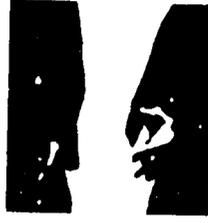
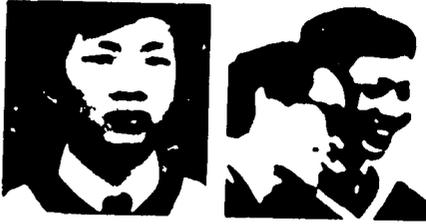


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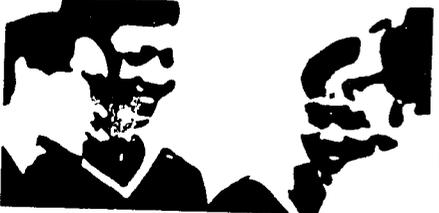
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# ASIAN INSTITUTE OF TECHNOLOGY

## TRACER STUDY AND EMPLOYER SURVEY



## PREFACE

Each year the Overseas Development Administration (ODA) commissions a number of ex-post evaluation studies with two aims in mind; firstly, to assess the effectiveness of its aid activities and secondly, to learn lessons for improving the effectiveness of future aid activities.

This evaluation is one such study.

Evaluation studies are undertaken by individuals or by teams especially recruited for their particular knowledge with regard to the subject under study. Sometimes these teams will include personnel from ODA (increasingly teams are a mix of ODA and external personnel).

In all cases the reports and conclusions are attributable to the authors, who are finally responsible for their contents, and not to ODA.

Evaluation Unit  
Manpower and Evaluation Department

**Asian Institute of Technology**

**ALUMNI TRACER STUDY  
AND  
EMPLOYER SURVEY**

**A report prepared for the Ministry of Overseas Development, London,  
by W.P.J. Brandon, Academic Secretary, Asian Institute of Technology.**

## PREFACE

This tracer study and survey of employers has been undertaken at the request of the Ministry of Overseas Development, London, which is responsible for administering British aid to AIT. The Ministry provided a generous research grant for the study and gave some initial guidance but has not otherwise participated in the work. The responsibility for this report, for the information it contains and for all opinions expressed, unless clearly attributed, rests solely with me.

I have been assisted principally by Mr Chackapong Wongwan, who wrote most of the computer programs, by the staff in AIT's Regional Computer Center, by Miss Amphai Areephongsa, clerical assistant for the project, and by my very capable Secretary, Mrs Werawan Seniwong. I am grateful to them all.

Bill Brandon

May 1978

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## THE ASIAN INSTITUTE OF TECHNOLOGY

The Asian Institute of Technology is an autonomous, international, post-graduate institute, providing advanced education in engineering, science and allied fields through:

- i) *academic programs* leading to the degrees of Master of Engineering, Master of Science, Doctor of Engineering, Doctor of Technical Science, and the Diploma;
- ii) *research activities* by faculty and students directed towards the solution of technological problems to improve the quality of life in Asia;
- iii) *special programs* comprising of conferences, seminars and short in-service training courses.

Since its establishment in 1959, the Institute's main emphasis has been on the Master's degree program; 95% of degrees awarded in the period 1959-1977 have been at this level.

Degree programs are offered in seven academic Divisions.

Agricultural & Food Engineering  
Environmental Engineering  
Geotechnical & Transportation Engineering  
Human Settlements Development  
Industrial Engineering & Management  
Structural Engineering & Construction  
Water Resources Engineering

Students are admitted from all the countries of Asia. In January 1978, 437 students were enrolled from 20 countries. The largest groups being from:

Thailand	21.5%
Bangladesh	12.4%
Sri Lanka	11.4%
Rep. of China	10.3%
Philippines	9.4%
Pakistan	8.4%
India	7.0%
Indonesia	5.9%
Malaysia	4.1%

All teaching is conducted in English, and the Faculty is recruited internationally (from some twenty countries at present).

The underlying purpose of the Institute is to train engineers and planners in the way that will best fit them to work in fields that are important for

the social and economic development of their home countries. As far as possible, the academic programs are orientated towards the study of the major problems facing the developing countries of Asia.

Although it is located and chartered in Thailand, AIT is not subject to control by the Royal Thai Government. It does, however, benefit from the generous support of the Thai Government, as it does from many other governments - from some within Asia, as far as they are able, and from many outside Asia. The Institute is also supported financially by foundations, businesses, industries and individuals.

The Asian Institute of Technology is genuinely international -- in its student body, in its Faculty, in the variety of sources from which it receives support, and in the wide range of countries in which its alumni are working.

For more information, please write to the Academic Secretary, Asian Institute of Technology, P.O. Box 2754, Bangkok, Thailand.

# 1 PURPOSES AND METHODS

## 1.1 Purposes

This study had the following primary objectives:

- i) to gather information about the whereabouts and employment of students who have graduated from AIT and its forerunner, the SEATO Graduate School of Engineering.
- ii) to make an assessment of the appropriateness of AIT's programs of study as a training for the different kinds of employment actually followed by the Institute's alumni.
- iii) to obtain the views of employers in the region on the qualities they seek when recruiting technically qualified professional staff and on the training given by AIT.
- iv) to establish permanent computer based alumni records which would enable subsequent studies to be made more easily.

## 1.2 Methods

1.2.1 A questionnaire was sent to all AIT alumni who graduated between 1961 and December 1976 asking for information about their present employment, the additional academic qualifications they have obtained and about their attitudes towards their program of study at AIT.

1.2.2 A questionnaire was also sent to employers of AIT alumni to obtain their views on the kind of training given at AIT. In addition, interviews were conducted with more than fifty employers in eight countries and meetings were held with groups of alumni.

## 1.3 Cohorts

For the purpose of analysis, respondents to the alumni questionnaire have been divided into the following cohorts

Cohort	Year of Graduation
A	1961 - 1966
B	1967 - 1969
C	1970 - 1972
D	1973 - 1974
E	1975 - 1976

## 2. RESPONSE TO QUESTIONNAIRES

### 2.1 Alumni Questionnaire

2.1.1 832 alumni responded to the questionnaire, with the following representation from each cohort:

TABLE 1 - ALUMNI RESPONSE, BY YEAR OF GRADUATION

Cohort	Years of graduation	Total alumni in cohort period	Number responding	Respondents as a percentage of the cohort
A	1961-66	150	84	56
B	1967-69	128	79	62
C	1970-72	263	165	67
D	1973-74	255	200	78
E	1975-76	378	304	80
Total	1961-1976	1,173	832	71

- Notes:
- i) Alumni who have obtained a doctoral degree from AIT as well as the Master's degree have been counted only in the cohort appropriate to their doctoral degree.
  - ii) Cohorts D and E (1973-76) constitute approximately 54% of the total body of alumni up to 1976. 60% of the respondents graduated in these cohorts.

2.1.2 The response according to home country was as follows:

TABLE 2 - ALUMNI RESPONSE, BY HOME COUNTRY

Home Country	No. of respondents	% of total alumni from the country	% of total respondents
Afghanistan	3	75.0	0.4
Bangladesh	34	56.7	4.1
Brunei	2	100	0.24
Burma	1	100	0.12
Canada	1	100	0.12
Hong Kong	33	100	4.0
India	40	71.4	4.8
Indonesia	21	84.0	2.5
Iran	21	75.0	0.4
Japan	3	100	0.4
Khmer Rep.	1	33.3	0.1
Korea	8	66.7	0.96
Macao	3	100	0.4
Malaysia	44	80.0	5.3
Nepal	4	66.7	0.5
Pakistan	67	66.0	8.1
Philippines	93	75.0	11.2
Rep. of China	149	70.0	18.0
Singapore	8	100	0.96
Sri Lanka	10	66.7	1.2
Tanzania	1	100	0.12
Thailand	281	68.7	33.8
Turkey	4	80.0	0.5
U.K.	1	50.0	0.12
U.S.A.	1	100	0.12
Vietnam	16	66.7	1.9

## 2.2 Response to Employer Questionnaire

2.2.1 The employer questionnaire was sent to employers named by respondents to the alumni questionnaire, regardless of the number of AIT graduates employed. Very few questionnaires were returned by educational institutions and the "employer section" of this report is, therefore, devoted entirely to the views of employers outside education. However, comments from employers in education are included in appendix 2.

2.2.2 Excluding educational institutions, 107 organizations in 12 countries returned the employer questionnaire.

TABLE 3 - EMPLOYER RESPONSE

Country	No. of respondents	
	Government	Private
Afghanistan	1	-
Bangladesh	4	-
Hong Kong	2	5
India	3	1
Indonesia	1	-
Malaysia	-	7
Pakistan	3	5
Philippines	7	7
Republic of China	13	16
Singapore	2	11
Sri Lanka	1	-
Thailand	8	10
<b>Total</b>	<b>45</b>	<b>62</b>

2.2.3 45 of the responding organizations are government organizations and 62 are private:

government	42%
private	58%

2.2.4 The response rate of the government sector was much higher than that of the private sector.

2.2.5 63 (59%) of the responding organizations are concerned with civil engineering activities:

TABLE 4 - EMPLOYER RESPONSE, BY ACTIVITY

Activity	No. of respondents
Banking & finance	2
Civil engineering	63
Manufacturing (including petroleum industry)	17
Planning	12
Business management	7
Trading	2
Other	4
<b>Total</b>	<b>107</b>

### 3. THE AIT STUDENT BODY

#### 3.1 Age of AIT Students

3.1.1 The average age at entry and graduation of respondents in each cohort was as follows:

TABLE 5 - AGE AT ENTRY AND AT GRADUATION

Cohort	Average age at entry to AIT	Average age at graduation
	years/month	years/month
A	25/5	27/1
B	24/8	26/4
C	25/3	26/11
D	25/3	26/11
E	25/11*	27/7*

\*A separate study of all alumni (not just respondents) in cohort E was also made, and this shows that the average age of the *whole cohort* was three months lower than that for the respondents alone.

3.1.2 An analysis of average age according to nationality indicates some differences between countries. Those from which the larger national groups in the sample were drawn are shown below:

TABLE 6 - AGE AT GRADUATION, BY HOME COUNTRY, FOR LARGER NATIONAL GROUPS

Home Country	Average age of cohort at graduation			Comparison with average of whole sample
	C Yrs/Mths	D Yrs/Mths	E Yrs/Mths	
Bangladesh	25/11	24/6	27/4	younger
Hong Kong	26/2	26/0	26/6	younger
India	26/6	27/9	27/1	similar
Indonesia	29/0	28/9	30/9	older
Malaysia	27/7	26/4	26/1	recently younger
Pakistan	25/8	26/7	27/8	similar
Philippines	25/0	25/8	26/0	younger
Rep. of China	29/9	28/7	29/7	older
Thailand	25/8	25/7	26/3	younger
Whole sample	26/11	26/11	27/7	

3.1.3 A more detailed analysis of ages at entry of cohort E (all members, not just respondents) is given below, together with corresponding figures for the entries in August 1977 and January 1978. (To explain the column headings -- if the "highest age in the first quartile" is 24 years, this means that one quarter of the sample is 24 years old or younger, and that the remaining three quarters of the sample is at least 24 years old.

TABLE 7 - AGE ANALYSIS BY QUANTILES FOR COHORT E AND 1977/78 ENTRANTS

	Highest age in first quartile (years)		Highest age in second quartile (years)		Highest age in third quartile (years)		Average age (years/months)	
	Cohort E 1977/78		Cohort E 1977/78		Cohort E 1977/78		Cohort E 1977/78	
Agricultural & Food Eng.	22	24	22	25	26	27	25/0	26/2
Environmental Eng.	23	23	24	25	25	28	25/0	26/0
Geotechnical & Transportation Eng.	23	25	25	26	27	29	26/0	27/9
Human Settlements Development	24	26	26	27	28	28	26/9	27/6
Industrial Eng. & Management	22	23	23	25	26	27	24/9	25/6
Structural Eng. & Construction	23	24	24	25	26	27	25/6	25/9
Water Resources Eng.	24	25	25	26	27	29	26/3	27/6
All students	23	24	24	26	27	28	25/8	26/9

3.1.4 The average age of students at AIT has varied, but not greatly, in the period covered by this study. The indications are that it is now rising.

3.1.5 An examination of average age by academic Division shows that students tend to be younger in the Divisions of

Agricultural & Food Engineering  
 Environmental Engineering  
 Industrial Engineering & Management  
 Structural Engineering & Management

and relatively older in the Divisions of

Geotechnical & Transportation Engineering  
 Human Settlements Development  
 Water Resources Engineering

### 3.2 Interval Between the Bachelor's Degree and Entry to the Master's Program

3.2.1 An opinion expressed by many employers (see 5.2) is that it is generally beneficial for a student to gain professional experience between completing the Bachelor's degree and entering a Master's degree program. Clearly it would be interesting to know how many AIT students do gain significant professional experience before entering the Institute. Unfortunately, the data required to answer this question for the alumni groups under study is not available. However, it has been possible to examine the interval between completion of the Bachelor's degree and entry to AIT for all students who entered the Master's program in either August 1977 or January 1978. The results are given in the following table.

TABLE 8 - INTERVAL BETWEEN COMPLETION OF BACHELOR'S DEGREE  
AND ENTRY TO AIT'S MASTER'S PROGRAM - ENTRANTS  
IN AUGUST 1977 AND JANUARY 1978

	No. of Entrants	% of Entrants with Interval of				Average Interval yrs/months
		0-12 months	13-24 months	25-36 months	37 or more months	
Agricultural & Food Eng.	32	28.1	21.9	12.5	37.5	2/10
Environmental Eng.	24	33.3	29.2	-	37.5	2/8
Geotechnical & Transportation Eng.	39	23.1	20.5	7.7	48.7	3/10
Human Settlements Development	24	16.7	16.7	12.5	54.1	3/11
Industrial Eng. & Management	21	28.6	28.6	19.0	23.8	2/7
Structural Eng. & Construction	36	36.1	25.0	11.1	27.8	2/6
Water Resources Eng.	37	8.1	24.3	27.0	40.6	3/5
Total sample	213	24.4	23.5	13.1	39.0	3/2

Approximately one quarter of this entry group had no more than one year's interval before coming to AIT and most of that 25 percent came more or less straight from the Bachelor's program. Slightly more than half of the entry group had two years or longer between degree programs and, therefore, had the opportunity to gain useful professional experience.

3.2.2 The response to the questionnaire shows that the proportion of entrants to AIT who were students immediately prior to entry has declined:

Cohort	% who were students prior to entry
A	23
B	33
C	25
D	18
E	15

3.2.3 A substantial majority in each cohort was in employment (permanent or temporary) prior to entering AIT:

Cohort	% in employment
A	76
B	66
C	72
D	77
E	81

Their distribution between different types of employment is shown in the following table.

TABLE 9 - EMPLOYMENT PRIOR TO ENTERING AIT

COHORT	OF THOSE EMPLOYED		
	% in education	% in government and other non-profit organization	% in private sector
A	12	3	85
B	27	10	63
C	20	10	70
D	30	7	63
E	28	5	67

Note: of those employed before coming to AIT, a significant percentage returned to their former employer after graduating:

	No. returning	% of employed group	% of cohort
A	33	52	22
B	19	37	15
C	52	44	20
D	67	43	26
E	111	45	29

## 4. TRACER STUDY

### 4.1 Doctoral Degree and Continuation of Formal Study

- 4.1.1 20 respondents had obtained a doctoral degree at AIT. A further 49 respondents had obtained a doctoral degree after leaving AIT. 69 respondents are, therefore, now qualified with a doctoral degree (8.3% of total respondents).
- 4.1.2 A further 47 respondents were working for a doctoral degree at the time of the study, 13 of them at AIT. It can be expected, therefore, that eventually 14% of the total respondents will have a doctoral qualification.
- 4.1.3 The respondents who had obtained or were working for their doctoral degree elsewhere than at AIT had studied, or were still studying, in the following countries:

<u>Country</u>	<u>No. of respondents</u>
U.S.A.	50
U.K.	11
Australia	9
Canada	5

- 4.1.4 The percentage of each cohort continuing with formal academic study of all kinds *since leaving AIT* is largest in cohort A and declines steadily through to cohort E:

	Number	% of cohort
A	33	39.3
B	22	27.9
C	32	19.4
D	30	15.0
E	23	7.5

This decline is presumably due partly to the introduction of the doctoral degree program at AIT.

### 4.2 First Professional Employment

- 4.2.1 A large proportion of those employed before coming to AIT return to their former employers. See the note to TABLE 9.
- 4.2.2 Of those respondents who entered employment immediately after graduation, 84% took up first jobs in their own country. All of the Thais in this group took up a first job in Thailand, 43 (8.6%) of the non-Thai respondents in the group had a first job in Thailand (in most cases as Research Associates at AIT); 27 (5.4%) of the non-Thai respondents in this group found their first employment in Singapore.

An analysis according to home country for the larger national groups gives the following:

TABLE 10 - COUNTRY OF FIRST EMPLOYMENT

Home country	Respondents taking up employment immediately after graduation	% employed in home country	% employed elsewhere
Bangladesh	30	56.7	43.3
Hong Kong	31	74.2	25.8
India	33	60.6	39.4
Indonesia	20	90.0	10.0
Korea	8	100	-
Malaysia	40	63.0	37.0
Pakistan	62	72.6	27.4
Philippines	87	85.1	14.9
Rep. of China	138	87.7	12.3
Singapore	7	100	-
Sri Lanka	7	29.0	71.0
Thailand	238	99.5	0.5
Others	35	65.7	34.3
Total	736	84.2	15.8

#### 4.3 Present Employment

##### 4.3.1 Employment Sector

778 respondents (93.5%) indicated that they were presently employed (this figure includes those who were concurrently working for a doctoral degree). Their distribution between different employment sectors is as follows.

Education	23.3%
Government and other non-profit organizations	11.9%
Private sector	64.8%

An analysis of employment sectors according to the respondents' areas of study at AIT provides the following:

TABLE 11 - EMPLOYMENT SECTORS, BY AREA OF STUDY

Area of Study at AIT	No. of respondents	Employment Sector		
		Education %	Government and other non-profit %	Private %
Agricultural Eng.	16	70	6	24
Environmental Eng.	103	20	18	62
Geotechnical Eng.	99	14	14	72
Human Settlements	37	32	24	54
Industrial Eng.	67	15	-	85
Structural Eng.	165	30	12	58
Systems Eng.	35	23	9	68
Transportation	81	14	8	78
Water Resources	175	26	14	60
All respondents	778	23	12	65

4.3.2 An analysis of employment sectors according to the country of employment is given below (for those countries in which 10 or more alumni are employed).

TABLE 12 - EMPLOYMENT SECTORS, BY COUNTRY OF EMPLOYMENT

Country	Total no. of employed	Education %	Government & other non-profit %	Private sector %
Bangladesh	12	33	-	67
Hong Kong	27	4	33	63
India	20	25	10	65
Indonesia	20	40	-	60
Malaysia	36	22	6	72
Pakistan	36	17	19	64
Philippines	72	21	12	67
Rep. of China	127	9	17	74
Saudi Arabia	12	-	50	50
Singapore	40	15	25	60
Thailand	256	27	7	66
U.S.A.	37	27	8	65
All respondents	778	23	12	65

#### 4.3.3 Relevance of Field of Study to Current Employment

Respondents were asked about the relevance of their field of study at AIT to their present employment. They were also asked whether there was any other area of science or technology which was *more* relevant than the one they had studied at AIT. The responses show a very similar pattern for each cohort.

TABLE 13 - RELEVANCE OF FIELD OF STUDY TO EMPLOYMENT

Part (i)			Part (ii)	
Cohort	AIT field of study is relevant to current employment		AIT field of study is relevant to current employment but another area of science or technology is <i>more</i> relevant	
	Number	% of those in employment	Number	% of those in employment
A	71	86	25	30
B	68	87	20	26
C	134	85	40	25
D	167	89	53	28
E	239	87	78	29

Part (iii)		
Cohort	AIT field of study is <i>not relevant</i> to current employment or is <i>less relevant</i> than another area of science or technology	
	Number	% of those in employment
A	34	41
B	30	38
C	63	40
D	73	39
E	112	41

Part (iii) of this table shows that 40% of AIT alumni in employment are substantially engaged in professional activities which do not relate closely to their field of study at AIT. This is perhaps not surprising in view of the fact that 80% of the respondents in employment graduated from AIT in fields within the broad area of civil engineering. Many would seek employment within civil engineering in general and not necessarily in the more limited area of their specialism.

#### 4.3.4 Usefulness of AIT Program in Professional Career

Another question asked which parts of the respondent's program at AIT had been useful to him in his professional career (i.e. his career as a whole, not just his present job). The replies given were as follows:

TABLE 14 - USEFULNESS OF ACADEMIC PROGRAM IN CAREER

	No. of respondents	Assessment		
		Very Useful %	Useful %	Not Useful %
Courses in main specialism	767	66	31	3
Courses outside main specialism	637	13	75	12
Courses in computing	600	26	57	17
Courses in English language	500	32	56	12
Thesis or project research	731	36	48	16

#### 4.3.5 Work Content

Respondents in employment were asked "approximately what percentage of your working time is spent on the following activities?..."

1. technical work (research, design, planning, supervision, inspection, etc.);
2. teaching in science or technology;
3. teaching in other subjects;
4. personnel management;
5. financial management;
6. general management;
7. client relations,
8. other."

The purpose of the question was to discover how soon an AIT graduate is likely to become involved in non-technical, management functions. An analysis of replies, shows that 2 of those in *non-educational* employment spend *less* than 50% of their working time in technical work:

TABLE 15 - TECHNICAL WORK AND MANAGEMENT FUNCTIONS

## Part (i)

Cohort	Spend less than 50% of working time in technical work	
	Number	%
A	25	37
B	11	18
C	30	25
D	26	19
E	35	18

## Part (ii)

Cohort	Spend at least 33% of working time in management functions	
	Number	%
A	37	54
B	27	43
C	35	29
D	44	32
E	54	27

With the exception of the response from cohort B alumni on the proportion of time spent on technical work (part (i) above), these responses indicate, as most people would expect, that the older alumni are generally less involved in technical work and more in managerial work than the younger alumni. They also demonstrate that many AIT alumni take on managerial duties quite soon after graduating.

#### 4.3.6 Report Writing and Use of English

Respondents were asked, "Is the ability to write reports important in your job?". The answers indicate that it is important in most cases.

TABLE 16 - REPORT WRITING

Cohort	% of those in employment who find report writing important in their job
A	81
B	82
C	76
D	85
E	86
All cohorts	83

Respondents were asked about the frequency ("frequently", "sometimes" or "never") with which they used the English language (in reading, writing, or speaking) in their present job. The replies were analysed according to the countries in which the respondents were working (33 countries).

In 22 countries, at least 75% of the respondents reported that they use English frequently in reading, writing and speaking. This consistency was not apparent in the remaining 11 countries, for which details are given in TABLE 17.

TABLE 17 - USE OF ENGLISH IN EMPLOYMENT (SELECTED COUNTRIES)

Country	No. of respondents	% responding "frequently" for -		
		reading English	writing English	speaking English
Hong Kong	27	100	88.9	63.0
Indonesia	20	75	30.0	25.0
Iran	5	100	60.0	100.0
Japan	3	66.7	66.7	0.0
Korea	8	87.5	50.0	50.0
Nepal	3	33.3	66.7	66.7
Pakistan	37	100	100	73.0
Rep. of China	127	74.0	41.7	28.4
Thailand	265	75.8	46.2	36.4
Turkey	3	100	66.7	66.7
Vietnam	2	100	50.0	0.0

References to report writing and other communication skills are also made in sections 5.2, 5.5 and 5.7.5.

#### 4.3.7 Working Outside Home Country

A total of 158 respondents (19.4% of those working) were working outside their home countries. Of these 45 had compelling reasons for not currently working in their home country:

	Number
1. On secondment by home government or in overseas office of home-based firm	8
2. Pursuing further studies and working (often as research assistants) to support themselves	18
3. Unable or unwilling to return to home country because of political situation	6
4. Working in a regional or international organization (e.g. AIT, World Bank)	11
5. Home country is non-Asian but respondents choose to work in Asia.	2

If this group is discounted, the number counted as working in countries other than their home country reduces to 113. Of these, 57 are working in other Asian countries and 56 in non-Asian countries. The national 'brain drain' in the respondent group, if defined as *those working outside their own countries excluding those with a compelling reason for doing so* and then expressed as a percentage of *all those in employment*, is

$$\frac{113}{778} \times 100 = 14.5\%$$

The regional brain drain (i.e. loss to the region calculated on the same basis) is

$$\frac{56}{778} \times 100 = 7.2\%$$

The mixed motivations for working away from one's home country are best summed up by an alumnus in Singapore: "Better working conditions, job satisfaction, opportunity to apply advanced knowledge gathered at AIT, and good pay".

TABLE 18 - RESPONDENTS WORKING OUTSIDE THEIR HOME COUNTRY

Country of origin	Country of Employment																		Totals			
	Brunei	Hong Kong	Iran	Malaysia	Mauritius	R.O.C.	Singapore	Thailand	Algeria	Australia	Canada	Iraq	Kuwait	New Zealand	Nigeria	Saudi Arabia	U.A.Emirates	U.K.		U.S.A.	Yemen	
Bangladesh				5			4				1	2			1	1						14
Hong Kong							2	1			1											4
India				1	1		7			1			1			1				2		14
Indonesia						1																1
Macau		2																				2
Malaysia	1	1					9	1												1		14
Nepal							1															1
Pakistan				2			2		1	1		1			2	5	1	1	8	1		25
Philippines		1	1	3			2			1								1	8			19
Rep. of China							3			1				2				1	4			11
Sri Lanka		1					1															2
Thailand			1			1	1											1	3			7
Vietnam						1																1
Totals	1	5	2	11	1	3	32	2	1	5	2	3	1	2	3	7	1	4	26	1		113

57

56

#### 4.3.8 Unemployment

Respondents were asked whether they had been out of work for more than three months after recommencing their professional career after leaving AIT.

Fifteen respondents (1.8% of all respondents) have been genuinely unemployed for more than three months - i.e. not engaged in further full-time study or in some other purposeful activity (e.g. bearing children or entering the monkhood). The breakdown by home country is as follows:

Thailand	6
Republic of China	4
Bangladesh	2
Hong Kong	1
India	1
Pakistan	1

#### 4.4 Directory of Alumni

A Directory of AIT Alumni 1951-1976 is being published separately but constitutes an important addendum to this report. It is based largely on information obtained through the tracer study and shows for each alumnus:

1. Name and nationality
2. AIT degree and academic Division; degrees obtained since leaving AIT.
3. Present address
4. Job title and name of employing organization

A list of some of the positions held by AIT alumni is given in appendix 1, to illustrate the fields in which alumni are working.

## 5. EMPLOYER SURVEY

### 5.1 Proportion of Professional Staff with a Master's Degree

Respondents were asked to indicate how many staff they employ with a Bachelor's degree or higher, and how many of these have a Master's degree. An analysis by country shows that respondents from India have the highest proportion of staff qualified with a Master's degree, those from Indonesia have the lowest.

TABLE 19 - STAFF QUALIFIED WITH A MASTER'S DEGREE, BY COUNTRY

Country	No. of respondents	% of university qualified staff with a Master's degree
India	4	36
Afghanistan	1	25
Singapore	13	22
Thailand	18	21
Bangladesh	4	21
Pakistan	8	20
Malaysia	7	18
Rep. of China	29	18
Hong Kong	7	16
Philippines	14	10
Sri Lanka	1	8
Indonesia	1	3

The proportion is much the same in the government sector as in the private sector:

Government	17.8%
Private	19.3%

## 5.2 Qualities Sought in Young Professional Staff

### 5.2.1 Method of Analysis

Respondents were asked "what do you think are the most important qualities to look for in *young* professional staff recruited to your organization?" Twelve qualities were listed and respondents were asked to rank them in order of importance -- equal ranking could be given when appropriate. The qualities included technical skills, management skills, general professional skills and other characteristics.

The responses to this question are summarized in TABLES 20-23, using a simple averaging technique based on the frequency with which a particular quality is given a particular ranking by the employers in the group under study e.g.:

	No. of respondents indicating each rank				Total score	Overall rank
	1st	2nd	3rd	4th		
Quality A	1	3	2	1	13	2nd
Quality B	4	2	1	0	8	1st
Quality C	1	1	3	2	20	4th
Quality D	2	1	1	3	19	3rd

The sample is broken down into four main activity groups:

Civil engineering  
 Manufacturing (including the petroleum industry)  
 Planning  
 Other

5.2.2 Analysis

The average ranking by all respondents is given in the following TABLE.

TABLE 20 - AVERAGE RANKING - OVERALL

<u>Rank</u>	<u>Quality</u>
1	general technical ability
2	specialised technical ability in a specific field
3	ability to work with others
4	practical experience
5	potential for leadership
6	management - planning and administration
7	ability to present good reports
8	ability in English language
9	management - supervision of supporting staff
10	knowledge of computer applications
11	management - financial control
12	knowledge of contract law

TABLE 21 - RANKING ACCORDING TO ACTIVITY OF ORGANIZATION

Quality	All respondents	Civil Engineering (63)	Manufacturing & Petroleum (17)	Planning (12)	Other (15)
General technical ability	1	2	2	3=	1
Specialized technical ability in a specific field	2	1	4	1=	9
Practical experience	4	4	7	1=	4=
Management ability in:					
<u>planning and administration</u>	6	7	5	6	7
<u>supervision of supporting staff</u>	9	9	8	9	6
<u>financial control</u>	11	11	10	11	11
Ability to work with others	3	3	1	3=	3
Potential for leadership	5	5	3	5	2
Ability to present good reports	7	6	9	8	4=
Knowledge of contract law	12	12	11	12	12
Ability in English language	8	8	6	7	8
Knowledge of computer applications	10	10	12	10	10

TABLE 22 - RANKING BY SECTOR

Quality	Government	Private
General technical*ability	2	2
Specialized technical ability in a specific field	1	3
Practical experience	3	4
Management ability in: <u>planning and administration</u>	5=	8
<u>supervision of supporting staff</u>	8	9
<u>financial control</u>	10	11
Ability to work with others	4	1
Potential for leadership	5=	5
Ability to present good reports	7	7
Knowledge of contract law	12	12
Ability in English language	9	6
Knowledge of computer applications	11	11

TABLE 23 - SUMMARY OF RANKING 1-6, BY ACTIVITY AND SECTOR

Quality	All Employers (107)	Civil Engineering (63)	Manufacturing & Petroleum (17)	Planning (12)	Others (15)	Government (45)	Private (62)
General technical ability	1	2	2	3=	1	2	2
Specialized technical ability in a specific field	2	1	4	1=		1	3
Practical experience	4	4		1=	4=	3	4
Management ability in: <u>planning and administration</u>	6		5	6		5=	
<u>supervision of supporting staff</u>					6		
<u>financial control</u>							
Ability to work with others	3	3	1	3=	3	4	1
Potential for leadership	5	5	3	5	2	5=	5
Ability to present good reports		6			4=		
Knowledge of contract law							
Ability in English language			6				6
Knowledge of computer applications							

### 5.2.3 Comments

Each employer was asked to rank the listed qualities but he was not asked to indicate degrees of importance, i.e. *by how much* one quality is more important than another. The summaries of ranking have the same limitation and can provide no more than a crude measure of opinion. Small differences in ranking are almost certainly not significant. However, it is reasonable to suppose that a difference of three or more ranks is significant.

The responses summarized in the tables give support to the following statements about the qualities sought in young professional staff by employers of AIT alumni:

- 1) The greatest importance is normally attached to a candidate's *general* and *specialised technical ability*. In manufacturing companies, however, less stress is placed on specialized technical ability.
- ii) *Ability to work with others* is rated highly and in manufacturing companies is regarded as more important than specialized technical ability.
- iii) *Potential for leadership* ranks in the top half of the list but overall, and within each sub-group, ranks below ability to work with others.
- iv) Importance is attached to *practical experience* and, in planning organizations, this is regarded as one of the most important qualifications. (It is interesting, in this regard, to note that students in the Division of Human Settlements Development, which is primarily concerned with physical planning, on average, take a longer interval between their Bachelor's degree and entry to AIT than is the case in other Divisions (see TABLE 8).
- v) Overall, and in the three activity areas most strongly represented in the sample, the importance of *management abilities*, relative to each other are ranked as follows:

first: planning and administration  
 second: supervision of supporting staff  
 third. financial control

Management ability, as a whole, predictably ranks clearly below technical ability. With minor exceptions, it also ranks below practical experience, ability to work with others and potential for leadership (see also the report on interviews with employers, page 35).

- vi) *Ability to present good reports and ability in English language*, both rank in the second half of the list. The comments offered by employers who were interviewed (see section 5.7.5) indicate however, that this lower ranking should not be taken as indicating lack of interest in these skills. It is simply that other qualifications (notably those involving technical skills and personal qualities) are given greater emphasis.
- vii) *Knowledge of computer applications* is regarded as relatively low priority qualification. This result was borne out in interviews with employers (see page 36) which indicated that a knowledge of computing was generally seen as a desirable preparation for the future rather than as a necessary qualification now. However, 83% of alumni report that a knowledge of computing is 'very useful' or 'useful' to them (see TABLE 14).
- viii) *Knowledge of contract law* is not an important qualification.
- ix) A comparison of opinions expressed by employers in the *public sector* with those expressed in the *private sector* indicates rather little difference in the requirements of the two sectors. The only marked differences are that private sector employers place greater emphasis on i) ability to work with others and ii) ability in English language. Indeed the first of these qualities is ranked highest of all by the private sector (to which the majority of AIT alumni go).

### 5.3 Experience Before the Master's Degree

- 5.3.1 Respondents were asked "Do you think a young graduate should obtain professional experience after his Bachelor's degree and *before* studying for the Master's degree?" Responses were

Yes	No	Doesn't matter
63.6%	2.8%	33.6%

- 5.3.2 The responses in the activity areas represented by 10 or more employers were as follows:

	Yes	No	Doesn't matter
Civil Engineering	50.3%	4.8%	34.9%
Manufacturing & Petroleum	64.6%	0	35.4%
Planning	75.0%	0	25.0%

5.3.3 The weight of opinion among employers is clearly in favour of students obtaining professional experience before starting a Master's program. In discussion with employers, a view frequently presented was that a period of two to three years would be appropriate (see page 32).

#### 5.4 Leave of Absence

5.4.1 The attitude of employers to the value of gaining practical experience between the Bachelor's degree and entry to the Master's degree raises the question of willingness to grant leave of absence for further study. The probability of being granted leave of absence, especially if salary is continued during leave, constitutes a significant encouragement to spending time in employment between the Bachelor's degree and further academic study.

5.4.2 Employers were asked whether they give leave of absence for further study or are at least, willing to consider doing so, and under what financial conditions. The replies indicate a marked difference between the government and private sectors:

TABLE 24 - LEAVE OF ABSENCE

Part (i)	% of All Government Employers	% of All Private Employers
Give leave of absence	78%	31%
Willing to consider leave of absence	18%	47%
Do not give leave of absence	4%	22%

Part (ii)	% of All Government Employers	% of All Private Employers
Salary may be continued during leave	82%	29%
Travel expenses may be paid	58%	23%
Tuition fees may be paid	53%	29%

Given the difference in attitude which these replies indicate, it is surprising that a large majority of the students who enter AIT after a period of employment have been employed in the private sector. In cohort E, for example, 67% of those in prior employment were employed in the private sector (see TABLE 9). One explanation for this lies in the scholarship system operated by AIT, with the co-operation of many donors, which allows most students to be virtually independent of other financial support. Another factor may be the connection, existing in many countries in the region, between government service and opportunities to study abroad. Government agencies normally have control over the operation of bi-lateral scholarship schemes and tend to give preference to government employees. There are, therefore, often good opportunities already existing for government employees to study outside the region and, therefore, perhaps less demand from them to study at AIT. This argument would seem, however, to apply with less force to those whose prior employment was in education (28% of cohort E in prior employment), although education is largely within the public sector. This may reflect a higher expectation of advancement to further study among those employed in education -- an expectation beyond the resources of bi-lateral aid, which leads a greater number to apply for admission to AIT.

## 5.5 Abilities Shown by AIT Graduates

5.5.1 Employers were asked "What has been your *general* experience with regard to the abilities shown by AIT graduates?" They were asked to evaluate the different qualities listed below on the following scale: good, adequate, inadequate, (no opinion). A summary of the opinions expressed by all employers in the sample is given in the next page.

TABLE 25 - ABILITIES OF AIT GRADUATES

Quality	% of employers indicating...			
	Good	Ade- quate	Inade- quate	No Opinion
General technical ability	56	36	-	8
Specialized technical ability	55	30	2	13
Practical skills	17	49	14	20
Management ability in:				
<u>planning &amp; administration</u>	26	32	14	28
<u>supervision of supporting staff</u>	19	49	10	22
<u>financial control</u>	8	30	12	50
Ability to work with others	49	41	1	9
Leadership qualities	22	48	8	22
Ability to present good reports	37	38	13	12
Knowledge of contract law	4	22	19	55
Ability in English language	31	52	8	9
Knowledge of computer applications	21	35	5	39

5.5.2 This summary suggests that the majority of employers are well satisfied with the *general and specialized technical abilities* of AIT graduates and with their *ability to work with others*. The statement is less enthusiastic, though still satisfactory, with regard to *ability to supervise supporting staff, leadership qualities, presentation of reports* and *ability in English*. The assessment of *practical skills* suggests that there is room for definite improvement, and the same is true of ability in *planning and administration*, which also rank in the top half of qualities sought in the young professional employee (see TABLE 20). Ability in *financial control, knowledge of contract law* and *knowledge of computer applications* all rank low in the list of qualities sought in young professional employees and this is reflected in the large number of employers who have not expressed an opinion on abilities in these areas.

#### 5.6 Appropriateness of AIT Training

Employers were asked to compare AIT's training with that given in good graduate schools in America and Europe and to say whether it was more or less appropriate, bearing in mind that AIT's purpose is to prepare graduates for responsible work *in Asia*. Their opinions are summarized below:

TABLE 26 - APPROPRIATENESS OF AIT TRAINING

Activity	% of respondents indicating that...			No Opinion %
	AIT's training is <i>more</i> <i>appropriate</i> than that offered in America or Europe %	AIT's training is <i>equally</i> <i>appropriate</i> to that offered in America or Europe %	AIT's training is <i>less</i> <i>appropriate</i> than that offered in America or Europe %	
Civil Engineering	13	56	6	25
Manufac- turing & Petroleum	24	29	18	29
Planning	25	42	8	25
Government	16	56	4	24
Private	16	43	10	31
Total	16	49	7	28

## 5.7 Report on Interviews with Selected Employers of AIT Alumni

### 5.7.1 Approach

Interviews were conducted with employers representing government agencies and the private sector in eight countries.

Bangladesh  
Hong Kong  
Malaysia  
Pakistan  
Philippines  
Republic of China  
Singapore  
Thailand

In selecting employers for interview, a number of factors were taken into account:

- i) geographical location;
- ii) number of alumni employed, with a preference for those employing several;
- iii) activity of the organization, with a view to obtaining a fair cross section of employers in civil engineering, manufacturing and planning;

- iv) sector in which the organization operates, so as to obtain good representation of both the private and government sectors.

Most interviews lasted about an hour and focussed on the issues raised in the questionnaire, which had been sent to the employer prior to the interview.

In addition to giving a summary of the opinions I received, I have also added some suggestions and comments of my own arising out of these discussions.

#### 5.7.2 General Reactions

Almost without exception, the employers interviewed were most appreciative of the training given at AIT and clearly held the Institute in high regard. On several occasions, employers said that they would encourage their staff to go to AIT rather than to the West "because they will come back". But that was not the only reason - the quality of the AIT degree is generally recognized to be high. One consultant in Hong Kong, who was losing an AIT alumnus because he had been attracted by a higher salary in government work, had already begun to look for another AIT alumnus to replace him.

Enthusiasm for graduate training in general varied among employers and was least strong in Malaysia and Singapore. In Malaysia, the importance of graduate training seems mainly to be in its usefulness in up-grading a Bachelor's degree from an 'unrecognized' university. But, even there, it was accepted that the opportunity to acquire more detailed knowledge in a special area was valuable. A large employer of AIT alumni in Taiwan said quite firmly that his organization would continue to send staff to study at AIT even though programs of a comparable technical quality were offered in Taiwan. He emphasized not only the high standard of teaching, library resources and other facilities at AIT, but also the importance of English as the language of instruction and the broadening opportunity of living in a regional institution.

#### 5.7.3 Experience Prior to the Master's Program

Employers consistently expressed the view that two to three years of professional experience prior to entering the Master's program is desirable for most candidates. The main advantage is seen to be that the student is better able to set his studies against his future professional situation and has a much clearer idea of what he wants to study. This applies to his selection of coursework but perhaps more strongly to his selection of a

thesis topic (see section 5.7.4 below). It was felt that, for most students, this advantage would far outweigh any difficulties arising from a hiatus in their academic studies.

The implications of this are

- i) that employers must be willing to give leave of absence
- ii) that AIT should attach weight to employers' recommendations when considering applications for admission.

#### 5.7.4 Thesis Work

Without exception, employers rate very highly the need to develop professional initiative, a sound approach to engineering problems, the ability to work both independently and as an effective team member, and to communicate the results of a professional study clearly and concisely. The question is - how best to train the student to develop these qualities? Is the thesis study, occupying roughly half the Master's program, an effective training for this purpose?

The majority of employers, and the overwhelming majority of alumni, take the view that the thesis study gives an effective training for most students. Some employers, however, are apprehensive that concentration on one sharply focussed topic may encourage undue interest in academic (in the pejorative sense of 'unreal') problems at the expense of attention to the kinds of issue which concern the practising engineer. They would prefer more students either to spend less of the program on research or to tackle perhaps two or three projects (designs, feasibility studies, project appraisals) of the kind they will encounter in employment. This would allow the student to complete, perhaps two or three times, the exercise of

1. defining the problem,
2. working out an approach and seeking a solution,
3. presenting the solution as a report,
4. defending the report in discussion.

(This issue has been the subject of much discussion within AIT during the past several years. Attempts to steer more students towards project work have foundered, however, largely because the vast majority prefer thesis work - partly because there is more academic status attaching to research and the thesis than to the more mundane project.)

A few employers feel that the actual topic of research is not important, but many would like to see students tackle problems relevant to their future professional work and/or to particular conditions in their home country. This is already the case with many students, particularly when the student is on leave from his employment (and this relates back to the view that most students ought to have had professional experience before coming to AIT and, by implication, normally be on leave of absence). Some students (and all those in the Human Settlements Development Division) already undertake part of their research work in their home country. This development is attractive to employers.

AIT should consider improving its contacts with employers in the region in order to identify suitable topics for these. Some employers, perhaps many, would be open to requests to provide some financial support (particularly local costs) for projects in which they are interested.

Finally, on the issue of research, some employers emphasized the value of group projects as an element in training students for the kind of team work often involved in professional practice.

#### 5.7.5 Communication Skills

Time and again, employers stressed the importance of ability in report writing, in oral presentation and in communicating engineering ideas through the use of simple drawings or sketches. Some employers were critical of the performance of AIT alumni in this area and most of those interviewed felt that training in communication skills was very desirable. It was suggested that training might be given through a course on report writing which would assist the student to develop a logical approach in the presentation of data and related discussion. Language is one element in this and it is clear that proficiency in English is an important attribute for most senior engineers in the region. However, there are other elements (the orderly and logical presentation of data, the development of discussion in a manner that makes it easily understood, and the clear statement of conclusions) which are as important in communication as competence in the language being used. A short course on report writing could be helpful to many students.

Spoken communication is also important and ways of assisting students to develop competence and confidence in this area would help them professionally. One employer observed that, in his organization, skill in spoken communication seemed to be a vital factor in promotion to

the top jobs; and another remarked that graduates of western universities appear to develop this capability to a much higher degree than those from AIT.

#### 5.7.6 Management Skills

AIT graduates are likely to be involved in the non-technical aspects of professional work quite soon after leaving AIT, particularly if they have gained professional experience before beginning the Master's program (see TABLE 15). There was a consensus among the employers interviewed that some attention should be given to this during the Master's program. Views varied as to how much management training was appropriate, and it would differ from student to student - rather little, or perhaps none, for the inexperienced engineer, more for those who have already 'served their apprenticeship' before coming to AIT. Among the topics suggested as appropriate were

- cost accounting
- contract administration and the basics of contract law
- organization and utilization of resources
- personnel management
- theory of organizations
- engineering economics

Specific reference was made by one employer (a consulting engineer and a former AIT graduate) to the courses offered by the Economic Development Institute of the World Bank, which he found extremely useful.

There was agreement that the student who goes straight to AIT after his Bachelor's degree would not benefit much from management courses but should rather be exposed to at least one course concerned with the practical aspects of engineering and with the techniques required to convert a design into a structure.

#### 5.7.7 Case Studies

Many employers felt that a course based on case studies (existing project reports, feasibility studies, etc.) would provide the student with a valuable insight into this aspect of professional work. One such course is already offered - in Geotechnical Engineering. Apart from this, the addition of a collection of project reports to the library would offer a stimulus to students through the opportunity to study at leisure reports on problems in their own countries. Such collections are already being made in some areas of study but the practice could be extended more widely

#### 5.7.8 Sophisticated Equipment

Observers of AIT, both inside and outside, are sometimes apprehensive that AIT's technical equipment, including the computer, is too sophisticated. This apprehension is not shared by the alumni or their employers. Some organizations do have access to advanced computers and other sophisticated equipment but, even where this is not so, it is not felt that the training at AIT is mis-directed. Knowledge of advanced techniques which cannot be immediately used can lead to frustration (and partly explains the mobility of AIT alumni) but it also instills confidence and enables the organization to improve its facilities when the money is available.

#### 5.7.9 Faculty

There is a wide appreciation of the strength of AIT's Faculty and of the contribution it can make through the dissemination of knowledge across the region. The hope was frequently expressed that the Institute would offer more short courses and, whenever possible, bring them to different centers in the region. Many of those interviewed stressed the importance of balancing academic teaching with an understanding of professional realities. In this connection, they expressed some misgivings at the appointment of faculty with little or no professional experience. The involvement of faculty members in consulting work and in sponsored research does, however, go part of the way towards meeting this objection.

#### 5.7.10 Brain-Drain

The employment of alumni outside their home country was raised with employers in Bangladesh and Pakistan. Their attitude is not one of great concern, indeed many see positive benefits accruing from 'brain drain', which is expected in most cases to be temporary rather than permanent. It enables engineers to acquire valuable experience for which there is at present only a limited opportunity in these countries, so that they will be more effective engineers on their return. And in the meantime they are earning foreign exchange, which is badly needed.

#### 5.7.11 Continuing Relationships with Employers

All the employers interviewed greatly appreciated the fact that they were being consulted; for almost all of them it was a novel experience and AIT's reputation has been enhanced because it has demonstrated its concern to provide graduates who are professionally effective. The Institute should continue to promote good communication with employers in the region and can only benefit from developing further the kind of direct contact with individual employers used in this study.

## 6 POSTSCRIPT

This study is the first major attempt to evaluate AIT's effectiveness in training engineers and planners to work in Asia. It is based on information obtained from those students who graduated in the period from 1961-1976 and from some of their employers. Many radical changes took place during that period of growth (from birth to near maturity) and change continues now, though more gradually.

1,173 students graduated in the period 1961-76, the majority of them in the four years 1973-76. The Institute had an annual enrolment of less than 200 students up to 1970 but it now has more than twice that number, and enrolments are continuing to increase at the rate of about 10% per year.

The national composition of the student body changed considerably during the period studied in this report and is still changing. For example, the first student from Sri Lanka was admitted in 1972 and yet by 1978 Sri Lankans were the third largest national group in enrolment. The number of students from Bangladesh has risen considerably in the past few years; the number from Indonesia has also increased markedly. The proportion of places occupied by Thai students has always been high but is gradually diminishing and the proportion coming from the Republic of China is now greatly reduced, because fewer scholarships are available to them.

In addition to changes in the size and composition of the student body, there is continuing development of the academic program. The number range of courses are increasing as new fields of study become more established and as existing fields focus on new problems. The methods of teaching are also changing. It is now quite common for students to undertake the practical or experimental part of their research work in their own country. This is now the case for all students in the Division of Human Settlements Development and is being encouraged in other areas also. Courses in management are now an important component in many fields of study.

AIT in 1978 is different in some important ways from the institution reflected in this study. Conclusions drawn from the study may not apply in their entirety to AIT as it is today; but they are, nonetheless likely to be a reasonable indicator not only of the Institute's past success in achieving its objectives but also of the ways in which its performance can be improved in the future.

## APPENDIX I – LIST OF APPOINTMENTS HELD BY SOME AIT ALUMNI

The purpose of this list is to illustrate the types of appointment commonly held by AIT alumni and also to show that some alumni now occupy very senior positions in education, government service and the private sector.

The list is divided into countries. The year of each alumnus' graduation from AIT is indicated in brackets after his position title.

### Bangladesh

Director, Bangladesh Atomic Energy Commission (1965)  
 Head of Department of Water Resources Engineering, Bangladesh  
 University of Engineering and Technology (1965)  
 Deputy Director, Directorate of Design (Power), Bangladesh (1972)

### Brazil

Professor and Head, School of Engineering, University of Sao Paulo,  
 Brazil (1966)

### Republic of China

Senior Engineer, Taiwan Freeway Construction Bureau (1970)  
 Chief of Field Office for construction company (1971)  
 Senior Planner Economic Planning Council (1972)  
 Deputy Chief Engineer, Department of New Construction (1972)  
 Deputy Manager of major consulting company (1972)  
 General Manager of development corporation (1973)  
 Technical Sales Manager of Taiwan office of international marketing  
 company (1973)  
 Chief Engineer, Directorate of Posts (1974)  
 Chief of Civil Engineering Division, Civil Aeronautics Administration,  
 Ministry of Communication (1974)  
 Group Chief, Taiwan Power Company (1974)  
 Systems Engineer, Kaohsiung Refinery (1976)

### Hong Kong

Senior Engineer, Drainage Works Division (1971)  
 Methods Engineer, Textile Alliance Ltd (1975)  
 Project Officer, HK Council of Social Service (1975)  
 Process Engineer, Sybron Asia Ltd (1976)

### India

Design Engineer, Kerala State Board of Prevention and Control of  
 Water Pollution (1971)  
 Hydrologist, Action for Food Production (1972)  
 Lecturer, Engineering College (1973)

Superintending Engineer, Public Works Department, Rajasthan (1973)  
 Executive Engineer, Ministry of Transport (1975)  
 Systems Engineer, Oil and Natural Gas Commission (1976)

#### Indonesia

Chief Surveyor, Ret-Ser Engineering Agency (1972)  
 Dean of Engineering, Surabaya Institute of Technology (1972)  
 Deputy Manager, Prosida Irrigation Project (1973)  
 Head, Occupational Health, Pertamina Oil (1975)  
 Chief Engineer, Ministry of Public Works (1975)  
 Chief of Hydrology Section, Institute of Hydraulic Engineering,  
 Bandung (1975)  
 Associate Professor, Bandung Institute of Technology (1976)

#### Iran

Project Manager, Tehran Regional Water Board (1972)  
 Lecturer, Tehran Polytechnic (1975)

#### Japan

Instructor, Tokyo Institute of Technology (1974)  
 Assistant Section Chief, Nippon Koei Company (1974)

#### Malaysia

Senior Civil Engineer, Perunding Bersatu Sdn Bhd (1965)  
 Senior Soils Engineer, Geotech (Malaysia) Sdn (1969)  
 Consultant for World Bank (1972)  
 Lecturer, Mara Institute of Technology (1973)  
 Operations Geologist, Sarawak Shell Bhd (1975)  
 Executive Engineer Public Works Department (1976)

#### Philippines

Managing Director, Philippines Rigid Construction Co. (1965)  
 General Manager, Freysuet Post-tensioning Sys., Philippines (1966)  
 Dean of Engineering, Silliman University (1966)  
 Chief, Metropolitan Waterworks and Sewerage System, Quezon City (1966)  
 Systems Analyst, National Water Resource Council (1967)  
 Associate Professor, Central Luzon State University (1969)  
 Loan Appraiser, Development Bank of the Philippines (1973)  
 Head of Planning Division, Cotabato-Agusan River Basin Development  
 Project (1974)  
 Senior Projects Manager, Philippine Refinery Co. (1975)

#### Pakistan

Head of Project Wing, Port Md Bin Qasim Authority (1962)  
 Vice-Chancellor, Mehran University of Engineering and Technology (1965)

Manager of Bridges, Indus Superhighway Board (1966)  
 Managing Partner, Abaseen Construction Association (1968)  
 General Manager Planning, Baluchistan Development Authority (1969)  
 Senior Water Engineer, Gongola State Water Board (1970)  
 Senior Engineer, Republic Engineering Corporation (1972)  
 Senior Architect Planner, Progressive Consultants (1975)  
 Senior Engineer, National Engineering Services (1975)  
 Senior Geologist, Water and Power Development Authority (1976)  
 Senior Engineer, National Engineering Services (1976)

### Singapore

Managing Director, Hildebrand Singapore Pte (1969)  
 Senior Structural Engineer, Monenco Asia (1970)  
 Lecturer, Singapore Polytechnic (1971)  
 Senior Civil Engineer, Housing and Development Board (1971)  
 Senior Lecturer, University of Singapore (1972)  
 Group Manager (Production and Systems), Singapore Paper Producers Ltd (1972)  
 Environmental Engineer, Pollution Control Services (FE) Pte (1973)  
 Technical Services Engineer, Singapore Petroleum Co. (1974)  
 Civil and Structural Engineer, T.H. Chuah and Assoc. (1975)  
 Industrial Engineer, Texas Instrument Singapore(Pte) Ltd (1976)

### Sri Lanka

Regional Support Engineer, International Computers (1974)  
 Irrigation Engineer, Department of Irrigation (1974)

### Saudi Arabia

Hydrologist, Ministry of Agricultural and Water (1962)  
 Transportation Engineer, China Engineering Consultants Inc. (1970)  
 Chief Staff Engineer, Ret-Ser Engineering Agency (Taiwan) (1971)  
 Project Engineer, Ret-Ser Engineering Agency (Taiwan) 1973  
 Materials Engineer, Netherlands Airport Consultants (1975)

### Thailand

Chief, Water Resources Planning and Development Division, Electricity Generating Authority of Thailand (1961)  
 President, SEATEC Consulting Engineers (1961)  
 Governor, Expressway and Rapid Transit Authority (1962)  
 Professor of Hydraulic Engineering, AIT (1962)  
 Chief of Survey Section, Location and Design Division, Department of Highways (1963)  
 Director, Provincial Roads Construction Division, Department of Highways (1963)  
 Chief, Project Planning Division, Royal Irrigation Department (1964)  
 Deputy Director, Public Works Department, Bangkok Metropolitan Administration (1965)

Head, Applied Research and Development Division, Siam Cement Co.,  
 Ltd (1966)  
 Hydraulic Engineer, Investigation and Planning Division, National  
 Energy Administration (1967)  
 Associate Professor, Chulalongkorn University (1968)  
 Chief, Water Quality Control Division, Metropolitan Water Works,  
 Bangkok (1968)  
 Project Engineer, Italian-Thai Development Corporation (1969)  
 Chief Investigation and Planning Division, National Energy Adminis-  
 tration (1969)  
 Chairman of Department of Civil Engineering, Chiang Mai University  
 (1970)  
 Chief, Research and Development Division, Metropolitan Water Works  
 Authority (1970)  
 Engineer, Provincial Road Division, Department of Highways (1971)  
 Chief of Transportation Section, Town and Country Planning Department,  
 Ministry of Interior (1971)  
 Policy and Plan Analyst, National Economic and Social Development  
 Board (1972)  
 Lecturer, Kasetsart University (1972)  
 Systems Analyst, ESSO Standard Thailand Ltd (1973)  
 Civil Engineer, Atomic Power Division, Electricity Generating Authority  
 of Thailand (1973)  
 Lecturer in Agricultural Engineering, Khon Kaen University (1974)  
 Engineering Manager, Sino-Thai Industrial Corp. Ltd (1974)  
 Engineer, Thai Australian Rural Development Office (1975)  
 Field Engineer, Bangkok Metropolitan Administration (1975)  
 Chief, Human Settlement Division, Applied Scientific Research Corpora-  
 tion of Thailand (1976)  
 Civil Engineer, Fine Arts Department, Ministry of Education (1976)

#### Turkey

Systems Development Manager, British Petroleum Company (1972)  
 Assistant Professor, Middle East Technical University (1975)

#### Vietnam

Project Analyst, National Bank of Vietnam (1973)  
 Lecturer Polytechnic Institute, Ho Chi Minh City (1973)

## APPENDIX II – OPINIONS EXPRESSED BY EMPLOYERS OF AIT ALUMNI

The questionnaire sent to employers invited respondents to "add any comments you wish on your organizations experience with AIT graduates". *All* the comments received are given below, with just very minor editorial changes in a few cases. The organizations are not named but the country and activity of each organization is indicated.

### A. ALL ACTIVITIES EXCEPT EDUCATION

#### BANGLADESH

##### Government

##### Civil Engineering

1. AIT graduates have good technical background. But it will be good if they are taught advanced method of flood estimation and design of a regulating structure permeable foundation.
2. The few AIT graduates who have been associated with inland navigation in a deltaic country like Bangladesh were mainly educated at the AIT in the field of structures and as such they soon switched over to structural engineering in other organizations, (this organization) being mainly concerned with hydraulics and coastal engineering.
3. There is no AIT graduate in our organization but in day to day work I come across AIT graduates working in university and in government and I found them good in work in their respective professional fields.
4. I have had experience with AIT graduates in the past as a director of designs in .... I found them better equipped with engineering knowledge, ability to provide leadership in ideas and technical skill when they returned.

#### HONG KONG

##### Private

##### Civil Engineering

Experience we have with the AIT graduates in our company reveals that they are competent in their specific field of training, despite relative lack of practical experience. They are on the average hard-working and conscientious.

## MALAYSIA

PrivateCivil Engineering

1. AIT's training is more appropriate for Malaysia in the following fields:

- (1) Wastewater Engineering
- (2) Soil Engineering
- (3) Transportation

Graduates from Structural Engineering were found inadequate in practical design training.

2. We have been thoroughly satisfied with AIT graduates.

Manufacturing

As I have an interest in Industry/Technical Cooperation with engineering institutions, I think AIT performs a much-needed service for industry and their graduates appear to be fairly mature and well-rounded to enable success in the projects they undertake.

Trading

On present employee, his post graduate training is not relevant to his work.

On one occasion, while interviewing a graduate in Environmental Technology & Management, his knowledge of air and water pollution control was appalling.

## PAKISTAN

GovernmentCivil Engineering

1. Graduates deal less with practical aspects of Engineering during their training. The training is oriented more towards problems/matters relevant to Southeast Asia.
2. According to our experience AIT graduates have adequate general and specialized technical ability. They have enough knowledge regarding financial control and supervision of supporting staff. In addition they are conversant in English language.
3. AIT graduates have been found to be well trained and equipped with sound theoretical knowledge.

PrivateCivil Engineering

1. Mr ..... is very good in every way. If he is a representative sample then you are doing very well.
2. Our experience with AIT graduates has been rather good.
3. They are particularly deficient in reporting writing, general awareness of development framework and leadership qualities.

Planning

We have recruited one AIT graduate who has proved an excellent asset to our company. However we have also rejected two other AIT graduates after interview as they did not appear upto the mark.

At present, we have two employees on leave of absence studying at AIT. A third student is an ex-employee.

## PHILIPPINES

GovernmentCivil Engineering

Good technical skills and professional competence.

Planning

1. We are quite happy with performance of the alumnus with us during the short period of employment.
2. AIT graduates are efficient, resourceful and dependable workers.

PrivateBusiness Management

We have two graduates of AIT and we find them competent for the work they are assigned to. We would actually appreciate if you could refer to us AIT Filipino graduates.

Civil Engineering

1. Easy to get along with and train for management of highly technical jobs; versatile; and highly capable to undertake special assignments along their respective disciplines.

2. We are very pleased about the experience we have on our AIT trained staff members.
3. Likes to do theoretical studies. Meticulous thinkers.

## REPUBLIC OF CHINA

### Government

#### Civil Engineering

General speaking, AIT graduates have been well trained in technical ability. But it will be helpful for their working ability, if one or two management courses can be arranged in their Master's program.

#### Planning

1. The high-level staff in this organization largely come from AIT. According to our experience with AIT graduates the major weakness in your training program is that the graduates have almost no knowledge about economics, no sense about data reduction.
2. We found it is helpful to have our staff trained at AIT. However, we hope AIT will put more emphasis on practical aspects in various courses. Divert transportation of technique from Europe and America would minimize AIT's contribution to the Asia.

### Private

#### Civil Engineering

1. Research experience in doing thesis work is useful. Should have more training in handling practical problems.
2. Generally speaking, they have competent capability and good service attitude.
3. Our experience with AIT graduates has been, in general, quite satisfactory. Many of them have been promoted to managerial positions for projects both at home and abroad.
4. Their performances are quite satisfactory but abilities in English, report writing and understanding of contract law the inadequacies need to be straightened.

#### Manufacturing

1. Need to provide more training on the following courses.
  - a) Communication
  - b) Management
 Anyway, a professional staff with master degree is good for us to develop him as professional management, above mentioned courses are important and necessary.

2. New to sales work but has already demonstrated outstanding abilities to define and solve problems. Has organizing ability and communicates effectively with staff and management alike. Leadership and management ability has been demonstrated in manufacturing position but not yet in marketing area because of nature of current assignment.
3. In addition to possessing the specialized technical knowledge, the potential for leadership is more need to be developed.
4. AIT should provide students with more insights and experience in decision making process, evaluating different kinds of factors involved, setting priorities, and communicating in general terms with other people.

#### Oil and Petroleum

All AIT graduates here are found to be very smart and capable of doing good jobs.

#### SINGAPORE

##### Government

##### Business Management

The AIT alumni's job depends more on his basic degree training in Structural Engineering. However, his training at AIT in Systems and Industrial Engineering is useful as a background and foundation.

##### Private

##### Oil and Petroleum

We are satisfied with the performance of our AIT graduate. He has demonstrated general technical competence and gets along well with his colleagues.

#### THAILAND

##### Government

##### Planning

Our experience with AIT graduates has been very satisfactory.

##### Civil Engineering

1. AIT graduates, with some professional experience after their bachelor degree before studying for the Master's degree in AIT, mostly are capable to take up the assignment with high efficiency rather than the AIT graduates without professional experience. Moreover, most of the AIT graduates especially

the Thai Engineers are still handicapped in English to present a good report.

2. AIT graduates should know more about planning, management and economical analysis of the project.

### Private

#### Civil Engineering

1. We wish to emphasize that the following opinion is only for the heavy construction contractor company.
  - 1) To make a selection specially on AIT graduate is the best way of recruitment since formerly, only the top brains of Thai engineers have a chance to enter AIT.
  - 2) Most of AIT graduate is energetic and willing to work hard.
  - 3) The quality of Thai AIT graduates at present is much lower than the previous.

We think that the selection method of AIT student has been considerably changed according to AIT financial problem.

2. AIT graduate has a good knowledge, they have a capability and responsibility to carry the work as assigned by supervisor. It has never been necessary to closely supervise his duties.
3. We would like AIT graduates to have more practical skills and more management ability in planning and administration.

#### Manufacturing

AIT graduate students are gradually taking up higher posts in the middle management level. More emphasis should be given in the business orientation, the human side of the enterprise, the cost consciousness, and "There's always a better way" attitude.

## B. EDUCATION

### Bangladesh

Five AIT graduates have already joined the faculty. Their ability in both teaching and research are found to be good.

### Korea

Our experience with both Dr ..... and Mr ..... has been very satisfactory. After further doctoral work in France, Dr ..... is now director of academic affairs and also chairman of the Mech. Eng. Dept. Mr ..... is teaching now and will be sent to France for doctoral work.

Malaysia

All AIT graduates in this School come from either Pakistan or Bangladesh. All of them show no sign of urgency with their work especially when cooperation is required. I think this is just the attitude of the people that are with us and not a reflection of AIT.

Philippines

1. Generally good; creative ability needs to be developed.
2. Since industry can afford to pay (AIT graduates) much more than the school, the most that the school can have is to hire them on part-time basis.
3. Satisfied with their performance.
4. AIT graduates feel they belong to the Asian region while the other graduates from Western nations seem to be inappropriate in training and attitudes.

Singapore

I am happy with the two staff I have; both, beside their lecturing load, have been given administrative duties as well.

Republic of China

AIT's training is so far so good in every aspect.

Thailand

Most of AIT graduates have shown good academic ability and aptitude in performing their career as university lecturers. They are very keen on applying the knowledge which gained from studying at AIT, particularly those from their thesis.

Australia

I have only had experience with one AIT graduate in this Department, and that experience was completely satisfactory to me.

Scotland

All (with one exception, accountable to personal problems) have achieved their chosen goals (usually the Ph.D. degree).

U.S.A.

1. Generally, our experience has been good.
2. Dr ..... was my first graduate student from AIT and has been one of my outstanding Ph.D. students. His course background from AIT was broad and up-to-date. His ideas in research were innovative and he is capable of conducting research independently. In addition to his technical ability, he has a fine personality and experience.
3. Regarding the two students.
  - 1) AIT graduates are well prepared technically. I have found all of them to be good hard workers with a good motivation to return home and do engineering work.
  - 2) The AIT graduates with whom I have worked have all ranked in the top 1/4 of all graduates. They are hard working, thorough, and well trained students who cope well with the American educational methods.