing increased realistic demand.

We also asked how many teachers might use an interactive TV facility for individual college science courses (as opposed to school-sponsored inservice training). Responses vary between zero and 21. The projected total use within the sample is 120 for elementary and 60

¹ One school*session is counted every time any school holds one interactive TV session. Thus, ten school*sessions could mean that ten schools held one session each or that one school held ten sessions.

for middle/high schools, with a considerable number of “don’t know” responses. If these reports are extrapolated to include all schools in the ESD, the numbers would become 254 elementary school teachers and 102 middle or high school teachers. These estimates are, of course, subject to sampling error and error in principal’s estimates and should be treated as extremely tentative.

Finally, we asked whether respondents knew of any planned or already constructed interactive TV facilities in their vicinity. Respondents from six middle/high schools and two elementary schools replied in the affirmative. The principals from two elementary schools that already have access to interactive TV facilities were decidedly negative, however, calling such facilities “very ineffective” and reporting that their “Star School System” was not used at all. How much this finding should be used as a caution to interpreting hypothetical demand estimates is unknown, but it does remind us that all the findings above are based on principal’s best guesses in the absence of experience with such facilities.

Projected Use of Internet-Based Training

We asked similar questions concerning use of the Internet for “learning opportunities in the science area.” Tables 13 and 14 report principal’s projections concerning use of such training via Internet. These responses reflect much greater enthusiasm than for interactive TV, as was also portrayed in principal’s commentary. Indeed, most of the “don’t know” responses from elementary school principals stem from the fact that their schools are only now being wired for Internet rather than any sense of hesitation about the technology. At the time of the interview, only one district had not yet begun to be wired for Internet, but several were at that moment being wired or had been wired too recently for the principals to feel knowledgeable about likely use patterns. Even among those hesitant to estimate use levels, however, enthusiasm about the Internet was very high.

Table 13. Projected Frequency of Using Internet-Based Training, Elementary Schools

	<u>Percent</u>
Frequently (twice a month or more)	20.0
Occasionally (about once a month)	14.3
Rarely (less than once a month)	11.4
Never	2.9
Don’t Know/Not Applicable/No Answer	51.4
TOTAL	100.0% (n=35)

Despite principals’ enthusiasm about training via Internet, half feel unable to estimate likely use, most of these because the technology is too new for a track record to have been established. Of those who did venture an opinion, about half indicate relatively frequent use and only one principal indicated no use at all (see Table 13). If we projected on the basis of the few principals who gave us estimated use data, we would project that throughout the ESD, 11 elementary schools with 224 teachers would make rare use of Internet training, 14 schools with 288 teachers would make occasional use, and 19 schools with 321 teachers would make frequent use.

Among middle and high schools, projected use is very high. With only 16% unable to venture an estimate, fully three-fifths expect frequent use--most often estimating more than once per week. No principals from this group estimated that training on the Internet would "never" be used, and only two of 25 said "rarely." (See Table 14.)

Projecting from the principals who gave us estimated use data to the entire ESD, we find three middle schools and high schools with 26 science teachers would make rare use of Internet training, six schools with 29 science teachers would make occasional use, and 24 schools with 214 science teachers would make frequent use. Again, these estimates are relatively unreliable, although they are considerably firmer than for elementary schools, where more than half the sample were unable to give an estimate.

Table 14. Projected Frequency of Using Internet-Based Training, Middle/High Schools

	<u>Percent</u>
Frequently (twice a month or more)	60.0
Occasionally (about once a month)	16.0
Rarely (less than once a month)	8.0
Never	0.0
Don't Know/Not Applicable/No Answer	16.0
TOTAL	100.0% (n=25)

When the question was how many teachers might use the Internet for individual college courses, estimates are lower than for interactive TV facilities among elementary school teachers but higher among middle/high school teachers. Elementary schools in the sample would generate an estimated 66 users, which extrapolates to 152 in the entire ESD. For middle and high school, the sample generates an estimated 102 users, which extrapolates to 165 in the entire ESD.

Projected Need for College Degrees and New Endorsements

In addition to need for inservice training and course-by-course updates, demand for distance college courses could be generated by staff needs to complete degrees, to change degree fields, or to add endorsements. We therefore asked principals how many of their teaching staffs "do you think will need science degree programs, at the bachelors level and the masters level" in the next five years and also how many would need "additional or different endorsements in science?" While responses necessarily involve speculation on the part of principals, we did provide opportunity for them to consult with their staffs and, of course, to respond that they did not know.

Very few principals indicated that they felt unable to answer these questions, and very relatively few indicated staff who would need additional degree programs. Table 15 displays the findings. Figures represent projected estimates of the actual number of teachers with each need.

Table 15. Projected Number of Teachers who will Need Degree Programs and Endorsements in the Next Five Years, Elementary Schools and Middle/High Schools in the Olympic ESD

	<u>Elementary</u>	<u>Middle/High</u>
Need Science Bachelors degrees	0	6
Need Science Masters degrees	3	31
Need new endorsements in science	3	43

Teaching Staff Turnover

Another source of need for additional training, both for degree programs and for ongoing inservice training, is staff turnover. This source of instability and training need varies wildly across schools in the sample, from as low as 0% to a high of 100%! Extrapolating the number of replacement positions to the entire ESD, we calculate that 254 new elementary teaching positions and 76 new middle/high school science positions will be filled in the five year period

Some Additional Notes

During the course of our interviews, some principals mentioned relevant information that is not reported above because it was not collected systematically, but is nonetheless worth mentioning here. This information is difficult to interpret precisely because we had no control over who would volunteer particular types of observations. It is offered when it seems to offer useful additional ideas to consider when interpreting the full findings.

As would be expected, elementary schools situated in rural areas are the most enthusiastic about distance learning programs. In addition to the obvious reason of access problems, another reason was mentioned by several principals of rural elementary schools: higher teacher turnover in these rural schools. These principals mentioned the issue while expressing the desire for regular inservice to balance the high turnover rate of teachers and preserve some program continuity. Likewise, three principals suggested an ongoing inservice program for new teachers.

Schools in small districts or in highly rural areas are also the most enthusiastic about using services such as interactive TV. Enthusiasm is especially apparent when one considers the responses to how often an interactive TV facility would be utilized if the facility were 30 miles away from the school. Most schools were unwilling to travel such a distance (see Tables 11 and 12) and several replied that they are closer than 30 miles to community colleges or universities and could more easily take advantage of locally offered programs. However, three principals stated explicitly that their schools are so isolated that even a 30 mile drive feels quite reasonable to them.

The technology about which principals most often offered additional enthusiastic comments is the Internet. However, the nature of those comments also offers a caution to the interpretation of findings on likely use of training via the Internet. First, the excitement is almost entirely directed to an unknown potential. The Internet remains a potential to be guessed about in two senses. First, principals have little or no experience guiding them about the nature of programs that might become available over the Internet. Many elementary and secondary principals mentioned that their estimated frequency of Internet program use would depend on the appropriateness of the programs offered.

Second, as of our interviews, a sizable proportion of the sample had had no experience with the Internet at their schools. Five elementary schools (14%) indicated that they do not yet possess the computer hardware that would enable them to use Internet. Another four elementary schools had scheduled connection to the Internet before the end of this academic year, and three were newly connected or being connected as we interviewed them. This means that a total of 12 of 34 elementary schools in our sample (35%) had no experience with the Internet at the time of the interview.

Likewise, six secondary schools, a full 25% of middle and high schools, reported that they had only recently been connected to Internet. Only one said they did not have the proper resources. One entire district is not yet wired, in either elementary or secondary schools, and another has just completed its network.

This lack of experience does not dampen enthusiasm for the possibilities offered by the Internet, but it does suggest a caution to those planning inservice training. The results presented in this report represent the best estimates of principals to look into a future that is barely developing for two-thirds and has not yet been experienced by one-third.

Another area in which a few principals volunteered comments that might be useful involves particular programs they are using for inservice science training at this time. Only a few mentioned specific programs, so that this report is not at all representative, but we pass along those that were mentioned.

For elementary schools, the AIMS program was most often mentioned (three times), and DASH, Private Eye and TASK (through UW) were each cited once. Secondary schools named the FAST program, offered through the University of Hawaii, twice and a UW summer session twice. The Mamatt project, from Iowa State University and offered through the ESD, was also mentioned. Several principals from both levels of schools also mentioned appreciating specialists from the ESD.

District Interviews as Validation

Our survey of District Superintendents (or, more often, the appropriate curriculum officer in the district) served primarily as assurance that responses from school principals were accurate and will generalize to those schools with which we did not complete surveys. On specifics, district officials deferred to principals. On other questions, such as directions for science instruction, availability of facilities in the area, methods by which inservice training decisions are made, etc., district staff closely echoed the responses of principals. We therefore report the more specific and reliable information provided by principals.

We did learn from district interviews that one district prefers to do its own inservice. The result is that estimates of types of training needed, etc., from principals in that district may have little bearing on the demand for outside inservice training if district policy remains unchanged. We did not remove that district from the analysis because the policy may change as new training possibilities emerge. We did examine the responses of principals from the district in question and found no basis on which to differentiate their responses as to directions or training needs from responses of other principals. Rather than attempting to make adjustments to the data, we therefore simply note here that if this district decides not to participate in any training sponsored by others, the demand levels reported here may be overstated by about ten percent.