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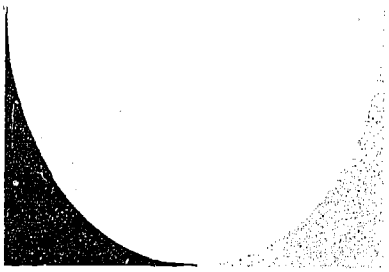
ABSTRACT

The Joint Committee on Higher Education in the state of Washington had as its mandate in this particular instance to study technical education in the state and to provide an analysis of ways to utilize existing facilities to meet the short term immediate needs of the state in this area. Further, the Committee was directed to conduct a study on the feasibility of instituting student exchange programs in the area of advanced technology in polytechnic fields. The recommendations of the Committee include: (1) There should be established a clearinghouse in technology with responsibilities for compilation and distribution of information in the field; (2) the Council on Higher Education should specifically incorporate, within its long-range planning, consideration of the delivery systems of advanced technological programs, the need for new or additional programs, and their proper organizational location; (3) all statewide planning agencies responsible for the development of technical education should continue their efforts to seek new and more effective ways to provide educational opportunities, and attention should be given to methods that do not rely on traditional educational approaches. (Author/HS)



Technological Education

January, 1973

Joint Committee on Higher Education

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(Technological Education)

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State of Washington

JOINT COMMITTEE ON HIGHER EDUCATION

J. ARNOLD BRICKER, Executive Secretary

January 3, 1972

Governor Daniel J. Evans and
Members of the Legislature:

Senate Resolution 71-108 directed the Joint Committee on Higher Education to continue its study of the feasibility of establishing a polytechnic institute, and House Resolution 72-89 added a request to explore the feasibility of educational compacts for technology programs.

This study dealt with sensitive issues, in terms of both educational policy and of relationships between different educational organizational structures. The eleven recommendations speak to two general themes. First, they deal with the need for increased planning and coordination for advanced technological education: specifically, that a statewide clearing house for technological education planning and coordination be established to assist in program development; and that the responsibility for this function be given to the Council on Higher Education. Further, that the Council, in cooperation with other agencies and institutions of post-secondary education, should continue the study of the means for providing increased opportunities in technological education.

Second is a set of recommendations which reject certain proposals as not being in the best interest of technological education until the necessary planning and coordination have been accomplished. The latter recommendations are that: the State should not proceed at this time with the establishment of a comprehensive polytechnic-type institution; the authorization for the bachelor of technology degree should be deferred; and it is not currently feasible nor educationally prudent to pursue a compact with adjacent states to provide technological education programs.

Respectfully submitted,

Gordon Sandison

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TECHNOLOGICAL EDUCATION

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TECHNOLOGICAL EDUCATION

PURPOSE

The purpose of this report is to comply with the directives of Senate Resolution 71-108 and House Resolution 72-89. Senate Resolution 71-108 directed a continuation of the polytechnic institute study, and an analysis of "ways to utilize existing facilities to meet the short term, immediate needs of the State of Washington". House Resolution 72-89 directed a study on the "feasibility of instituting student exchange programs in the area of advanced technology in polytechnic fields" (see Appendices A and B).

RECOMMENDATIONS[1]

The Joint Committee on Higher Education recommends that:

1. *A comprehensive polytechnic institute to be established as a separate campus, as envisioned by the 1971 report of the Joint Committee on Higher Education, is not presently feasible, given current student enrollment patterns, state economic conditions, and long-range educational considerations.*

2. *As evidence of legislative intent, a concurrent resolution should direct the Council on Higher Education to continue the study of technological education and feasibility of a polytechnic institute, with specific emphasis upon the following questions (see Appendix C):*

   a. *Is there unmet need and demand for specific technology programs, particularly at the advanced levels in areas related to engineering?*

   b. *What should be the delivery systems for new or expanded technological programs?*

   c. *Are there innovative methods for providing educational opportunities in advanced technology that do not necessarily rely upon traditional educational programming, methods, and structures?*

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[1]These recommendations reflect consensus reached by Task Force members as individual specialists, and are not presented as official policy of the agencies they represent.

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3d Revised Draft

d. As a part of the long-range post-secondary educational planning what is the feasibility and educational desirability of having a single-purpose polytechnic institution as the focal point for educational programs in advanced technology?

e. What are appropriate degrees for technology?

3. There should immediately be established a clearing house in technology, with responsibilities for compilation and distribution of information to support:

a. Career guidance information of all programs and levels of technology;

b. Assistance in curriculum development;

c. Coordination of long-range technological planning; and

d. Assistance in maximizing federal and other non-state funding grants for program development in technology.

4. The technological clearing house should be an administrative entity located within an existing planning and coordination agency --rather than establishing a new higher education agency-- and should not be located within a particular educational institution; it is therefore recommended that the responsibility for programming planning and coordination in technology be located within the Council on Higher Education. (See Appendix D)

5. The Council on Higher Education should specifically incorporate, within its long-range planning, consideration of the delivery systems of advanced technological programs, the need for new or additional programs, and their proper organizational location.

6. To insure inputs from users as well as educators, a special advisory council should be established on technological education which would both assist the technological clearing house in its initial establishment and direction, and be available to provide consultation to the Council on Higher Education in its continuing study of technological education. The advisory council should contain representation from industry and labor, as well as representatives of the post-secondary agencies conducting technological programs. The Advisory Council on Vocational Education may be able to assume this additional responsibility.

7. All state-wide planning agencies responsible for the development of technical education should continue their efforts to seek new and more effective ways to provide educational opportunities, and attention should be given to methods which

do not rely upon traditional educational approaches. Programs beyond those offered by community colleges and technical institutes should not necessarily be geared to the traditional baccalaureate framework requiring residency, general educational courses, etc., and should not necessarily result in the awarding of a baccalaureate degree.

8. *Multimedia should be utilized to the fullest potential and other means should be sought to convey information of specialized nature aimed at avoiding duplication of program efforts where the demand is nominal.*

9. *At this time, it does not appear in the best interest of the State to pursue a compact exchange with other states in technological education, as an interim solution.*

10. *The Task Force recognizes the need for advanced educational technological program offerings, as a result of both demonstrated student interest, as well as business endorsement. The efforts of Eastern, Central and Western Washington State Colleges to expand and improve their current industrial technological programs are commendable. These programs should reflect this new interest, and priority should be given to the continued enhancement and support of these programs.*

11. *All post-secondary educational planning agencies, together with the assistance of the Department of Employment Security, must strive to improve knowledge of and data about industrial needs in advanced technological programs, including retraining, and then structure educational programs in technology accordingly.*

POLICY QUESTIONS

The Task Force reviewed the recommendations of the 1971 MAKERS Report submitted to the Joint Committee on Higher Education, and specifically considered the following issues:

1. The advisability, and the demonstrated need for a polytechnic institution in the State of Washington.

2. The availability of technology programs for Washington residents.

3. The adequacy of post-secondary planning activities in technology.

4. The alternatives available for increasing the State's commitment to education in advanced technology without the neccessity of a new institutional structure.

5. The desirability of the bachelor's degree of technology.

BACKGROUND

House Resolution 69-127 directed the Joint Committee on Higher Education to undertake a study to determine the feasibility and desirability of establishing a polytechnic institute. To assist in this endeavor the Joint Committee retained the services of a consulting firm, MAKERS, Inc., Tacoma. The consultants developed a comprehensive report which was provided to the 1971 Session of the Legislature. Several recommendations were made in that report (see Appendices E and F) dealing with the structure and organization of the State for the delivery of technological education, technological education planning, and the recommendation that the State should take steps toward the establishment of a polytechnic institute.

The 1971 Legislative Session directed a continuation of this study by Senate Resolution 71-108, and the 1972 Session added House Resolution 72-89, requesting the examination of methods for enhancing and increasing the State's technological education opportunities, and specifically directing an inquiry into the feasibility of compact agreements with other states to provide certain technology programs. (See Appendices A and B)

To assist in gathering data, and to advise on the parameters for review of these issues by the Joint Committee, a special Task Force comprised of representatives of all the post-secondary educational elements was established (see Appendix G). This Task Force held a series of meetings, and consulted with other organizations and individuals knowledgeable on the subject, and data from other relevant sources were reviewed. Staff of the Joint Committee made visitations to technology programs conducted in Oregon and California.

FINDINGS

The Current Scene. What constitutes technological education can be, and often is, a nebulous term employed in an ambiguous arena. What one post-secondary structure envisions as a polytechnic institute another could call a vocational-technical school. There are distinctions based upon educational programming and societal values. There has not been sufficient clarification of the varied elements of technological education to draw clearly defined and well recognized distinctions. Furthermore, the field has been in a state of flux, and rightly so, as educational structures respond to changing industrial demands in the areas of vocational-technical training.

Several generalizations should be made in focusing on the issues.

- This state has made commitments to, and is considered a national leader in, the support of occupational, technical and vocational education.[2] This is clearly recognized in the U.S. Office of Education reports on the myriad of programs offered by the community colleges and vocational-technical institutes. The state colleges and universities also have programs in the technical areas.

  Many persons ascribe to technology an emphasis on engineering and engineering-related programs. However, there are other fields which should be considered. These include industrial technology and the managerial skills within the various areas.

  Historically, the various professional occupational areas have evolved into several sub levels of skills. And, as the level of responsibility increases for those within the jobs nearest the professional, the level of education and training also increases. Therefore, in the future there probably will be demands for an increase in the level of education and training in other evolving fields. These may very well include the medical, electronic data processing, electronics, electro-mechanical, waste disposal and the energy generation fields.

- There are well-defined technology programs in engineering, and engineering-related subjects such as electronics at the community colleges and vocational-technical institutes. These require primarily the same curricular mix: some appreciation for mathematics and general-engineering theories, together with a specific emphasis upon the technical area of concentration. There is a range of other non-engineering-related technology programs requiring different curricula and skill orientations. These range from various mechanical programs to the occupational skills required in business management. The underlying philosophy of the programs offered by the community colleges and vocational-technical institutes is that they produce a skilled technician who is capable of entering the job market at the end of his educational exposure.

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[2] This study was restricted to advanced technology programs. There are several other studies relating to the general subject of vocational-technical education. Primary among these are the efforts of the Advisory Council on Occupational Education and the Coordinating Council on Occupational Education's review of vocational education delivery systems under SCR 71-23; and the studies by the Superintendent of Public Instruction (SCR 71-2) and State Board for Community College Education (SCR-3) on vocational education funding.

- There is also a range of programs related to the industrial technology field at the state college level. These were originally derived from the need to educate industrial arts teachers for the secondary school system. However, industrial technology split away from industrial arts during the 1960's. The state college campuses have developed extensive and successful industrial technology programs. These programs stress some technical orientation, including general theoretical exposures in engineering and engineering related areas. For the most part the curriculum is directed toward management and production skills. There are, as will be described later in this report, other new developments further defining technical areas of concentration.

- The two universities have well-established schools of engineering granting both undergraduate and graduate degrees. They are traditional in their educational approach, which is highly theoretical, and provides concentrations in mathematics. The end product is to be a skilled theoretician in engineering matters. There is little emphasis on applied experience. There are a few small programs at the undergraduate level which could be referred to as falling within the industrial technology area.

- National Trends. In recent years there has been a continuing dialogue for enhancing and increasing emphasis upon advanced technological education programs at the baccalaureate level. This pertains primarily to engineering and related programs.

  Accredited four-year bachelor degree programs show the following trends:[3]

Year	Number of Schools	Graduates
1968	1	30
1969	2	173
1970	5	720
1971	11	1144

[3] "Industrial Engineering Technology?", Engineering Education, Oct. 1972, page 30.

There are also examples of further developments and refinements in the area of industrial technology. California, for example, has schools that have developed educational programs in both directions, and some that have been designated to concentrate in a specific area. The professional and accrediting organizations concerned with engineering education now recognize that there may be a role for, and a need to produce, a person with skills somewhat different than those normally growing out of well-established engineering programs.

Generally, the discussions recognize these distinctions: (1) The engineer who was theoretically trained and able to perform for industry a research or higher-level administrative function, and (2) the technologist, a person with some appreciation for engineering theories, but an extensive emphasis upon applied skills. [4]

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4 "Engineering Technology Education Study", American Society for Engineering Education, January, 1972, page 6:

> "Engineering technology is that part of the engineering field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities; it lies in the occupational area between the craftsman and the engineer at the end of the area closest to the engineer.
>
> Engineering technology is concerned primarily with the application of established scientific and engineering knowledge and methods. Normally engineering technology is not concerned with the development of new principles and methods. Technical skills such as drafting are characteristic of engineering technology."

The latter is capable of performing several functions in industry: as a collaborator on an engineering research project, as a skilled technician to do applied work based upon theoretical resear[illegible] an interpreter and lead supervisor of techni[illegible] able to communicate with the theoretician as [illegible] practitioner. It is this category which is ju[illegible]erging and around which mo[illegible] of the debate centers. A final category is the technician who is the product of the well-established and defined programs at the community college and vocational-technical levels. He is capable of performing technically the function for which he was schooled and is readily assimilated in the job market.

Many who argue for the need of recognized, well-defined baccalaureate technology programs do so from the basis of a purported gap that presently exists between the technician and the engineer. This is graphically portrayed as shown in the following figure.

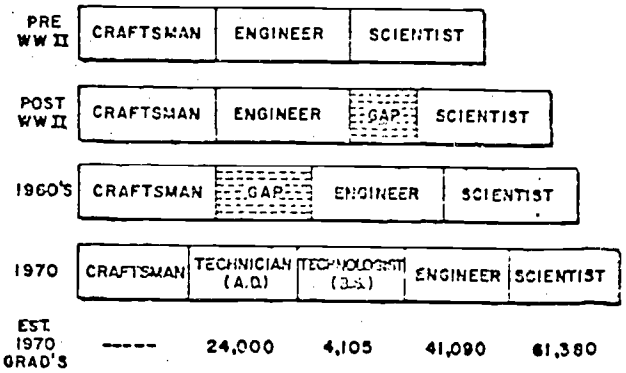

Figure 1. Technology Spectrum ranging from skill to theoretical capabilities. [5]

In summary, then, the developments nationwide as evidenced by the professional associations' accrediting processes, together with the educational institutions' response to industrial needs, have prompted the establishment of well-defined and recognized baccalaureate-level programs in engineering technology. Although much of the dialogue deals with programs in engineering-related areas, there has been a corollary development in the area of industrial technological education programs. All technological program areas need clearer definition of educational goals.

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5 "Professional Schools of Engineering," Engineering Education, May, 1972, page 915.

Review of MAKERS 1971 Report Recommendations. The 1971 Report by MAKERS and Associates as commissioned by the Joint Committee on Higher Education and subsequently submitted to the 1971 Legislature, presented several recommendations to increase and enhance the State's commitment to technical and technological education. The report had as its basic premise that the State's commitment to technological education in particular "...can be instrumental in directing the State to favorable trends and in helping to achieve its long-range goals." (See Appendices E and F)

In conducting this continued study, the Joint Committee carefully examined each of the MAKERS' recommendations. The following is a summary of the conclusions as they pertain to the specific MAKERS' recommendations.

MAKERS° *It is recommended that higher education, and technical and technological education in particular, should relate to and help the State in attaining its overall goals. Towards this end, the study recommends that the State define its long-range goals and express them in a usable and relatable form.*

MAKERS° *The State's education planning process should then relate the role of education in achieving these goals.*

Major educational commitment requires comprehensive planning review to insure its compatibility with other educational goals, and to focus the necessary commitments of talents, funds, and supporting apparatus to bring the endeavor to a successful conclusion.

The MAKERS' Report stressed the need to define the State's educational goals and to plan accordingly. At the outset of this study, the Joint Committee requested each of the State's educational planning agencies, with responsibilities directly or indirectly related to the subject of technology programs, to respond with a critique of the 1971 recommendations and to explain their current planning as it relates to technological education.

The Council on Higher Education was mandated by the 1969 Legislature to undertake a long-range planning process for all post-secondary education programs and, further, to specifically approve all new degree programs (see Appendix H). The Council is in the final stages of putting together its initial comprehensive planning document, which is scheduled for completion in the

spring of 1973. The planning procedures adopted by the Council in March, 1972, identified the elements to be studied and the methodology. One area of primary consideration was that of instructional programming; consideration of advanced technology program needs will fall within this area.

The Council submitted to the Joint Committee (November, 1971) an initial statement on planning activities as they relate to the study of technological education, and an additional progress report on September 28, 1972. The Council's Executive Coordinator stated that:

> "The Council has always assumed that [post-secondary] vocational-technical education is an integral part of higher education programming in this State; consequently, the planning outline reflects the importance of vocational-technical education throughout its design. Major parts of the six-year plan currently being prepared by the State Board for Community College Education will be incorporated into the Council's comprehensive plan for the state system of higher education. Vocational-technical education will undoubtedly receive considerable emphasis in the ongoing planning activities of the community college system."

As noted, the Council's complete report is not due until the spring of 1973, but some likely initial recommendations from the Council's long-range planning effort can be summarized as follows:

1. That there was not substantial data to indicate the need for a new technological institution, particularly in light of the current enrollment picture which indicates that the State has adequate student stations throughout the various institutions of higher education and of current economic considerations.

2. That no existing state college should be converted into a single-purpose institution, and that priorities within the colleges should continually be adjusted to reflect the educational needs of this State.

3. That commitments to technological education must be well thought out, since they would involve extensive commitment of funds as well as requiring specialized technical skills and equipment.

4. That technology education should respond to industry's needs.

[illegible] four-year institution has submitted a new [illegible] program in the area of technological education to the Council for its review (in addition to notification of intent for another program). This would indicate that the four-year institutions have not determined the need for substantial realignment of their educational objectives, and the concomitant reallocation of resources to the degree that it would alter their currently assigned educational responsibilities.

In January of 1972, the State Board for Community College Education presented a status report of its planning activity as it relates to technological education. Until there are well-defined, overall state goals, the community college system develops its educational plans in accordance with the goals perceived by the community colleges, and conditioned by specific direction from the Legislature. This planning anticipates a continued expansion of vocational education services, primarily for programs which are two years or less in length. In some technical areas, such as electronics and data processing, there is an apparent need for programs of greater length. The primary constraint on the community college system against implementation of the report's recommendations is lack of adequate funding for new programs. Further planning and implementation were halted on 58 programs identified during the 1970-71 school year as appropriate developments for a number of reasons, largely due to lack of funds. The expansion in the vocational education programs mandated by the Legislature has been accomplished largely through increasing the size of existing programs rather than implementation of new ones.

During the late spring of 1972, both the Coordinating Council for Occupational Education and the Advisory Council on Vocational Education submitted some comments to the Joint Committee on the status of vocational planning as it relates to the 1971 MAKERS Report's recommendations. The concern of these two organizations is primarily with vocational and technical training other than specific

programs leading to a bachelor's degree. (Recommendations for changes in vocational education delivery systems from these two organizations will be incorporated within the report to the Legislature in response to Senate Concurrent Resolution 71-23.)

All of the State's higher education planning agencies reported concern for, and directed efforts towards technology planning. Thus, they saw no need to re-structure the State's educational system to promote emphasis on this aspect of post-secondary planning. However, these agencies do concur that immediate establishment of a clearing house in technology, as envisioned by recommendations 3, 4, and 5, would be an important step in providing a coordinative and planning framework for the further development of technological education.

MAKERS° *It is recommended that several educational modes be incorporated in a statewide plan for technological education, and it indicates that such a plan should utilize four facets:*

1. *short-term, non-degree programs in mobile or secondary use facilities;*
2. *existing community colleges and vocational-technical institutes;*
3. *existing four-year colleges;*
4. *a new technological education/study center.*

Since the MAKERS Report was published in 1971, there has been a continuing emphasis on enhancement of technological education at the community colleges and vocational-technical institutes, and most significantly a new direction at the state colleges. The state colleges' efforts will be specifically noted later in this report.

Although there is a growing acceptance that there is a need for bachelor-level technology programs, all of the related planning agencies have emphasized the desirability of non-traditional programming methods in providing additional opportunities in technological education. Recommendations 2-c and 7 signify the importance of the methods for delivering technological educational programs.

Commitments to a new education/study center in technology should await the results of the planning efforts as noted above.

MAKERS° *There is a need for technical programs related to existing industries and situations, including aerospace, oceanography, social services, and government operation. But more importantly, the analysis illustrates the need and desirability for technical programs at all levels to relate to potential industries and situations in the State and to lead in the development of favorable trends.*

Educational systems do seem to be responding to industrial needs. Reference should be made again to the recent efforts of the state colleges in developing new industrial technology programs in response to both local and statewide needs, as well as the continued efforts of the State's community colleges and vocational-technical institutes.

The severity of the recent economic situation in the State requires that each level of the educational system review again its commitment to and responsibilities for maintaining and enhancing the State's economic vitality. Education is a major focal point for industrial growth.

MAKERS° *The Legislature ought to clarify its attitude now by making a commitment to the necessity and ultimate implementation of a polytechnic institute--more precisely a technological education/study center.*

MAKERS° *The study recommends that planning for a technological education/study center begin now, although actual implementation is not recommended before five years have elapsed.*

The Joint Committee has reviewed the studies undertaken during 1969-71 and has concluded that there is not sufficient clear-cut evidence to support the establishment of a separate campus for a specialized polytechnic institute in the State of Washington at this time. The reasons are manifold: not necessarily in order of priority, they deal with educational programming, economic conditions, marketability, student aspirations and the resultant shifts in student enrollment patterns.

The Joint Committee's previous studies indicated that a polytechnic institute could be a catalyst in the future for improving the State's industrial picture, as well as providing a needed educational service. The type of institution was not clearly defined, but it

would appear to fall short of the highly theoretical, research-oriented model like the Massachusetts Institute of Technology. Rather, it would have concentrated more on the applications of advanced technology in specialized fields of particular significance to the State of Washington.

Serious and far-reaching educational planning questions should be examined in depth before undertaking [illegible] ment to a different emphasis in educational goals, and a new organizational structure. If advanced technology programs were readily available through a single-purpose type institution, would this artifically motivate other post-secondary institutions to structure their programs to encourage continued education toward a baccalaureate or post-graduate degree simply because it was available? Further, there is strong argument that a single-purpose type of institutions is too narrrowly structured to produce a well-rounded education. It is well documented that persons possessing professional and vocational skills need re-orientation and re-training approximately every decade to remain current. Whether this can best be done within a broad-range academic community, such as a multi-university, or in a specialized institution like MIT, is an unanswered question.

Conversely, the Joint Committee has not been made aware of data which indicate that industry in the State of Washington is actively seeking advanced technology graduates from out-of-state institutions.

The planning necessary to provide answers for these types of fundamental educational questions has not been done; it should be undertaken prior to any definitive answers being reached. The Council on Higher Education is including consideration of these types of questions within its long-range master planning.

The Council on Higher Education, the Coordinating Council for Occupational Education, and the Advisory Committee on Occupational Education have concluded for various reasons that a commitment to the establishment of a polytechnic-type institution is not warranted at this time. The State Board for Community College Education recommended further in-depth study of the matter, with no major educational direction modification until 1975.

The Washington Council on Engineering and Related Technical Education (WCERTE) is a voluntary organization of post-secondary institutions within the State who are involved with a portion of the total spectrum of engineering and engineering-related technical education. The organization has as one of its purposes to provide a structure under whose auspices problems which are related to engineering education can be studied and recommendations made. WCERTE has reviewed the State's polytechnic feasibility studies and concluded [see Appendix I for other WCERTE recommendations]:

> "The immediate need for a polytechnic institute in the State of Washington is not clearly established and the present economic climate does not encourage the development and construction of a new educational institution in the traditional sense. The MAKERS Report recommends, however, and our task group concurs, that planning begin now for the development of a publicly-funded technological education study center. Parameters for this center include industry, government, and education inputs. The center should be concerned with subdegree, nondegree, and degree-oriented programs on both a resident and non-resident basis. The center should also be concerned with utilizing existing educational resources in the most beneficial way through a variety of new approaches."

In general terms, the "Technological Study Skills Center" could have the following possibilities:

1. Be located in a metropolitan area;
2. Have mobile capability;
3. Inventory program resources in the state's public and private institutions, working with the Council on Higher Education;
4. Advise and contract with students for programs to be carried out wherever educational opportunities exist. (A program to provide students additional competencies would be established between the "Skill Center Advisor" and the student.)
5. The center would assist in coordination of existing programs and recommend modifications and development of programs to meet additional needs.

MAKERS° *It is recommended that internships in real situations--industry, social service, government operations--should be encouraged as an integral aspect of formal education. These programs could be coordinated by some form of polytechnic institute.*

The Joint Committee concurs that internships and actual industrial experience are crucial to programming in technological education and recommends that this be a major emphasis in continued planning.

MAKERS° *It is recommended that the Legislature provide emphasis, funds, and direction to community colleges and vocational-technical institutes to strengthen programs needed to meet the short term and interim needs in these areas as identified in the study.*

The 1971 and 1972 Legislative Sessions did address the need for additional emphasis on technical training by mandating that two-thirds of new authorized community college students shall be enrolled in occupational courses, and by the enactment of Referendum 31 providing for a $50-million community college capital bond issue for primarily vocational-occupational facilities and equipment.

MAKERS° *The study recommends that bachelor of technology degrees be offered when it becomes widely recognized that these degrees reflect unique capabilities--a combination of technical skills with theoretical background and/or proficiency in secondary fields, such as business and communications. Otherwise, these capabilities should be achievable through other degree programs, such as bachelor of arts or science in technology.*

Concurrently with the desire to increase baccalaureate-level technology programs have come requests for authorization to grant Bachelor of Technology degrees. The arguments correspond with the perceived need for a new industrial type, the "technologist," as contrasted with the engineer and the technician. Some fear that this move, by itself, could result in further inducements to students to pursue educational goals which are not required in the job market. Further, most BT degrees are not generally accepted for entrance to graduate engineering programs. The American Society for Engineering Education's Study on Engineering Technology (January, 1972) endorsed the "Bachelor of Technology degree but with the underlying assumption that ...meaningful distinctions should be maintained between engineering and technology, between the purposes of the respective programs, and between the normal roles and career patterns of the graduates." [6]

[6]American Society for Engineering Education, Engineering Technology Education Study, January 1972, page 8.

The report goes on to state:

> No analysis was made of the names of degrees awarded to engineers, technologists or technicians. The names of degrees are determined by historical precedent or accident and are a jealously protected privilege of each institution. Efforts to develop a logical sequence of named degrees for the field of engineering have all failed. There is not likely to be any more standardization of titles of degrees awarded to technologists. The objective here is to define educational boundaries or guidelines, not to attempt to control, standardize or even influence terminology.

Further, this report, like many others dealing with technology does not adequately emphasize the broad range of technology programs, the stress being on the traditional engineering programs.

The Council on Higher Education, which has primary degree review responsibilities (see Appendix H), informed the Joint Committee:

> Recommendations to establish a new degree entitled "Bachelor of Technology" run counter to a number of recent national studies on degree terminology. For example, the Carnegie Commission proposed that four-year undergraduate degree programs be identified simply as "Bachelor of Arts" or "Bachelor of Science" with appropriate majors. Since the state colleges and universities currently have authority to offer a Bachelor of Arts or Science, a degree in technology could be granted without seeking specific additional legislative authority for this purpose. Consequently, requesting legislative authority in the offering of such degrees does not seem to be necessary or appropriate.

Recommendation 2-e, directs that the continued study of technological education should include the question of appropriate degrees, including the organizations that should be authorized to grant such degrees. This question cannot be separated from the organizational determination of the scope of future technological programs, and the primary responsibility for conducting such programs. If it is concluded that there is need for a centralized effort in providing technological education, then degree authorization should be extended along with that designated responsibility. On the other hand, if the primary responsibility at the baccalaureate level will remain with the existing four-year institutions, they should then have the prerogative to develop course content leading to the desired degree.

Other States' Programs: Compact Feasibility. House Resolution 72-89 directed the Joint Committee on Higher Education to examine alternative forms of delivering educational opportunities in advanced technology. One directive was to examine the feasibility of a compact with adjacent states to provide opportunities for Washington residents to enroll in their programs. Oregon, California, and Idaho all have schools offering programs at the four-year level in technology.

Idaho's Lewis and Clark College has a limited program offering in the area of advanced technology. It attracts few Washington residents. California has an extensive array and various forms of technology programs at the baccalaureate level. The most sophisticated and comprehensive of these are found at the State Polytechnic University's campuses at San Luis Obispo and at Pomona. The state colleges offer various programs in technology more closely akin to the industrial technology approach discussed previously. Most programs are located in southern California and are therefore not readily available to Washington residents. Oregon has one institution, Oregon Technical Institute at Klamath Falls, which is specifically oriented to an advanced engineering-technology baccalaureate-level program. Oregon State University also has a bachelor program in engineering technology.

At Oregon State University of 238 fall 1972 enrollees, nine appear to be Washington residents, with only two in the upper division. During the past two years no graduate of a Washington community college has transferred to OSU. Of the nine students, five listed mechanical technology as their major while four listed civil technology.

The 53 Washington residents attending Oregon Technical Institute were surveyed (with the cooperation of the Oregon Coordinating Council for Higher Education). The questions dealt with curriculum, program availability and general student interest (see Appendix J). Each of the individuals surveyed were asked several general questions including the reason for choosing Oregon Technical Institute; how they learned of its program; what their majors were, and so on. The Joint Committee then summarized these under the headings most applicable to each major question. It seems important to note that a great number of the respondents chose Oregon Technical Institute because it was "the only institution in the northwest offering a four-year technology degree".

That is not precisely correct, since most of the state colleges in both Washington and Oregon offer a bachelor's degree with majors in technology. It is true, however, that OTI is the only institution which offers a "Bachelor of Technology" degree.

There are 113 Washingtonians presently enrolled at OTI; given its location, that is a significant number. The majority (71) are upper division. The Joint Committee later received a program identification for each student enrolled. This is shown on the second page of the questionnaire, Appendix J, as the second set of columns. The 113 students actually enrolled and those surveyed do carry relatively the same program emphasis. The programs experiencing the greatest student enrollment are not for the most part offered by Washington institutions. The program at Oregon Technical Institute emphasizes the ability for "block transfers," accepting the two-year community college degree as fulfilling the first two years, and direct junior or upper division status.

The conclusions that can be drawn from this survey indicate that a number of Washington residents seek the types of programs offered by Oregon Technical Institute, and some of these programs are not presently offered at the baccalaureate degree level in the State of Washington. The extent of acceptability of this baccalaureate graduate vis-a-vis the technician matriculating from a community college or vocational-technical institute is unknown, however. If there were a coordinating mechanism for technological education within the State of Washington, many of these students might be able to find the types of programs and experiences at one of our existing institutions rather than accept the necessity of traveling to another state.

The Joint Committee concluded that a formal compact at this time would not be in the best interest of the State of Washington in consideration of the findings under industry acceptability (which follows); the location of Oregon Technical Institute which is far removed from the populous areas of Washington; and the availability of some similar program offerings within the State. This alternative should, however, remain a possible long-range planning consideration depending on the determination of the provisions for additional educational opportunities through some mechanisms other than existing four-year colleges within this State.

Technological Education Program Needs. As identified within this report, several factors prompt interest and demand for additional and increased educational opportunities in technical subjects; industries' technical needs and promotional practices; students' interest; community problems; and expanding technological knowledge. Educational agencies and institutions are attempting to meet these new demands. One difficulty is the uncertainty of need, both in scope and degree.

Two projects being accomplished by the Coordinating Council for Occupational Education may have some significance. First is the development of an employment/enrollment forecast model which will attempt to answer two questions:

1. What level of statewide enrollment is appropriate in various occupational fields?

2. What impact does the level of enrollment and placement have on the present and anticipated demand?

Second is the development, in cooperation with each specific industry, of occupational analyses of the field and the development of the competencies required by the industry. This effort should provide indicators as to when the performance required by the industry cannot be met without a higher level of education and training.

An encouraging development has been the recent effort by three state colleges to increase their program opportunities in occupational and career technical areas. Such redirection of a significant portion of baccalaureate level programs to meet these new industrial-student-community needs, together with the high priority given to technological education programming by the State's education planning agencies, should provide the basis for flexible and speedy response to this educational need, as well as complementing the existing post-secondary occupational systems. These new baccalaureate program opportunities may respond to the needs of some Washington residents currently attending out-of-state four-year technical programs.

Two demand factors can be identified at this time to assist in inital program planning. An examination of 1971 community college enrollments in preparatory technician programs shows 3,958, with 627 in engineering related programs. (See Appendix K) An additional 3,650 students were enrolled in supplementary courses. Many of these students will, for the varied reasons noted above, be seeking advanced educational opportunities.

The other demand factor is technical occupations offered by the community colleges and vocational-technical institutes which require additional academic experience, either immediately upon program completion, or later during the individual's career.

Figure 2 identifies some of these program areas based upon current community college and vocational-technical institute program offerings. (See Appendices K and L)

Figure 2

OCCUPATIONAL AREAS FOR WHICH A POTENTIAL EXISTS FOR ADVANCED STUDY

Field	Enrollments	Completions
Agriculture Related	571	133
Dental-Medical Related	304	79
Electronic Data Processing	1097	358
Engineering Related	1342	244
Electronics, Chemical, Environmental, Other	2387	472
TOTAL	5701	1286

In the technical occupations in the State of Washington, approximately 70% of the graduates accept employment in the field for which trained, or in a directly related field. This means that about 30% of the graduates seek other employment, do not seek employment, or go on to advanced training.

Assuming a placement rate of 70% of completions in the field, 386 persons are potential candidates for (a) not seeking employment, (b) seeking non-related employment, or (c) seeking advanced training. A total possible demand for additional educational training of total occupational enrollees could reach 1,500. In addition there is the element of technical retraining, middle management programs, and so on.

CONCLUSIONS

1. There has been a substantial increase in the recognition of and emphasis upon the enhancement and availability of technological education programs. At the national level, Commissioner Marland has been talking about "career education." At the state and local levels, this development has resulted in additional programming for occupational and vocational courses, within both the secondary and post-secondary educational structures.

2. This interest has prompted demands for more advanced opportunities in technological education. The responses have varied from the traditional skills approach espoused by the vocational educational agencies to advanced theoretical academic offerings of the more technical and professional occupational programs. Two other factors have influenced the range of responses. One is the lack of clarification by industry as to what differing kinds of educational experiences are desired for their employees; another is the more subtle but pervasive question of career advancement. Industry still seems to be prone to advance persons to management positions who have acquired a baccalaureate degree without particular regard to the type of educational experience. Secondly, coupled with the influence of the industrial structure, is an increased student appetite which prompts demands in the areas of advanced technological training, as well as retraining, and the availability of corollary courses in management.

3. One of the paramount issues yet to be answered is definitional: what is technological education? To some it is the narrow but well defined area of engineering. To others it is all those occupational and vocational programs which have some reliance upon theoretical understanding, mathematical analysis, or even broad managerial skill requirements. All of the interested parties - - the educational structure, industry, and the students - - must define clearly what they want in the way of advanced technological education prior to any determinations of organizational structure and new program delivery systems.

4. For the above reasons the establishment of planning responsibility at the state level for advanced technological education is of paramount importance. To enhance this planning responsibility, a coordinative function for program development, together with inventories of current programs plus industry's needs and students' desires, should be implemented. The Council on Higher Education should be directed to include specific emphasis upon advanced technological education within its long-range planning.

5. Recognizing the need for answers to long-range educational considerations, as well as the reflection upon current student enrollment patterns and the state's economic conditions, a comprehensive polytechnic institute established as a separate campus is not presently feasible.

APPENDICES

APPENDIX A - Senate Resolution 71-108

APPENDIX B - House Resolution 72-89

APPENDIX C - Proposed Senate Concurrent Resolution

APPENDIX D - Proposed Legislation-Technological Education Clearinghouse

APPENDIX E - MAKERS 1971 Report Recommendations

APPENDIX F - Joint Committee on Higher Education 1971 Report Recommendations

APPENDIX G - Task Force Roster

APPENDIX H - Council on Higher Education, Planning Responsibilities

APPENDIX I - Washington Council for Engineering and Related Technical Education, Recommendations December, 1971

APPENDIX J - Washington Residents' Questionnaire/ Oregon Technical Institute

APPENDIX K - State Board for Community College Education, 1971 Technical Program Enrollments

APPENDIX L - Coordinating Council for Occupational Education, Vocational-Technical Institutes 1971 Technical Program Enrollments

IN THE LEGISLATURE
of the
STATE OF WASHINGTON

SENATE RESOLUTION
1971 - Ex. 108

By Senators Jim Matson, Francis E. Holman, Elmer C. Huntley, Bruce A. Wilson and Gordon Sandison

WHEREAS, The Joint Committee on Higher Education conducted a study of the feasibility of establishing a Polytechnic Institute in Washington pursuant to 1969 House Resolution No. 69-127; and

WHEREAS, The study performed by the Joint Committee on Higher Education indicated not only the feasibility but the appropriateness of establishing polytechnic programs in existing facilities to meet existing needs and the establishment of a Polytechnic Institute in the mid 1970's; and

WHEREAS, The study recommended several alternative solutions to the short term problem;

NOW, THEREFORE, BE IT RESOLVED, By the Senate, that the Joint Committee on Higher Education prepare a study on the best possible way to utilize existing facilities to meet the short term, immediate needs of the state of Washington; and

BE IT FURTHER RESOLVED, That the results of the study on short term utilization including recommended legislation be reported to the members of the 42nd Session of the Legislature no later than January 1972; and

BE IT FURTHER RESOLVED, That the Joint Committee on Higher Education shall prepare a study relating to the appropriate steps necessary to establish a Polytechnic Institute in the state of Washington by the mid 1970's for presentation to the members of the 43rd Legislature no later than January 1, 1973.

I, Sidney R. Snyder, Secretary of the Senate, do hereby certify this is a true and correct copy of Senate Resolution No. 1971-Ex. 108 adopted by the Senate May 10, 1971.

SIDNEY R. SNYDER
Secretary of the Senate

IN THE LEGISLATURE
of the
STATE OF WASHINGTON

HOUSE OF REPRESENTATIVES

Resolution No. 72-89 by Representatives Gladder, Charnley and Kiskaddon

WHEREAS, The Western Interstate Commission on Higher Education is a compact of the thirteen western states providing for student exchange programs which allow students to move across state lines to attend certain professional education programs; and

WHEREAS, The State of Washington has been a receiving state in these programs for approximately twenty years, accepting students from other compact states on a resident-fee basis, with the sending state providing direct appropriations of additional support fees; and

WHEREAS, The State of Washington will receive $452,499 this academic year for offering professional education under the WICHE student exchange program to forty-five medical students, thirty-nine dental students, one hundred and twelve veterinary students, seven physical therapy students, and eleven occupational therapy students; and

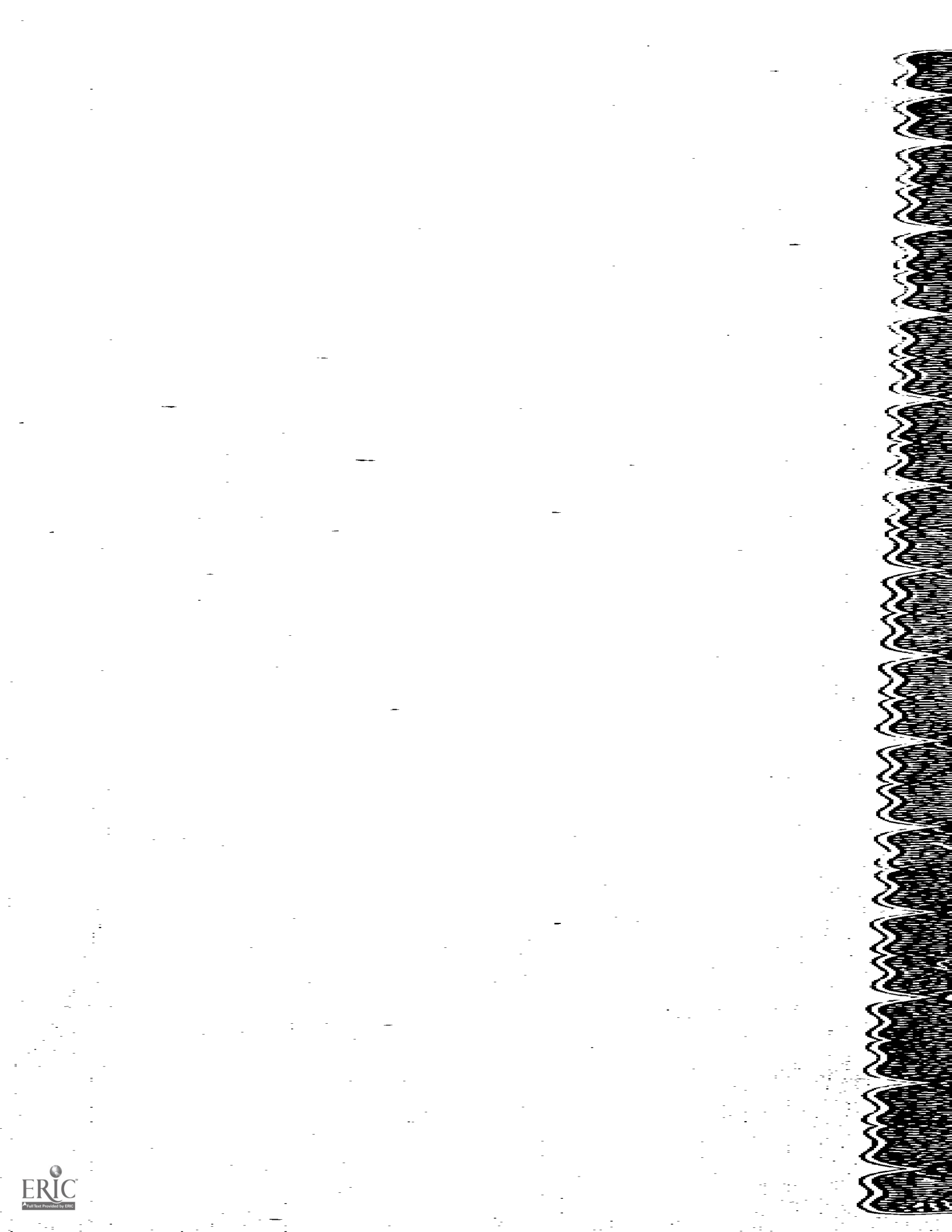
WHEREAS, The two decades of WICHE experience have demonstrated that the student exchange concept is beneficial to the sender states by reducing substantially state financial support for high-cost educational programs, and for the receiving states by curtailing duplication of certain high-cost programs and providing additional students to make these programs more economical; and

WHEREAS, By House Resolution 69-197 and Senate Resolution 71-108, and reports of the Joint Committee on Higher Education, the Legislature has expressed interest in establishing a polytechnic institute or advanced technology programs; and

WHEREAS, The cost of establishing new technical and professional programs, especially the initial capital facility needs, makes it uneconomical for each state to consider establishing separate programs to meet all of its educational needs;

NOW, THEREFORE, BE IT RESOLVED, By the House of Representatives, That the Joint Committee on Higher Education, with the cooperation of the Council on Higher Education, shall review the feasibility of establishing a student exchange program for bachelor and graduate degrees of advanced technology, provided that the Washington resident has attended a state institution and satisfactorily completed at least a two-year program in an occupational, vocational or technological area; and

BE IT FURTHER RESOLVED, That the Joint Committee on Higher Education in conjunction with the Western Interstate Commission on Higher Education, shall consult with the necessary state officials in Idaho, Oregon, and



alifornia about the feasibility of instituting student exchange programs
n the area of advanced technology and polytechnic fields, and consult
ith the necessary state officials in Idaho and Oregon about the feasibility
f instituting community college student exchange programs.

February 19, 1972.

hereby certify this to be
true and correct copy of
esolution adopted by the
ouse of Representatives
ebruary 19, 1972.

Malcolm McBeath

alcoim McBeath, Chief Clerk
ouse of Representatives

WHEREAS, The Joint Committee on Higher Education in responding to the directives of Senate Resolution 71-108 and House Resolution 72-89 has studied the feasibility of establishing a polytechnic institute and other aleternatives for enhancing and increasing the State's advanced educational opportunities in technology; and

WHEREAS, In compliance with the aforementioned directives, the Joint Committee on Higher Education has submitted a report to the 1973 legislative session recommending several interim steps aimed at increasing the coordination and planning for technological education; and

WHEREAS, Changing emphasis of the State's post-secondary educational structure through new program opportunities in technological education would raise fundamental and long-range policy planning issues, and could result in significant program redirection, and commitments of capital and operating funds; and

WHEREAS, Senate Bill No. .... of the 1973 legislative session will assign to the Council on Higher Education the responsibility of providing a state-wide mechanism for coordination and planning for technological education;

NOW, THEREFORE, BE IT RESOLVED, by the Senate, the House of Representatives concurring, That the Council on Higher Education is directed to continue the study of technological education, and specifically to submit recommendations concerning the following issues:

(1) Is there unmet need and demand for specific technology programs, particulary at the advanced levels in areas related to engineering?

(2) What should be the delivery systems for new or expanded technological programs?

(3) Are there innovative methods for providing educational opportunities in advanced technology that do not necessarily rely upon traditional educational programming, methods, and structures?

(4) As a part of the long-range post-secondary educational planning, what is the feasibility and educational desirability of having a single-purpose polytechnic institution as the focal point for educational programs in advanced technology?

(5) What are appropriate degrees for technology?

BE IT FURTHER RESOLVED, That the Council on Higher Education shall submit a final report by November 1, 1974, to the Joint Committee on Higher Education, and make interim reports as appropriate.

APPENDIX D-1

AN ACT Relating to the council on higher education; and adding new sections to chapter 277, Laws of 1969 ex. sess. and to chapter 28B.80 RCW.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF WASHINGTON:

NEW SECTION. Section 1. There is added to chapter 277, Laws of 1969 ex. sess. and to chapter 28B.80 RCW a new section to read as follows:

In addition to the functions delegated to the council by RCW 28B.80.030, the council is hereby specifically directed to be the clearinghouse for technological education, with responsibilities for compilation and distribution of information to support:

(1) Career guidance information of all programs and levels of technology;

(2) Assistance in curriculum development;

(3) Coordination of long-range technological planning; and

(4) Assistance in maximizing federal and other nonstate funding grants for program development in technology.

The council shall incorporate within its long-range planning consideration of the delivery systems of advanced technological programs, the need for new or additional programs, and their proper organizational location.

NEW SECTION. Sec. 2. There is added to chapter 277, Laws of 1969 ex. sess. and to chapter 28B.80 RCW a new section to read as follows:

A special advisory council on technological education shall be appointed by the council. It shall assist in the initial establishment and direction of the clearinghouse for technological

education and be available to provide consultation to the council in its continuing study thereof. Such advisory council should contain representation from industry and labor, as well as representation from the post secondary agencies conducting technological programs. In lieu of appointing the special advisory council as provided in this section, the council on higher education may designate the advisory council on vocational education to assume this additional responsibility.

MAKERS, Inc., Jan, 1972

Summar Recommendations

It is recommended that higher education, and technical and technological education in particular, should relate to and help the State in attaining its overall goals. Towards this end, the study recommends that the State define its long range goals and express them in a usable and relatable form.

- The State's education planning process should then relate the role of education in achieving these goals.

- There is a need for technical programs related to existing industries and situations, including aerospace, oceanography, social services, and government operation. But more importantly, the analysis illustrates the need and desirability for technical programs at all levels to relate to potential industries and situations in the State and to lead in the development of favorable trends.

- It is recommended that several educational modes be incorporated in a State-wide plan for technological education, and it indicates that such a plan should utilize four facets:
  1. short-term, non-degree programs in mobile or secondary use facilities;
  2. existing community colleges and vocational-technical institutes;
  3. existing four-year colleges;
  4. a new technological education/study center.

- The Legislature ought to clarify its attitude now by making a commitment to the necessity and ultimate implementation of a polytechnic institute--more precisely a technological education/study center.

- The study recommends that planning for a technological education/study center begin now, although actual implementation is not recommended before five years have elapsed.

- It is recommended that internship in real situations--industry, social service, government operations--should be encouraged as an integral aspect of formal education. These programs could be coordinated by some form of polytechnic institute.

- The study recommends that bachelor's of technology degrees be offered when it becomes widely recognized that these degrees reflect unique capabilities--a combination of technical skills with theoretical background and/or proficiency in secondary fields, such as business and communications. Otherwise, these capabilities should be achievable through other degree programs, such as bachelor's of arts or science in technology.

- It is recommended that the Legislature provide emphasis, funds, and direction to community colleges and vocational-technical institutes to strengthen programs needed to meet the short term and interim needs in these areas as identified in the study.

APPENDIX F

Joint Committee on Higher Education, Jan. 1971

SUMMARY OF RECOMMENDATIONS

The study was performed by Makers-Associated for the Joint Committee on Higher Education, and their recommendations in their report to the Legislature, The Feasibility of a Polytechnic Institute in Washington State are concurred in by the Joint Committee on Higher Education. A summary of the recommendations contained in the report are as follows:

1. Employment opportunities for individuals with technical skills will greatly increase over the next ten years.
2. The need for technically trained individuals will exceed the ability of the State's institutions of higher education to meet this need.
3. Community colleges and vocational-technical institutes are capable of meeting the State's needs for technically trained manpower for the next five or so years providing that appropriate direction and financial resources are made available to these institutions by the Legislature.
4. Evidence clearly indicates that the creation of a polytechnic institute is an appropriate solution to meet the State's need for technically trained manpower once the earlier lower level program needs have been satisfied by appropriately supported community colleges and vocational-technical institutes.
5. The Legislature should begin to plan now for the establishment of a polytechnic institute or similar form of institution in the mid-'70s.
6. Technical training should be regarded as a useful force in helping the State attain its overall goals. The study indicated that a polytechnic institute could assist the State in attaining those goals that relate to a stable and strong economy, to the full utilization of its natural and human resources and to the quality of life desired by its citizens.
7. The State should act to clearly establish its overall goals and planning for the establishment of a polytechnic institute should be related to those goals. The form and function of the polytechnic institute should be far more dependent upon the achievement of goals than upon the solution of existing or emerging problems.
8. Technical training should be considered as an integral part of the total educational system in the State. Present organizational arrangements for the coordination and delivery of all educational services in the State are in need of study and, ultimately, revision.

APPENDIX G

TASK FORCE 108 MEMBERSHIP

Representative Carlton Gladder Task Force Co-Chairman	Joint Committee on Higher Education
Senator Gordon Sandison Task Force Co-Chairman	Joint Committee on Higher Education
Jim Bricker Executive Secretary	Joint Committee on Higher Education
Anne Winchester Deputy Coordinator	Council on Higher Education
Richard Moe Education Program Director	State Board for Community College Education
Robert Putman Executive Director	Advisory Council on Vocational Education
Frank Wimer Director-Programming Planning and Research	Coordinating Council for Occupationl Education
Dr. James Brooks, President Central Washington State College	Council of Presidents
Dr. David B. Story, President Lower Columbia College	Washington Association of Community Colleges
Bruce Brennan, Admin. Director L. H. Bates Vocational-Technical Institue	Washington Council of Area Vocational-Technical Institutes

Council on Higher Education

28B.80.030 Functions generally. The council may perform any of the following functions:

(1) Engage in overall planning for higher education in the state, which shall include the collection and analysis of necessary data from public, and where appropriate private institutions of higher education. The purpose shall be to:

(a) assess and define the educational needs of the state to be served by higher education;

(b) recommend and coordinate studies to ascertain how defined educational needs are being met;

(c) study and make recommendations concerning adult education, continuing education and public service programs;

(d) identify priorities among the defined needs and specify the resources necessary to meet them;

(e) differentiate roles of the community college system and the individual public institutions and identify the most effective division of responsibility among them in meeting defined needs. To facilitate this, review and recommend the creation of all new degrees and recommend which institutions shall award them; and evaluate proposals for the elimination of existing degrees. Identify changing conditions which may require the revision of these roles and division of responsibility of the institutions.

(2) In the execution of the above planning responsibilities, develop criteria for the need for new baccalaureate institutions; and recommend the establishment, location and role of any new public baccalaureate granting institutions, and review the plans for the community college system in terms of their articulation with planning for higher education in the state.

(3) Study levels of fees and charges to students and, when necessary, make recommendations to the institutions, legislature, and governor.

(4) Study and make recommendations concerning admission and transfer policies.

(5) Review individual institutional operating budget requests to determine the conformity or lack thereof to the state's higher education plan: *Provided,* That its review of community colleges be limited to the plan prepared by the state board for community college education.

(6) Review the individual institutional capital budget requests to determine their conformity or lack thereof to the state's higher education plan: *Provided,* That its review of community colleges be limited to the plan prepared by the state board for community college education.

(7) Study and make recommendations for the development of improved practices of administrative management in order to facilitate the most efficient operation of the public institutions and the avoidance of unnecessary duplication among the institutions.

(8) At the request of the governor, legislature, state board for community college education, or baccalaureate granting institutions of higher education, and in conjunction with such legislative interim committee on higher education as may be in existence, study and make recommendations regarding legislation affecting higher education. [1969 1st ex.s. c 277 § 3. Formerly RCW 28.89.030.]

BACHELOR OF TECHNOLOGY PROGRAM IN THE STATE OF WASHINGTON

A position report of the Washington Council on Engineering and Related Technical Education on the expansion of technical education programs in the State of Washington.

The Washington Council on Engineering and Related Technical Education (WCERTE) is a voluntary organization of post-secondary institutions within the State of Washington who are involved with some portion of the total spectrum of engineering and engineering-related technical education. The organization has as one of its purposes to provide an organization under whose auspices problems which are related to engineering education can be studied and recommendations made.

In line with this purpose, a Bachelor of Technology Task Group of WCERTE was established. The formation of this task group was triggered primarily by House Resolution 69-127 (and later SR 71-108) requesting a feasibility study of establishing a polytechnic institute in the State of Washington.

Early deliberations confirmed the task groups feelings that it could best accomplish its task by reviewing two comprehensive studies that were currently being conducted. One was a contractual study by Makers Associated for the Joint Committee on Higher Education of the Washington State Legislature and the other is a major national study by a special committee of the American Society of Engineering Education (ASEE) and funded by the National Science Foundation. The Maker's Study has been completed and their report, "The Feasibility of a Polytechnic Institute in Washington State," has been submitted to the Legislature. The ASEE study is also complete and was published in the January, 1972 issue of Engineering Education.

The task group worked closely with Makers Associated in their study and utilized the material developed by the ASEE study. Several meetings of the task group were held, resulting in a report that was presented at the annual WCERTE meeting in December, 1971. After further revisions and editing, the following recommendations were accepted unanimously by the WCERTE members present at that December meeting:

1. The need for technicians with two-year associate degrees has been clearly demonstrated. They have been accepted by industry and have a clearly defined position in the technological spectrum. Many of the community colleges in the State of Washington have developed or are developing sound associate degree technician programs. Although present demands are low due to the depressed economic conditions, all studies indicate a significant future demand for people with this educational background. We, therefore, recommend that existing and developing programs in this category be strongly supported. We further recommend that all institutions offering such programs move strongly toward ECPD accreditation.

2. The three state colleges, Central, Eastern, and Western are presently offering baccalaureate programs with a major in industrial technology. These programs have developed from the industrial arts programs and emphasize the production and management aspects of industry. They are well established nationally as part of the technical education offerings. There appears to be a need for these programs and continued support should be offered. Although the program is not engineering based, graduates frequently work in engineering related positions. We recommend continuation and expansion of the liaison and communications that have developed between the institutions offering these programs and those offering other forms of technical education.

3. Baccalaureate programs in engineering technology are not presently offered in the State of Washington. They are a relatively new phenomenon and although these programs are expanding rapidly on the national scene there are still too few graduates to properly identify their proper place in industry and the potential need. The identification of this need is further complicated by the currently depressed economy. National studies report a significant future need but it must be emphasized that this is based on qualitative judgment of future industry utilization. In spite of this, it appears that the Bachelor of Technology program is becoming well established nationally and eventually the State of Washington will need to offer such programs. One institution in the State has expressed an interest in offering such a program when the need is demonstrated. Our task group does not, however, recommend the offering of such programs until the need and character is more definitely established.

4. The immediate need for a polytechnic institute in the State of Washington is not clearly established and the present economic climate does not encourage the development and construction of a new educational institution in the traditional sense. The Maker's report recommends, however, and our task group concurs, that planning begin now for the development of a publicly-funded technological education study center. Parameters for this center include industry, government, and education inputs. The center should be concerned with subdegree, nondegree, and degree-oriented programs on both a resident and non-resident basis. The center should also be concerned with utilizing existing educational resources in the most beneficial way through a variety of new approaches.

   An early function of this center, working with the Council on Higher Education, would be a detailed analysis of program resources in the State's public and private institutions. The center could then assist in the coordination of existing programs and recommend modifications and development of programs to meet additional demands as defined by inputs from educational and noneducational sources. This center could contract with students for programs to be carried out wherever educational opportunities exist. This idea is not new and variations of this proposal are being developed in other states and countries.

5. The most pressing immediate need in the State of Washington is a broader more accessible range of technical educational opportunities. This need is manifest in the case of the associate degree technicians by a desire to obtain the baccalaureate degree. In some cases this desire is the result of a genuine need for more education in a specific area but unfortunately in many others it is merely the result of current social and industry pressure to obtain the baccalaureate (many companies are reluctant to promote or hire above a certain position without a B.A. or B.S.).

   With our present rigid institutional degree structure it is mandatory that a baccalaureate-degree-seeking student attend one of our existing institutions on a resident basis. At the present time, many associate degree graduates are going out of the State or to one of the state colleges. Neither path has been satisfactory; expense and inconvenience in the first case and difficulty in establishing transfer credits in the second.

   Recognizing that costly new institutions such as a polytechnic are not going to be built in the near future and that efficient and innovative use of our present educational resources may preclude the need for new institutions of a traditional type, the task group recommends the immediate establishment of a state technological education/study center mentioned in No. 4 above. The task group does not expect the social pressures for the "college degree" will be materially reduced in the near future. Hopefully, however, the ready accessibility of viable educational programs when needed will reduce this pressure.

6. Finally, the task group recommends that the Council on Higher Education be further apprised of FCERTE with the view toward seeking official recognition as the spokesman for professionals in engineering and technical education in the State of Washington.

APPENDIX J-1

SUMMARY

RECRUITMENT OF WASHINGTON RESIDENTS TO

OREGON TECHNICAL INSTITUTE

Number of Responses -- 60
Number Inapplicable Because Not Washington Residents -- 7

1. Reason For Choosing Oregon Technical Institute	#
a. Only institution in Northwest offering 4-year technology degree	22
b. "Block transfer" of community college credits	16
c. Closest technical college to Washington	12
d. Reputation for excellence	11
e. Availability of desired program	11
f. High percentage of job placement	3
g. Small college, student - teacher ratio small	3
h. Management orientation	1
i. Quality of equipment in the classrooms	1
j. Other	3

2. Where Learned of Oregon Technical Institute?	
a. Community college	3
a_1. Instructor	14
a_2. Counselor/adviser	8
b. Oregon Technical Institute recruiter	14
c. Friends/other students	12
d. Brochures	3
e. Military	2
f. Prospective employer	2
g. Other	4

APPENDIX J-2

3. Major Field	Questionnaire No. per Dept. Lower	Upper	Total	Actual Enrollment per Dept. Lower	Upper	Total
a. Accounting Technology	1	-	1	2	-	2
b. Automotive Technology	1	4	5	1	13	14
c. Dental Assistant	0	-	0	1	-	2
d. Diesel Technology	5	0	5	12	1	13
e. Electronics Engineering Technology	0	12	12	4	25	29
f. Electro-Mechanical Engineering Technology	4	3	7	9	4	13
g. Engineering Drafting Technology	1	0	1	1	1	2
h. Highway Engineering Technology	0	2	2	0	4	4
i. Machining Processes Technology	0	-	0	1	-	1
j. Mechanical Engineering Technology	1	9	10	3	14	17
k. Medical Radiologic Technology	1	-	1	2	-	2
l. Small Arms Processes Technology	1	-	1	1	-	1
m. Structural Engineering Technology	0	6	6	0	7	7
n. Surveying Engineering Technology	0	1	1	0	1	1
o. Unclassified	0	-	0	4	-	4
p. Associate Degree Nursing	0	-	0	1	-	1
q. Medical Laboratory Technical	-	0	0	-	1	1
r. Unable to Classify	0	0	0	0	1	1

4.

Questionnaire:
Lower Division 13 Upper Division 40

Actual:
Lower Division 42 Upper Division 71

APPENDIX K-1

	Bellevue	Big Bend	Centralia/CVTI	Clark	Columbia Basin	Edmonds/Everett		Fort Steilacoom	Grays Harbor	Green River	Highline	Lower Columbia	Olympic	Peninsula	Seattle	Shoreline	Skagit Valley	Spokane	Tacoma	Walla Walla	Wenatchee Valley	Yakima
1.02.99 Animal Tech.			** 47/22					59/21														
01.07.00 Forestry Tech.			47/22			189/14				51/18		50/20		57/16		43/7				75/15		
TOTAL 01. - 571/133			47/22			189/14		59/21		51/18		50/20		57/16		43/7				75/15		
07.01.03 Dental Lab. Tech.															38/16							
07.02.00 Medical Lab Tech.																67/10				36/15		
07.02.03 Biological Lab. Te																11/3						
07.05.01 Radiologic Tech.	64/9																		19/0	31/15		38/11
TOTAL 07. - 64/9															33/16	78/13			19/0	67/35		38/11
14.02.03 Data Proc. 115/228		11/8	91/41	50/14	39/12	44/25		62/14	37/12		115/17	42/13	93/19		172/38				18/5			39/19
ENGINEERING RELATED																						
16.01.00 Engineering Tech.					25/14	105/15							64/15	22/9								36/7
16.01.06 Civil Engr. Tech	28/0		48/13	41/0				13/0		34/6	22/6						22/10	26/9	29/5		35/7	
16.01.13 Mechanical Engr.				10/6						11/8	31/5	21/9				9/2						28/7
TOTAL ENGINEERING 627/167	28/0		48/13	51/6	25/14	105/15		13/0		45/14	53/11	21/9	64/15	22/9		31/12	26/9	29/5				28/7

** 47 = enrollment
22 = completions

State Board for Community College Education, October, 1972

	Bellevue	Big Bend	Centralia /OVTI	Clark	Columbia Basin	Edmonds /Everett		Fort Steilacoom	Grays Harbor	Green River	Highline	Lower Columbia	Olympic	Peninsula	Seattle	Shoreline	Skagit Valley	Spokane	Tacoma	Walla Walla	Wenatchee Valley	Whatcom	Yakima
16.01.05 Chemical Tech.															35 0	2 1							
16.01.07 Electrical Power															15 0								
16.01.08 Electronics			52 13	37 15	41 7	120 21			32 3	55 20		33 8			100 19	122 20	139 46	190 42			15 3		37 9
16.01.09 Electromechanical																		16 9					
16.01.10 Environmental Tech.																6							
16.01.11 Industrial Tech.																	155 20	57 16					
Marine Biology																32 6							
Oceanography																50 6							
TOTAL 16. - 1394 284			52 13	37 15	41 7	120 21			32 3	55 20		33 8			150 19	212 33	344 66	263 67			18 3		37 9
17.13.00 Drafting 247 70				10 0						58 10					60 9	35 12		84 39					
GRAND TOTAL - 3958 941	92 9	11 8	238 89	148 38	105 33	458 75		134 35	69 15	211 60	168 28	146 50	162 34	69 25	420 82	399 77	376 75	376 111	37 5	38 7	60 48		147 37

APPENDIX L

VOCATIONAL TECHNICAL INSTITUTE TECHNICIANS PREPARATORY PROGRAMS

Job Title	1970 Enrollment (First Year)	1970 Completions
Data Processing	282	130
Architectural Technician	174	6
Civil Engineering Technician	357	44
Electronics Technician	606	99
Electrical Engineering Technician	87	20
Mechanical Engineering Technician	76	23
Industrial Engineering Technician	21	4
Industrial Electronics	387	89

Coordinating Council for Occupation Education, January, 1973