TABLE A. -- NUMBER OF STUDENTS COMPLETING PREPARATION FOR STANDARD TEACHING CERTIFICATES, BY TYPE OF PREPARATION, YEAR, AND STATE (CONTINUED)

TYPE OF PREPARATION COMPLETED BY STUDENT	ARKANSAS		CALIFORNIA		COLORADO	
	1970	1969	1970	1969	1970	1969
ELEMENTARY-SCHOOL TOTAL	1,110	1,030	7,309	6,682	1,467	1,286
REGULAR INSTRUCTION	1,083	1,023	6,978	6,309	1,434	1,251
SELECTED SUBJECTS(TOTAL)	27	7	331	373	33	35
ART	9	7	144	157	6	4
FOREIGN LANGUAGES	...	...	114	112	4	12
MUSIC	12	...	65	89	17	16
PHYSICAL & HEALTH EDUCATION	6	...	8	15	6	3
SECONDARY SCHOOL						
AGRICULTURE	57	48	204	116	...	16
ART	80	64	383	281	216	210
BUSINESS EDUCATION	249	259	204	196	156	165
DISTRIBUTIVE EDUCATION	1	2	2	4	29	36
ENGLISH LANGUAGE ARTS(TOTAL)	397	389	1,293	1,213	462	525
ENGLISH	302	331	1,110	1,088	366	426
JOURNALISM	8	6	34	23	2	3
SPEECH AND DRAMATIC ARTS	87	52	149	102	94	96
FOREIGN LANGUAGES(TOTAL)	46	49	567	513	167	201
FRENCH	19	20	195	165	52	59
GERMAN	2	1	94	73	14	20
LATIN	...	1	10	10	2	4
RUSSIAN	...	...	14	7	5	5
SPANISH	25	27	246	250	94	113
OTHER	...	...	8	8	...	...
HOME ECONOMICS	148	155	237	243	70	120
INDUSTRIAL ARTS	39	36	205	234	153	116
JUNIOR HIGH SCHOOL(GENERAL)	...	...	...	...	...	41
MATHEMATICS	149	136	305	323	157	159
MUSIC	144	129	175	166	158	153
PHYSICAL & HEALTH EDUCATION	428	382	607	566	306	358
NATURAL & PHYSICAL SCIENCES (TOTAL)	175	179	508	467	172	197
SUBJECT NOT SPECIFIED	7	7	90	57	46	55
GENERAL SCIENCE	33	31	46	38	9	13
BIOLOGY	109	123	300	284	85	101
CHEMISTRY	21	14	49	55	23	20
PHYSICS	5	4	23	33	9	8
SOCIAL STUDIES(TOTAL)	421	436	1,697	1,547	432	554
SUBJECT NOT SPECIFIED	342	303	329	237	191	281
HISTORY, GEOGRAPHY	59	67	937	965	182	219
ECONOMICS, SOCIOLOGY, PSYCHOLOGY	20	64	228	152	52	25
OTHER SOCIAL STUDIES	...	2	203	193	7	29
TRADE, INDUSTRY, TECHNOLOGY	...	...	2	5	1	29
OTHER SECONDARY SUBJECTS	...	...	36	40	5	16
SECONDARY-SCHOOL TOTAL	2,334	2,264	6,425	5,914	2,484	2,896
UNGRADED						
SPECIAL EDUCATION	186	139	320	397	172	313
LIBRARIAN	4	4	118	111	...	7
GUIDANCE COUNSELOR	109	102	300	327	...	101
SCHOOL PSYCHOLOGIST	...	...	99	147	...	3
SCHOOL SOCIAL WORKER	...	...	35	41	...	...
SCHOOL NURSE	...	...	26	19	...	...
OTHER UNGRADED	...	...	178	135	...	67

TABLE A. -- NUMBER OF STUDENTS COMPLETING PREPARATION FOR STANDARD TEACHING CERTIFICATES, BY TYPE OF PREPARATION, YEAR, AND STATE (CONTINUED)

TYPE OF PREPARATION COMPLETED BY STUDENT	CONNECTICUT		DELAWARE		DISTRICT OF COLUMBIA	
	1970	1969	1970	1969	1970	1969
ELEMENTARY-SCHOOL TOTAL	2,048	1,770	160	153	377	332
REGULAR INSTRUCTION	2,045	1,770	160	153	372	323
SELECTED SUBJECTS(TOTAL)	3	...	...	...	5	9
ART	3	...	...	...	1	2
FOREIGN LANGUAGES	...	...	...	...	...	2
MUSIC	...	...	...	...	1	1
PHYSICAL & HEALTH EDUCATION	...	...	...	...	3	4
SECONDARY SCHOOL						
AGRICULTURE	2	5	4	2	...	...
ART	155	126	17	12	24	19
BUSINESS EDUCATION	64	39	22	19	29	30
DISTRIBUTIVE EDUCATION	18	16	1	...	...	...
ENGLISH LANGUAGE ARTS(TOTAL)	397	346	38	28	121	93
ENGLISH	396	346	38	26	97	85
JOURNALISM	...	...	...	...	...	...
SPEECH AND DRAMATIC ARTS	1	...	...	2	24	8
FOREIGN LANGUAGES(TOTAL)	184	165	25	17	45	38
FRENCH	89	82	11	8	22	20
GERMAN	16	8	4	2	2	1
LATIN	7	10	...	...	1	...
RUSSIAN	3	1	...	...	...	...
SPANISH	67	62	10	7	18	17
OTHER	2	2	...	...	2	...
HOME ECONOMICS	19	14	33	20	8	2
INDUSTRIAL ARTS	54	55	...	...	...	...
JUNIOR HIGH SCHOOL(GENERAL)	...	...	...	...	10	...
MATHEMATICS	173	147	17	16	36	13
MUSIC	88	85	12	5	21	16
PHYSICAL & HEALTH EDUCATION	217	208	51	32	33	38
NATURAL & PHYSICAL SCIENCES (TOTAL)	160	143	11	10	29	7
SUBJECT NOT SPECIFIED	...	1	...	...	4	4
GENERAL SCIENCE	23	26	1	1	...	1
BIOLOGY	117	94	8	8	11	1
CHEMISTRY	16	12	2	1	8	...
PHYSICS	4	10	...	...	6	1
SOCIAL STUDIES(TOTAL)	422	334	45	28	147	98
SUBJECT NOT SPECIFIED	126	97	16	22	43	19
HISTORY, GEOGRAPHY	248	183	26	4	78	67
ECONOMICS, SOCIOLOGY, PSYCHOLOGY	13	8	3	1	20	...
OTHER SOCIAL STUDIES	35	46	...	1	6	12
TRADE, INDUSTRY, TECHNOLOGY	30	30	...	...	19	9
OTHER SECONDARY SUBJECTS	112	89	...	...	1	79
SECONDARY-SCHOOL TOTAL	2,095	1,802	276	189	523	442
UNGRADED						
SPECIAL EDUCATION	221	182	4	5	97	83
LIBRARIAN	65	50	...	...	43	39
GUIDANCE COUNSELOR	81	46	...	...	55	24
SCHOOL PSYCHOLOGIST	11	5	...	...	10	4
SCHOOL SOCIAL WORKER	...	...	...	...	...	...
SCHOOL NURSE	...	...	...	...	...	...
OTHER UNGRADED	7	8	...	...	...	...

TABLE A. -- NUMBER OF STUDENTS COMPLETING PREPARATION FOR STANDARD TEACHING CERTIFICATES, BY TYPE OF PREPARATION, YEAR, AND STATE (CONTINUED)

TYPE OF PREPARATION COMPLETED BY STUDENT	FLORIDA		GEORGIA		HAWAII	
	1970	1969	1970	1969	1970	1969
ELEMENTARY-SCHOOL TOTAL	2,625	2,481	1,828	1,891	615	495
REGULAR INSTRUCTION	2,574	2,432	1,828	1,891	615	495
SELECTED SUBJECTS(TOTAL)	51	49	...	...	...	...
ART	23	19	...	...	...	...
FOREIGN LANGUAGES	...	...	...	...	...	...
MUSIC	16	26	...	...	...	...
PHYSICAL & HEALTH EDUCATION	12	4	...	...	...	...
SECONDARY SCHOOL						
AGRICULTURE	23	17	25	25	1	...
ART	186	116	95	96	16	12
BUSINESS EDUCATION	193	190	230	165	19	23
DISTRIBUTIVE EDUCATION	27	23	14	11	...	...
ENGLISH LANGUAGE ARTS(TOTAL)	768	639	466	456	113	66
ENGLISH	660	558	446	433	88	45
JOURNALISM	25	14	...	2	...	...
SPEECH AND DRAMATIC ARTS	83	67	20	21	25	21
FOREIGN LANGUAGES(TOTAL)	184	170	140	108	29	16
FRENCH	59	51	72	61	9	5
GERMAN	11	13	6	4	1	1
LATIN	1	7	23	2	...	2
RUSSIAN	2	...	...	...	1	1
SPANISH	111	99	39	41	10	1
OTHER	...	...	...	...	8	6
HOME ECONOMICS	90	86	162	146	8	5
INDUSTRIAL ARTS	66	52	63	60	13	10
JUNIOR HIGH SCHOOL(GENERAL)	...	6	58	80	...	...
MATHEMATICS	251	255	245	262	30	26
MUSIC	214	195	122	119	18	9
PHYSICAL & HEALTH EDUCATION	484	490	283	257	51	39
NATURAL & PHYSICAL SCIENCES (TOTAL)	227	164	198	219	19	18
SUBJECT NOT SPECIFIED	22	15	44	45	3	...
GENERAL SCIENCE	39	35	38	47	4	2
BIOLOGY	111	75	88	95	8	11
CHEMISTRY	46	34	23	25	3	5
PHYSICS	9	5	5	7	1	...
SOCIAL STUDIES(TOTAL)	1,072	861	774	620	108	77
SUBJECT NOT SPECIFIED	575	522	359	300	37	57
HISTORY, GEOGRAPHY	175	121	285	211	59	18
ECONOMICS, SOCIOLOGY, PSYCHOLOGY	232	107	56	57	10	1
OTHER SOCIAL STUDIES	90	111	74	52	2	1
TRADE, INDUSTRY, TECHNOLOGY	60	51	20	8	...	...
OTHER SECONDARY SUBJECTS	...	1	...	...	...	...
SECONDARY-SCHOOL TOTAL	3,845	3,316	2,895	2,632	425	301
UNGRADED						
SPECIAL EDUCATION	312	232	150	137	...	...
LIBRARIAN	103	104	29	27	...	...
GUIDANCE COUNSELOR	152	126	134	174	...	...
SCHOOL PSYCHOLOGIST	...	...	...	...	60	71
SCHOOL SOCIAL WORKER	...	...	...	...	...	...
SCHOOL NURSE	...	...	...	...	...	...
OTHER UNGRADED	73	78	829	885	...	...

TABLE A. -- NUMBER OF STUDENTS COMPLETING PREPARATION FOR STANDARD TEACHING CERTIFICATES, BY TYPE OF PREPARATION, YEAR, AND STATE (CONTINUED)

TYPE OF PREPARATION COMPLETED BY STUDENT	IDAHO		ILLINOIS		INDIANA	
	1970	1969	1970	1969	1970	1969
ELEMENTARY-SCHOOL TOTAL	489	497	5,514	4,866	2,846	2,555
REGULAR INSTRUCTION	489	497	5,210	4,554	2,823	2,549
SELECTED SUBJECTS(TOTAL)	...	...	304	312	23	6
ART	...	...	46	73	19	...
FOREIGN LANGUAGES	...	...	18	30	...	...
MUSIC	...	...	60	63	2	3
PHYSICAL & HEALTH EDUCATION	...	...	180	146	2	3
SECONDARY SCHOOL						
AGRICULTURE	16	13	140	100	147	...
ART	14	20	419	386	180	188
BUSINESS EDUCATION	12	39	581	455	265	237
DISTRIBUTIVE EDUCATION	24	11	...	...	11	3
ENGLISH LANGUAGE ARTS(TOTAL)	65	81	1,737	1,428	966	954
ENGLISH	60	74	1,296	1,149	749	770
JOURNALISM	...	...	16	14	38	37
SPEECH AND DRAMATIC ARTS	5	7	425	265	179	147
FOREIGN LANGUAGES(TOTAL)	2	15	655	569	321	334
FRENCH	1	12	226	223	129	125
GERMAN	...	1	116	71	42	43
LATIN	...	...	34	36	29	25
RUSSIAN	...	...	19	8	5	12
SPANISH	1	2	246	223	116	129
OTHER	...	...	14	8	...	...
HOME ECONOMICS	11	64	305	291	266	224
INDUSTRIAL ARTS	14	13	312	237	207	199
JUNIOR HIGH SCHOOL(GENERAL)	...	...	119	102	...	...
MATHEMATICS	21	33	731	590	333	326
MUSIC	25	35	490	379	279	259
PHYSICAL & HEALTH EDUCATION	87	140	1,202	930	826	771
NATURAL & PHYSICAL SCIENCES (TOTAL)	62	44	525	461	379	348
SUBJECT NOT SPECIFIED	8	3	69	61	47	41
GENERAL SCIENCE	14	5	14	8	36	27
BIOLOGY	34	33	308	278	220	213
CHEMISTRY	3	2	81	76	58	49
PHYSICS	3	1	53	38	18	18
SOCIAL STUDIES(TOTAL)	130	131	1,700	1,440	1,236	1,263
SUBJECT NOT SPECIFIED	25	67	338	323	582	600
HISTORY, GEOGRAPHY	64	43	917	754	334	348
ECONOMICS, SOCIOLOGY, PSYCHOLOGY	21	12	251	237	203	204
OTHER SOCIAL STUDIES	20	9	184	126	117	111
TRADE, INDUSTRY, TECHNOLOGY	1	...	...	7	6	6
OTHER SECONDARY SUBJECTS	182	9	41	38	45	42
SECONDARY-SCHOOL TOTAL	666	648	8,957	7,413	5,487	5,154
UNGRADED						
SPECIAL EDUCATION	14	11	638	534	198	181
LIBRARIAN	...	...	34	24	102	67
GUIDANCE COUNSELOR	11	5	195	289	34	37
SCHOOL PSYCHOLOGIST	...	...	...	...	...	...
SCHOOL SOCIAL WORKER	...	...	...	...	...	...
SCHOOL NURSE	...	...	4	3	...	...
OTHER UNGRADED	7	8	86	47	35	37

TABLE A. -- NUMBER OF STUDENTS COMPLETING PREPARATION FOR STANDARD TEACHING CERTIFICATES, BY TYPE OF PREPARATION, YEAR, AND STATE (CONTINUED)

TYPE OF PREPARATION COMPLETED BY STUDENT	IOWA		KANSAS		KENTUCKY	
	1970	1969	1970	1969	1970	1969
ELEMENTARY-SCHOOL TOTAL	2,139	2,212	1,911	1,966	2,123	2,124
REGULAR INSTRUCTION	2,046	2,161	1,808	1,893	2,019	2,092
SELECTED SUBJECTS(TOTAL)	93	51	103	73	104	32
ART	15	6	21	17	...	1
FOREIGN LANGUAGES	2	1	...	...	...	...
MUSIC	28	2	52	34	11	10
PHYSICAL & HEALTH EDUCATION	48	42	30	22	93	21
SECONDARY SCHOOL						
AGRICULTURE	74	47	36	26	43	45
ART	210	138	130	120	160	148
BUSINESS EDUCATION	142	143	161	171	332	300
DISTRIBUTIVE EDUCATION	15	10	...	7	6	...
ENGLISH LANGUAGE ARTS(TOTAL)	638	666	523	500	684	699
ENGLISH	515	544	414	434	601	622
JOURNALISM	15	10	6	1	16	14
SPEECH AND DRAMATIC ARTS	108	112	103	65	67	63
FOREIGN LANGUAGES(TOTAL)	244	234	137	167	119	113
FRENCH	77	105	44	92	44	51
GERMAN	50	36	23	21	20	14
LATIN	5	4	8	2	5	9
RUSSIAN	6	1	...	...	1	1
SPANISH	106	88	60	49	48	34
OTHER	...	...	2	3	1	4
HOME ECONOMICS	189	247	194	145	194	181
INDUSTRIAL ARTS	82	82	121	139	191	160
JUNIOR HIGH SCHOOL(GENERAL)	46	67	10	...	24	34
MATHEMATICS	229	227	166	199	189	189
MUSIC	212	214	161	172	183	183
PHYSICAL & HEALTH EDUCATION	532	476	509	424	527	573
NATURAL & PHYSICAL SCIENCES (TOTAL)	264	253	175	180	237	228
SUBJECT NOT SPECIFIED	55	19	10	39	20	16
GENERAL SCIENCE	43	37	32	32	...	...
BIOLOGY	134	153	116	87	163	169
CHEMISTRY	17	32	15	17	46	40
PHYSICS	15	12	2	5	8	3
SOCIAL STUDIES(TOTAL)	717	763	465	489	1,082	911
SUBJECT NOT SPECIFIED	245	265	171	199	134	102
HISTORY, GEOGRAPHY	325	324	220	231	596	514
ECONOMICS, SOCIOLOGY, PSYCHOLOGY	93	109	64	44	273	234
OTHER SOCIAL STUDIES	54	65	10	15	79	61
TRADE, INDUSTRY, TECHNOLOGY	...	...	3	29	11	13
OTHER SECONDARY SUBJECTS	...	...	28	14	13	...
SECONDARY-SCHOOL TOTAL	3,594	3,567	2,819	2,782	3,995	3,777
UNGRADED						
SPECIAL EDUCATION	119	70	118	61	153	121
LIBRARIAN	76	...	33	39	51	43
GUIDANCE COUNSELOR	49	...	33	34	36	26
SCHOOL PSYCHOLOGIST	11	...	...	10	...	...
SCHOOL SOCIAL WORKER	...	...	4	6	1	...
SCHOOL NURSE	...	...	...	...	...	...
OTHER UNGRADED	...	...	...	24	...	...

TABLE A. -- NUMBER OF STUDENTS COMPLETING PREPARATION FOR STANDARD TEACHING CERTIFICATES, BY TYPE OF PREPARATION, YEAR, AND STATE (CONTINUED)

TYPE OF PREPARATION COMPLETED BY STUDENT	LOUISIANA		MAINE		MARYLAND	
	1970	1969	1970	1969	1970	1969
ELEMENTARY-SCHOOL TOTAL	2,008	1,758	523	510	1,795	1,612
REGULAR INSTRUCTION	2,008	1,751	522	510	1,702	1,554
SELECTED SUBJECTS(TOTAL)	...	7	1	...	93	58
ART	...	7	...	...	45	31
FOREIGN LANGUAGES	...	...	1	...	...	...
MUSIC	...	...	...	...	23	17
PHYSICAL & HEALTH EDUCATION	...	...	...	...	25	10
SECONDARY SCHOOL						
AGRICULTURE	44	33	...	...	5	8
ART	87	44	29	25	132	147
BUSINESS EDUCATION	380	252	64	69	46	48
DISTRIBUTIVE EDUCATION	20	15	...	...	...	...
ENGLISH LANGUAGE ARTS(TOTAL)	484	394	101	2	405	353
ENGLISH	355	290	101	...	376	324
JOURNALISM	...	...	...	1	...	...
SPEECH AND DRAMATIC ARTS	129	104	...	1	29	29
FOREIGN LANGUAGES(TOTAL)	172	141	24	...	140	113
FRENCH	93	69	20	...	77	64
GERMAN	2	4	2	...	10	12
LATIN	...	...	...	...	1	4
RUSSIAN	...	1	...	...	...	...
SPANISH	42	33	2	...	52	33
OTHER	35	34	...	...	...	...
HOME ECONOMICS	155	175	90	23	79	75
INDUSTRIAL ARTS	66	52	30	34	47	40
JUNIOR HIGH SCHOOL(GENERAL)	1	2	106	79	...	2
MATHEMATICS	220	208	48	69	155	180
MUSIC	159	138	27	32	91	68
PHYSICAL & HEALTH EDUCATION	423	389	31	111	203	142
NATURAL & PHYSICAL SCIENCES (TOTAL)	150	126	52	55	130	123
SUBJECT NOT SPECIFIED	19	15	2	3	7	6
GENERAL SCIENCE	21	19	21	26	15	15
BIOLOGY	86	72	23	23	81	78
CHEMISTRY	21	17	3	3	16	16
PHYSICS	3	3	3	...	11	8
SOCIAL STUDIES(TOTAL)	527	396	157	...	512	435
SUBJECT NOT SPECIFIED	484	362	114	...	204	148
HISTORY, GEOGRAPHY	40	33	40	...	286	271
ECONOMICS, SOCIOLOGY, PSYCHOLOGY	3	...	3	...	22	16
OTHER SOCIAL STUDIES	...	1	...	...	...	...
TRADE, INDUSTRY, TECHNOLOGY	9	16	...	3	...	...
OTHER SECONDARY SUBJECTS	5	13	1	2	...	...
SECONDARY-SCHOOL TOTAL	2,902	2,394	760	504	1,945	1,734
UNGRADED						
SPECIAL EDUCATION	90	72	28	22	38	49
LIBRARIAN	42	39	...	...	13	13
GUIDANCE COUNSELOR	188	142	...	...	14	38
SCHOOL PSYCHOLOGIST	...	...	...	...	1	6
SCHOOL SOCIAL WORKER	...	...	...	...	...	...
SCHOOL NURSE	...	...	...	...	...	...
OTHER UNGRADED	242	255	...	...	...	...

TABLE A. -- NUMBER OF STUDENTS COMPLETING PREPARATION FOR STANDARD TEACHING CERTIFICATES, BY TYPE OF PREPARATION, YEAR, AND STATE (CONTINUED)

TYPE OF PREPARATION COMPLETED BY STUDENT	MASSACHUSETTS 1970	MASSACHUSETTS 1969	MICHIGAN 1970	MICHIGAN 1969	MINNESOTA 1970	MINNESOTA 1969
ELEMENTARY-SCHOOL TOTAL	4,080	3,833	5,818	4,226	2,867	3,412
REGULAR INSTRUCTION	3,795	3,702	5,583	4,026	2,853	3,375
SELECTED SUBJECTS(TOTAL)	285	131	235	200	14	37
ART	81	24	101	97	2	8
FOREIGN LANGUAGES	28	...	35	29	...	...
MUSIC	6	7	67	43	7	18
PHYSICAL & HEALTH EDUCATION	170	100	32	31	5	11
SECONDARY SCHOOL						
AGRICULTURE	...	...	33	30	41	31
ART	75	50	374	258	215	194
BUSINESS EDUCATION	211	201	648	493	200	183
DISTRIBUTIVE EDUCATION	...	...	54	43	10	11
ENGLISH LANGUAGE ARTS(TOTAL)	1,125	982	2,010	1,452	757	743
ENGLISH	1,090	926	1,591	1,191	584	590
JOURNALISM	...	...	33	25	1	1
SPEECH AND DRAMATIC ARTS	35	56	386	236	172	152
FOREIGN LANGUAGES(TOTAL)	396	369	494	332	263	285
FRENCH	222	222	194	124	97	113
GERMAN	22	17	71	54	69	82
LATIN	70	71	44	32	7	7
RUSSIAN	10	3	20	7	6	7
SPANISH	66	48	165	113	83	76
OTHER	6	8	...	2	1	...
HOME ECONOMICS	129	104	368	235	166	156
INDUSTRIAL ARTS	...	...	241	216	188	190
JUNIOR HIGH SCHOOL(GENERAL)	8	1	...	1	2	3
MATHEMATICS	376	329	648	492	319	311
MUSIC	71	93	348	278	276	223
PHYSICAL & HEALTH EDUCATION	494	410	788	641	489	439
NATURAL & PHYSICAL SCIENCES (TOTAL)	496	350	703	527	304	270
SUBJECT NOT SPECIFIED	138	105	6	13	...	2
GENERAL SCIENCE	80	43	96	81	68	67
BIOLOGY	198	133	456	342	154	140
CHEMISTRY	31	32	93	51	54	38
PHYSICS	49	37	52	40	28	23
SOCIAL STUDIES(TOTAL)	1,167	1,025	2,068	1,680	834	716
SUBJECT NOT SPECIFIED	415	384	519	408	202	189
HISTORY, GEOGRAPHY	679	584	1,060	872	431	350
ECONOMICS, SOCIOLOGY, PSYCHOLOGY	66	41	362	259	55	53
OTHER SOCIAL STUDIES	7	16	127	141	146	124
TRADE, INDUSTRY, TECHNOLOGY	1	...	93	87	...	...
OTHER SECONDARY SUBJECTS	16	7	128	82	1	1
SECONDARY-SCHOOL TOTAL	4,565	3,921	8,998	6,847	4,065	3,756
UNGRADED						
SPECIAL EDUCATION	225	237	672	504	212	179
LIBRARIAN	1	17	75	63	55	45
GUIDANCE COUNSELOR	91	203	...	2	129	111
SCHOOL PSYCHOLOGIST	...	...	...	...	...	...
SCHOOL SOCIAL WORKER	...	...	...	...	...	...
SCHOOL NURSE	...	...	...	...	...	...
OTHER UNGRADED	11	...	...	...	101	83

TABLE A. -- NUMBER OF STUDENTS COMPLETING PREPARATION FOR STANDARD TEACHING CERTIFICATES, BY TYPE OF PREPARATION, YEAR, AND STATE (CONTINUED)

TYPE OF PREPARATION COMPLETED BY STUDENT	MISSISSIPPI		MISSOURI		MONTANA	
	1970	1969	1970	1969	1970	1969
ELEMENTARY-SCHOOL TOTAL	1,740	1,406	2,599	2,467	655	634
REGULAR INSTRUCTION	1,732	1,390	2,578	2,454	653	633
SELECTED SUBJECTS(TOTAL)	8	16	21	13	2	1
ART	6	12	3	1	...	...
FOREIGN LANGUAGES	...	...	...	3	...	...
MUSIC	2	4	4	2	2	1
PHYSICAL & HEALTH EDUCATION	...	...	14	7	...	...
SECONDARY SCHOOL						
AGRICULTURE	71	53	51	49	6	13
ART	70	54	210	181	50	46
BUSINESS EDUCATION	407	334	312	271	85	73
DISTRIBUTIVE EDUCATION	2	2	6	4	6	6
ENGLISH LANGUAGE ARTS(TOTAL)	446	472	899	771	181	160
ENGLISH	345	358	746	652	179	157
JOURNALISM	14	13	6	7	...	...
SPEECH AND DRAMATIC ARTS	87	101	147	112	2	3
FOREIGN LANGUAGES(TOTAL)	57	49	193	198	50	53
FRENCH	32	21	77	73	20	18
GERMAN	...	4	15	11	9	9
LATIN	3	...	6	10	2	2
RUSSIAN	...	...	...	...	1	2
SPANISH	22	24	80	96	18	22
OTHER	...	...	15	8	...	...
HOME ECONOMICS	184	193	265	224	59	57
INDUSTRIAL ARTS	164	104	175	157	13	25
JUNIOR HIGH SCHOOL(GENERAL)	...	2	...	...	...	...
MATHEMATICS	189	151	271	281	53	58
MUSIC	184	144	228	196	41	29
PHYSICAL & HEALTH EDUCATION	497	443	681	411	148	125
NATURAL & PHYSICAL SCIENCES (TOTAL)	177	138	280	251	93	97
SUBJECT NOT SPECIFIED	8	4	6	6	10	11
GENERAL SCIENCE	23	33	24	25	27	25
BIOLOGY	121	93	208	184	45	48
CHEMISTRY	25	7	28	26	9	11
PHYSICS	...	1	14	10	2	2
SOCIAL STUDIES(TOTAL)	796	550	876	771	225	219
SUBJECT NOT SPECIFIED	645	364	454	493	104	104
HISTORY, GEOGRAPHY	56	143	298	207	120	103
ECONOMICS, SOCIOLOGY, PSYCHOLOGY	76	39	74	51	1	3
OTHER SOCIAL STUDIES	19	4	50	20	...	9
TRADE, INDUSTRY, TECHNOLOGY	50	23	1	1	...	...
OTHER SECONDARY SUBJECTS	...	1	28	26	2	1
SECONDARY-SCHOOL TOTAL	3,294	2,713	4,476	3,792	1,012	962
UNGRADED						
SPECIAL EDUCATION	99	91	201	149	47	38
LIBRARIAN	48	44	85	68	4	3
GUIDANCE COUNSELOR	58	52	135	125	33	45
SCHOOL PSYCHOLOGIST	38	25	...	...	...	...
SCHOOL SOCIAL WORKER	...	...	...	...	...	...
SCHOOL NURSE	...	...	...	1	...	...
OTHER UNGRADED	...	1	28	48	...	4

TABLE A. - NUMBER OF STUDENTS COMPLETING PREPARATION FOR STANDARD TEACHING CERTIFICATES, BY TYPE OF PREPARATION, YEAR, AND STATE (CONTINUED)

TYPE OF PREPARATION COMPLETED BY STUDENT	NEBRASKA		NEVADA		NEW HAMPSHIRE	
	1970	1969	1970	1969	1970	1969
ELEMENTARY-SCHOOL TOTAL	1,762	1,718	173	170	471	453
REGULAR INSTRUCTION	1,710	1,680	173	170	460	448
SELECTED SUBJECTS(TOTAL)	52	38	...	...	11	5
ART	26	20	...	...	7	3
FOREIGN LANGUAGES	2	7	...	...	1	1
MUSIC	4	4	...	...	3	1
PHYSICAL & HEALTH EDUCATION	20	7	...	...	...	...
SECONDARY SCHOOL						
AGRICULTURE	43	40	2	...	3	4
ART	96	74	12	9	20	23
BUSINESS EDUCATION	222	184	14	11	29	35
DISTRIBUTIVE EDUCATION	...	9	...	...	...	...
ENGLISH LANGUAGE ARTS(TOTAL)	473	395	44	40	110	97
ENGLISH	372	316	33	35	110	97
JOURNALISM	16	11	...	1	...	...
SPEECH AND DRAMATIC ARTS	85	68	11	4	...	...
FOREIGN LANGUAGES(TOTAL)	99	98	11	12	38	54
FRENCH	37	66	3	5	26	47
GERMAN	15	11	1	2	4	2
LATIN	2	3	...	...	2	...
RUSSIAN	...	...	...	...	...	...
SPANISH	43	18	7	5	6	5
OTHER	2	...	...	...	...	...
HOME ECONOMICS	185	195	6	7	41	37
INDUSTRIAL ARTS	126	109	2	...	30	31
JUNIOR HIGH SCHOOL(GENERAL)	1	60	...	...	...	...
MATHEMATICS	150	170	9	7	64	57
MUSIC	147	113	6	7	22	25
PHYSICAL & HEALTH EDUCATION	417	302	40	39	115	49
NATURAL & PHYSICAL SCIENCES (TOTAL)	165	135	20	23	54	69
SUBJECT NOT SPECIFIED	6	12	...	...	3	14
GENERAL SCIENCE	30	21	1	2	18	7
BIOLOGY	95	75	13	12	33	40
CHEMISTRY	25	17	4	2	...	8
PHYSICS	9	10	2	7	...	...
SOCIAL STUDIES(TOTAL)	436	383	54	55	193	165
SUBJECT NOT SPECIFIED	183	175	...	3	102	89
HISTORY, GEOGRAPHY	208	161	39	39	69	57
ECONOMICS, SOCIOLOGY, PSYCHOLOGY	31	40	7	8	22	19
OTHER SOCIAL STUDIES	14	7	8	5	...	...
TRADE, INDUSTRY, TECHNOLOGY	...	...	...	1	...	...
OTHER SECONDARY SUBJECTS	27	26	9	2	...	...
SECONDARY-SCHOOL TOTAL	2,587	2,293	229	213	719	646
UNGRADED						
SPECIAL EDUCATION	31	31	22	17	1	2
LIBRARIAN	12	13	1	...	8	5
GUIDANCE COUNSELOR	56	52	21	15	...	19
SCHOOL PSYCHOLOGIST	...	...	1	1	...	...
SCHOOL SOCIAL WORKER	...	...	...	...	...	...
SCHOOL NURSE	...	...	...	...	...	...
OTHER UNGRADED	35	57	...	...	...	19

TABLE A. -- NUMBER OF STUDENTS COMPLETING PREPARATION FOR STANDARD TEACHING CERTIFICATES, BY TYPE OF PREPARATION, YEAR, AND STATE (CONTINUED)

TYPE OF PREPARATION COMPLETED BY STUDENT	NEW JERSEY		NEW MEXICO		NEW YORK	
	1970	1969	1970	1969	1970	1969
ELEMENTARY-SCHOOL TOTAL	3,063	2,974	349	305	11,400	10,522
REGULAR INSTRUCTION	2,994	2,924	347	302	11,069	10,210
SELECTED SUBJECTS(TOTAL)	69	50	2	3	331	312
ART	30	22	...	...	48	49
FOREIGN LANGUAGES	...	...	...	...	39	33
MUSIC	39	28	2	3	112	123
PHYSICAL & HEALTH EDUCATION	...	...	...	...	132	107
SECONDARY SCHOOL						
AGRICULTURE	6	5	13	15	15	15
ART	282	230	16	6	853	816
BUSINESS EDUCATION	309	260	50	51	412	398
DISTRIBUTIVE EDUCATION	36	20	2	3	64	47
ENGLISH LANGUAGE ARTS(TOTAL)	752	703	91	78	2,490	2,369
ENGLISH	639	617	82	71	2,121	2,027
JOURNALISM	...	...	1	...	138	111
SPEECH AND DRAMATIC ARTS	113	86	8	7	231	231
FOREIGN LANGUAGES(TOTAL)	341	291	42	34	1,164	1,002
FRENCH	146	126	2	7	499	378
GERMAN	21	13	...	...	43	82
LATIN	17	22	...	...	30	42
RUSSIAN	1	...	...	...	16	15
SPANISH	152	129	38	25	500	418
OTHER	4	1	2	2	76	67
HOME ECONOMICS	133	100	26	29	385	353
INDUSTRIAL ARTS	208	184	34	22	406	367
JUNIOR HIGH SCHOOL(GENERAL)	66	81	...	...	136	163
MATHEMATICS	462	413	25	24	1,186	1,077
MUSIC	211	185	16	22	504	507
PHYSICAL & HEALTH EDUCATION	490	414	103	93	887	766
NATURAL & PHYSICAL SCIENCES (TOTAL)	332	313	30	42	846	759
SUBJECT NOT SPECIFIED	50	72	2	2	188	131
GENERAL SCIENCE	109	153	4	5	77	75
BIOLOGY	134	75	21	31	425	396
CHEMISTRY	23	6	3	3	109	102
PHYSICS	16	7	...	1	47	55
SOCIAL STUDIES(TOTAL)	685	667	106	101	2,453	2,202
SUBJECT NOT SPECIFIED	401	465	30	53	2,144	1,814
HISTORY, GEOGRAPHY	130	74	58	25	216	255
ECONOMICS, SOCIOLOGY, PSYCHOLOGY	1	1	4	2	1	17
OTHER SOCIAL STUDIES	153	127	14	21	92	116
TRADE, INDUSTRY, TECHNOLOGY	...	...	3	3	2	1
OTHER SECONDARY SUBJECTS	45	21	...	...	79	108
SECONDARY-SCHOOL TOTAL	4,358	3,887	557	523	11,382	10,950
UNGRADED						
SPECIAL EDUCATION	354	346	22	18	495	516
LIBRARIAN	1	12	4	3	375	296
GUIDANCE COUNSELOR	302	295	25	18	438	472
SCHOOL PSYCHOLOGIST	38	24	...	...	130	127
SCHOOL SOCIAL WORKER	6	4	...	...	224	112
SCHOOL NURSE	80	70	...	...	18	53
OTHER UNGRADED	290	263	...	2	384	402

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ABSTRACT

This document contains papers intended to identify problems and issues confronting institutional research and to assess the measured response of institutional researchers. The following general topics are covered: (1) the campus and its environment, (2) allocation of college and university resources, (3) faculty workload and effectiveness, (4) student characteristics and achievement, (5) institutional change, (6) institutional research methodologies, (7) quantitative methods, and (8) the information revolution. A related document is ED 044 785. (LLR)

THE CHALLENGE AND RESPONSE OF INSTITUTIONAL RESEARCH

Proceedings of the
Ninth Annual Forum on Institutional Research
Sponsored by the
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Edited by
Cameron Fincher

THE ASSOCIATION FOR INSTITUTIONAL RESEARCH

1970

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FOREWORD

The theme of the Ninth Annual Forum on Institutional Research was "The Challenge and Response of Institutional Research." The Forum was held in Chicago, Illinois, during May 5-8, 1969, and an effort was made to identify the problems and issues confronting institutional research as a budding profession as well as to assess the "measured response" of institutional researchers.

As in previous published Proceedings of the Annual Forum, it has not been possible to include the clinics conducted on the first day of the Forum or the panel discussions held at various times throughout the meeting. It has been possible, however, to include several selected panel presentations along with the customary President's address, invited addresses, and contributed papers. The Editor sincerely hopes that these will represent with fidelity the gist of the Forum.

Limitations of space have necessitated not only the condensation of many contributed papers but the omission of many tables, charts, and graphs. In many cases the contributing author will find the editing of his paper excessive, if not downright brutal. The Editor can only offer his abject apologies and trust that the essential content and actual value of each contribution has not been destroyed. The Editor cannot escape full responsibility, however, and he asks that readers who desire more complete information about a particular paper contact the author directly.

Many members of the Association for Institutional Research will regard the publication of these Proceedings as inexcusably tardy. To such a charge the Editor can only enter the plea of nolo contendere and add that he has been able to rationalize most of the delay as unavoidable. Yet, his sincerest apologies go to the Association and its members.

An expression of appreciation must be given to the many persons who contributed time and effort to this publication. Not only are thanks due those who gave invited addresses or contributed papers but also to the many members of the Association who participated in the workshops or appeared on the various panels. As in the 1968 Proceedings, the competent typing of Mrs. Nina Berkley must be acknowledged; her speed and accuracy were certainly no cause for the delay in publication. Once again, the Proceedings have had the valuable assistance of Joseph Moorman who assisted in numerous ways, and special appreciation must be given Mrs. Alicia Hobbs who proofread type, checked grammar, and caught many an error. Lastly, a final careful reading was graciously given the manuscript by Mrs. Jean Bronfin. Such excellent assistance should absolve the Editor from blame for any errors remaining, but it cannot and it does not.

March 4, 1970

Cameron Fincher

ASSESSING PROGRAM QUALITY

Joe L. Saupe
Director of Institutional Research
University of Missouri

When I recently faced the fact that I would be called upon to make a presidential address (after first wondering if the custom that brings us together this evening is not already anachronistic) I quite naturally turned to the printed versions of the addresses of my predecessors. John Stecklein with his memorable lost page, Jim Montgomery with his circular administration building, and Lee Hull, with his "fact, myth, and doubt" have more than ably discussed the history, the present and the future of our Association and of our work, institutional research. They could not be topped. As a consequence, I decided to address myself to a specific substantive issue in higher education, one that it seems to me, should be of concern to each of us. The issue is the assessment of program quality.

Everyone talks about quality or excellence, but nobody does anything about it. Now, this is an overstatement, certainly; but it is sometimes fair, I think, to overstate in order to make a point. It has been our corporate inability to come to grips in specific and meaningful ways with the concept of quality in educational programs that underlies my contention that not very much has been done about it. To be sure, quality has been viewed as low student-faculty ratios and this view has guided actions. Quality has also been viewed as distinguished faculty and some of these have been recruited in its name. Indeed it is the latter view that seems to underlie the well-known Cartter report. These views may be applauded, if only on the basis that they have provided grounds for action. They are at least superior to the view that quality is intangible, undescribable, and, consequently, unassessable. The logical implication of this view is that in fact there is nothing that a college or university can do about the quality of its programs. If this were the case we would do better to stop talking about it, and get on with more practical problems. But this is an area that we can not in good conscience treat in so cavalier a fashion. We must, I think, continue the search.

It is clear to me, at least for now, that the student-faculty ratio, distinguished faculty, and similar single-dimension views of quality in higher education are overly restricted and may be inappropriate guides to action. I would hope that what I have to say might not only convince you that these views are too narrow, but would also suggest an alternative view that has some merit. It is easy to be critical, but criticism is most helpful when alternatives are proposed.

My remarks derive from a very intensive effort we have initiated the past year at the University of Missouri. This effort has been directed towards developing a concept of and assessment procedures for graduate program quality. Consequently, I can claim little, if any, credit for any originality that may appear in what follows; my colleagues have contributed much. I will, of course, accept responsibility for the limitations of these remarks. Indeed, the ideas expressed here have already received some fire in discussions with University of Missouri faculty groups, following their review of the position papers which we prepared as a stimulant to these discussions.

We have directed our first efforts to graduate programs and you may notice this focus in some of my remarks. We had to start somewhere and our efforts will be extended to undergraduate programs. I don't apologize for not giving you a complete and final set of procedures for the assessment of quality. It is important that in this controversial area, there be room for you, your administrative officers, and your faculties to reason together on central issues and procedures.

Purposes of Quality Assessment

Why should we attempt to assess program quality? Simply stated, because we talk about it all the time. A little more specifically, each of our colleges and universities is committed to maintaining and developing quality in its programs and in the absence of a concept and evidence of quality this commitment is hollow. Even more to the point is the fact that program quality is what education is all about and this fact should force institutions of higher education to take it into explicit consideration in all matters of decision making, management, and planning.

Another approach to answering this question of why quality assessment is needed lies in what it should be able to do for us. I will suggest five specific purposes of program quality assessment.

New Programs

The expansion of knowledge and its reorganization into new categories, the natural desire to expand offerings to higher degree levels, the attempt to attract attention through breadth of offerings, and a sincere desire to satisfy social needs for trained manpower in special areas all prompt our faculties to ask for authorization to offer new programs. New program proposals compete among themselves and with existing programs for scarce resources. On what basis should decisions for approval of such proposals be made? Clearly, in any rational process, the mission of the institution and the relation of the proposed program to this mission and to existing programs is a central consideration, as is student and social demand for the program. The most crucial consideration, however, has to be the degree of quality promised by the program. If a meaningful concept of program quality exists, then proposed programs can at least be ranked on the basis of quality promised and, other considerations being equal, the program of highest promised quality can be given priority. Even if the other considerations are not equal, no college or university with integrity will institute a new program without a promise of some acceptable level of quality, no matter how significant the need for the program on other bases. Program quality should be a central consideration in the review of new program proposals and this consideration should be based upon a meaningful concept of quality and how it may be assessed.

Existing Programs

The assessment of quality of existing programs can do two important things for the college or university that is interested in implementing its commitment to quality. First, it can provide a ranking or, at least, a categorization of

these programs on the basis of their relative quality. (As an aside I will mention here that it is probably inappropriate to compare diverse programs, say philosophy and physics, by the same standards. But in some way or another the diverse programs must be reflected on a common quality scale.) The ranking or categorization of programs may lead to the identification of some programs of high quality. These programs, in general, must be supported and nourished in a manner that will maintain this quality and the institutional leadership it signifies. Another group of programs will be identified as possessing adequate, but not high, quality. With this identification, and by bringing other obvious considerations to bear, decisions as to which of these programs should be maintained at just this level of quality and which should be nourished with the specific intent of raising their quality to the high category can be made. Finally, some programs will certainly be identified as possessing substandard quality. It is largely within this group that candidates for discontinuance can be found. If a substandard program is not marked for termination, the institution automatically marks it for specific attention directed towards increasing its quality to at least the "adequate quality" category. Specific evidence on quality may be the critical factor in permitting an institution to do what everyone knows should from time to time be done, but seldom is, and that is to prune academic programs.

The second service that quality assessment of existing programs can provide is to identify the specific program characteristics of the program which need attention if its quality is to be raised. This point leads me to the third potential benefit of quality assessment.

Guidelines for Budget Support

The idea of program quality assessment should provide guidelines for use by departments in requesting budget support for program or quality improvement purposes. The identification of program weaknesses should be expected to reveal the specific manners in which money may be deployed to alleviate the weaknesses and thereby enhance overall program quality.

To digress a moment, I would point out that the quality dimension is so central to higher education that its explicit consideration is what should distinguish program-planned budgeting for higher education from its application to other areas of human endeavor. With our computerized and even our implicit models of college or university operation, budgets for program continuation can be calculated in a largely automatic fashion on the basis of enrollment projections, course enrollment cross-over matrices, inflation factors, and the likes. Others have dealt with this topic; I will not pursue it here. The point is that the automatic calculation of continuation budgets allows the institution to focus program and budget attention where it should be focused--upon program improvement and new program budgets. Departments which identify specific weaknesses in their programs through quality assessment may, with the specificity required by the idea of program-planned budgeting, request money for program improvement. Program improvement requests then may be allowed to compete in a meaningful manner in the arena of scarce resources and, perhaps, with new program requests. Priorities can then be attached to such requests and they can be funded as far down the list as the money lasts. As with others of my statements, this one is oversimplified, but it does point up what I mean by using program quality assessment to facilitate budgeting for quality improvement.

Cost-Benefit Analysis

Quality assessment is also the basis for the cost-benefit analysis of new program and program quality improvement expenditures. By this I mean that after a new program has been instituted, the degree to which the quality it promised has developed should be determined, and ex post facto reviews of the impact of program improvement budgets should be carried out. Quality assessment is the means for these types of analyses.

Necessity of Research

Finally, and in a slightly different vein, the following proposals for quality assessment must be subjected to research in order to estimate the procedure's validity and as a basis for revisions in the procedure. In language this group will understand, what I have to propose may be considered to be a model. The research I speak of here would be directed towards a validation of this model.

A Concept of Quality for Assessment

I hope it has not been procrastination which has led me to delay so long this evening in facing up to necessity of suggesting a definition of program quality. At this point I am beginning to feel like the chef in the restaurant which advertised that "We serve everything." A patron, noticing the sign with this slogan, ordered an elephant sandwich. The waiter took the order and after a consultation with the chef, had to inform the customer that they couldn't kill a whole elephant for just one sandwich.

The matter of program quality is certainly an elephant. Perhaps, if I can produce a single sandwich for us to chew on without killing the elephant, that will be enough. Clearly, the quality of an educational program is indicated by the impact of the program on the behavior of the students who participate in that program. This statement has direct implications for program quality assessment and, indeed, it has served as a guide for some research on quality. For any particular program, of course, the statement needs to be fleshed out. What behaviors is the program designed to change and in what directions? Behavior, of course, must be broadly viewed and probably needs to include covert and affective as well as overt and intellective behavior. Also, how can behavior change be measured or assessed? Again, others have dealt with these questions and I will not review their work. However, I will assert that while as recently as ten years ago the measurement technology for first approximation assessment of relevant behavior changes did not exist, such tools are available to us now. We are merely avoiding the problem if we continue to hide behind the folklore that it cannot be done.

But there are problems in restricting our view of program quality to that provided by the behavior change framework. One of these is that we should be concerned with quality assessment as a basis for action and the behavior change approach to quality assessment takes time. For undergraduate programs it takes four years, at least, plus another number of months for data analysis. In any ultimate sense, product measurement would take place at some point in time after the student has left the program. In either case, programs change and the re-

sulting quality assessment would have dubious relevance to the program which existed when the evidence was available.

An even more fundamental problem is that while behavior change may be the ultimate indicator of quality, it provides at best only an indirect assessment of program quality. It cannot be expected to reveal why a program possesses the quality revealed by the assessment. It does not shed light on specific relationships between characteristics of the program and the program's overall quality and it is these characteristics that must be manipulated in an action-effort aimed at program quality. The point is that, though student behavior indicates quality, it does not provide a definition of it. The quality of a program lies in the program itself. Consequently, the assessment of quality must be based upon measures of characteristics of programs. A pseudo-definition of program quality, then, is that it is the combination of program factors that influence student behavior change. Now, I struggled for a few minutes in framing this definition and these words do not satisfy me altogether. Perhaps I would have done just as well to leave quality as an undefined term. You can be the judge.

Where this leads us, however, is to an attempt to identify those program factors or variables that do or should be expected to influence student development and to devise methods for measuring and evaluating these factors. What we are really doing is developing assumptions or hypotheses which assert that given program factors relate to quality as indicated by desirable behavior change. At this point we are ready to begin assessing program quality by means of measurement on program variables. Without forgetting the basic assumptions, we can agree, I think, that it is such a set of measures which provide direct quality assessment and the basis for action.

Furthermore, these direct program measures, in combination with behavior change measures, provide the basis for specifically examining and revising the basic assumptions or hypotheses and of modifying the quality assessment procedure to the end of increasing its validity in reference to student growth. Action on the quality front could be delayed until evidence from this research is in, but if we are impatient, and perhaps we should be, the assumptions and evidence on program variables can provide guides to action while the research evidence is being assembled.

Program Variables for Quality Assessment

What are the program variables that may be relevant to quality? The approach we have used in the University of Missouri effort in identifying measureable program variables related to quality has been based upon a view of a university as a handler of knowledge. A university carries out the interrelated activities of generating knowledge, of transmitting knowledge and those attitudes and intellectual skills and abilities associated with generating, processing, storing, and applying knowledge. Allied with these activities are the integration, analysis and synthesis of knowledge through scholarly and creative work which includes dealing with affective knowledge. This framework has led us to the specification of categories of program variables which reflect (1) the availability of existing knowledge in the field of the program, (2) the existence of effective knowledge transmittal procedures, and because

our effort focuses upon graduate programs, (3) the existence of productive activity in developing new knowledge.

For this paper I will modify these categories slightly and suggest a set of six categories that can be used as a framework for identifying quality variables. You will recognize in all of this the ideas of inputs, resources, processes, and outputs. Thus, perhaps I am talking about a model and, indeed, one day we may be able to identify the linkages in such a way that it will fully deserve to be called that. For the moment, though, I am interested in merely directing attention to the assessment of program quality and in initiating first steps. Therefore, I will not rely heavily on the model concept. The six categories I will use are (1) Program Rationale, (2) Knowledge Resources, (3) Transmission Variables, (4) Research and Scholarly Activities, (5) Support Resources, and (6) Operating Characteristics. Let me deal with each in turn.

Program Rationale

The assumption here is that a quality program will be guided by meaningful goals and objectives and that the design of such a program will be based explicitly on these objectives. Now, it is possible that an anarchial program is at least as effective as one that is guided by objectives, but, as has been amply discussed in other contexts, the nature of desired behavior change and measurement of it are incompatible with an absence of objectives.

It should be clear that my concern is with programs of instruction and with objectives for such programs. Although colleges and universities do intermingle instructional, research, and other activities and should do so on the basis of the mutually reinforcing nature of them, it is the instructional program and the objectives for it that are of concern here and these must as clearly as possible be distinguished from the objectives of research programs. While it may be possible to nourish both birds with a single feed, I would suggest that efforts to improve instruction cannot be completely equated with efforts to improve research, even at the graduate level.

Much can be said about objectives. I want to emphasize just one point and that is that objectives must indicate the competencies the program is intended to develop in its students. One issue for graduate programs is whether teachers, researchers, or teacher-researchers are being trained. Questions of this type must, we all know, be faced.

The second part of the program rationale category has to do with the design of the program, the catalog description of the courses and related experiences provided for the students in the program. It is obvious that this design must be based on the objectives of the program. If an objective of a graduate program is to prepare its students for college teaching, one would expect that provision for relevant experiences, perhaps teaching internships, would appear in the program design.

Program rational variables can be identified and measured for individual programs. At a minimum the existence of meaningful objectives and of a related program design can be scored one, and their absence, zero. Similarly, the relevance of the design to the objectives can be rated. Perhaps even specific questions that program objectives should be expected to answer can be developed

and serve as a basis for judgement. Probably, there is no need to go much beyond this, because there is no reason why a program rationale should not be complete and completely rational.

Knowledge Resources

The assumption underlying this category of variables is simply that program quality is dependent upon the existence of the knowledge that defines the program in convenient places and in retrievable forms. Existing knowledge is the base which is transmitted to students and upon which new information is developed. This base should be not only appropriately broad, but also open-ended. It suggests the existence in the program of faculty, trained to the doctorate, in the specialties required by the program design and of retrievable library and related resources.

The library and related resource centers, either on the campus or accessible in the community or by electronic or other means, is one subcategory and faculty expertise is a second. I will not attempt to detail relevant variables in these categories. My only advice here is that in the identification of variables to reflect library resources and faculty expertise, specific attention should be devoted to the relationship of the variables to the education of students. Faculty accomplishment in research, for example, may be a mark of expertise, but one may question the degree to which it is a relevant component of knowledge resources for instruction.

The idea of a critical mass of faculty for a program will be considered under another heading, but the coverage of the program by faculty expertise is a variable that perhaps best fits here.

Transmission Variables

The assumption underlying this third category of quality variables is that effective knowledge and skill transmittal procedures contribute to student development. Perhaps it is trite to state this assumption, but this is the pattern I have chosen to follow. This category of variables may also have library or resource center and faculty components. Is there a library staff qualified to assist students in the program in an efficient and effective manner? Is available library technology used effectively for instructional purposes, etc?

The faculty transmission side obviously includes any and all of the instructional effectiveness variables that are in the literature and these are certainly central variables in the quality scheme. The matter of student advising, as an indirect component of the transmission process, may be relevant. Are students advised in the directions suggested by the program design? The adequacy of thesis guidance is a variable for graduate programs and the pervasive factors of faculty accessibility, supportiveness, and rapport with students can be considered for any program.

Faculty evaluation has often included attention to initiative and efforts at innovation in instruction and curriculum, and while the results of such innovations may appear as pluses in the instructional effectiveness complex,

the existence of instructional experimentation may carry a "halo effect" that transforms faculty dedication and enthusiasm into student motivation and enhanced learning.

Finally, students themselves may initiate and carry on non-class activities in connection with the program that result in enhanced transmission of knowledge, skills, and attitudes. Student clubs and student-sponsored seminars are illustrative. As we talk about the student's responsibility for learning, we cannot ignore indicators of this type as measures of program quality.

Research and Scholarly Activities

This class of variables applies particularly, but perhaps not solely, to graduate programs. The assumption is that the climate produced by, as well as active student participation in, research and related scholarly and creative activities enhances student learning in desirable directions. Perhaps this enhancement is most directly related to training in research competence for students in graduate programs and it is this type of rationale that most directly connects research with graduate programs. The connection provided by faculty and knowledge growth as basic to undergraduate and graduate instruction is less direct.

Specific variables that could be measured with respect to this category can be identified with respect to the following four attributes of research and scholarly activity. One, the volume of this type of activity is simply the extent to which activities of this type exist. This may be considered to be a dimension of input. Two, the volume of production from the activities is the simple, unevaluated, output dimension and would be revealed by counts of completed projects, publications, and the like. It must be recognized that there will be a time lag between the activity and measurable evidence of its output. Three, the quality and significance of the production has to do with the efficacy and style, the clarity of purpose, the appropriateness of technique, the extent of development from and articulation with existing knowledge, the clarity of communication, and even its ultimate social impact. Measures would include the "referred journal" publication count, peer ratings, and others. This attribute would clearly be significant in the assessment of quality of research programs and is probably of more significance than the preceding two in the assessment of instructional program quality.

But of even more importance may be the degree and style of student involvement. Great research programs may be operated without students or at least with a style of student involvement that can be expected to contribute only marginally to student development. The extent to which graduate students are involved in ongoing faculty research and the extent to which this involvement is of a type that should be expected to contribute to their development of research competence, in particular, can be estimated.

Support Resources

This fifth category of quality variables is based upon the assumption that physical, financial, and emotional support by the college or university for a program is necessary, if maximum student learning is to occur. The effect of

these types of support variables may be mediated through other categories of quality variables, but at least in an experimental program of quality assessment these variables deserve attention. Included here are amounts and adequacy ratings of physical facilities--space and equipment for teaching and research; levels of institutional and, perhaps, extramural financial support for the program; secretarial, clerical, and technical support; business procedures support; support from related academic departments; and even the emotional support of the administration. Many or all of these types of variables can be measured.

Operating Characteristics

This final set of quality variables is considered here because they include some traditional measures of quality and because they may be useful as indicators of program quality even if they are not as integrally related to quality as may be the variables of the preceding categories. I will not try to offer a general definition of the term "operating characteristics" nor will I attempt to state the assumptions of the relationships of these factors to student development. In some cases this type of assumption would be awkward at best. Perhaps the consideration of these variables can be justified on the basis of tradition and for the sake of completeness. I will suggest three subcategories of program operating characteristics.

(a) Program Magnitude. While it certainly cannot be claimed that size is a direct or even highly relevant indicator of quality, it is to be expected that a quality program will attract students and faculty. Furthermore, there is some rationale that suggests that a program cannot achieve quality in the absence of some minimum magnitude which may be expressed in terms of "critical masses" of students and faculty. This may be the point at which to consider the proportion of students in the program who are studying on a full- as opposed to a part-time basis. Perhaps each program should undergo analyses designed to reveal what these critical masses for it should be and how it serves the special needs of part-time students. But I am getting close to talking about efficiency or productivity and this comes later.

(b) Program Growth. At least up to some maximum planned size a quality program should be expected to grow in magnitude (students, faculty, degrees, and resources). Program growth may be expected to reveal something about the vitality and momentum of the program.

(c) Program Efficiency and Productivity. Efficiency and effectiveness, that is, quality, are often considered to be independent, one of the other. In fact they may be separable and it is certainly desirable to avoid confusing the two. Yet, much as reliability is a requisite for validity in measurement, efficiency may be a component of quality in educational programs. Purposive and vital programs may be expected to be efficient and productive and the former two attributes are clearly related to quality. Specific variables for measurement might include some relevant student-faculty

ratio, degrees granted per faculty member, degrees per student enrollment, and average time to complete the degree. There are others.

Program Measures and Quality Assessment

To summarize to this point, we have talked about behavior change as the ultimate criterion of program quality and have suggested, without being specific, that relevant measures of behavior change can be applied. Then we have discussed six categories of program quality variables and the assumptions that relate these to program quality. I have not extended this discussion to the identification of all of the individual variables that can be derived from this sort of analysis. In our University of Missouri effort we have identified nearly one hundred program variables using this type of analysis. Very clearly, our next step will be to examine this list very carefully to the end of reducing it to some more manageable number while making certain that each category is adequately covered. This will be a critical step and we plan to do it.

What remains is to identify the specific procedures by which measures on these quality variables may be obtained and at this point I will merely suggest some of the measurement approaches that are available. Some of the measures will, initially at least, be crude and subjectivity will be involved. Clearly, equal-interval measurement will be the exception rather than the rule. The following list illustrates available measurement procedures:

(1) Regular institutional operating record systems can provide data on enrollments, faculty, degrees granted, finances, space, and other items.

(2) An exit questionnaire for degree recipients can be developed to yield not only evidence on behavior change and graduate competency, but also student evaluations of relevant program variables.

(3) Annual activity, accomplishment, and program evaluation reports by faculty members can be used.

(4) A special, more-or-less standardized annual report for each program by the department chairman may be required.

(5) For proposed new programs, the proposal document should provide the basic data required and rating scales can be developed for use in conjunction therewith.

(6) A program statement, including objectives, rationale, and program design should be available for each program offered or proposed. The structure of this statement can be explicitly specified and ratings of it can be made.

(7) Ratings and judgements by outside consultants will be used for some program variables. The appropriate variables can be specified and rating scales standardized.

This list is not exhaustive. As specific variables for quality assessment are selected, other measurement procedures will be suggested.

What will result will be a set of measures for each program in some more-or-less standard framework. These may be aggregated by weighting according to some initially subjective basis or may be presented in a profile format as a basis for overall program quality assessments.

The resulting measures must be interpreted by reference to some set of standards. Because of basic differences among programs, these standards cannot be uniform for all programs. Ideally, national standards based upon corresponding measures for a reference group of corresponding programs across the country would be used. For many variables, at least for the present, such explicit standards will not be available. Implicit and relative standards must then be employed.

Clearly, national standards should be used where they are available. Consultants can be asked to make their evaluations on the basis of their knowledge of national standards. For other variables it may be possible to develop fixed institutional standards based upon the nature and requirements of individual programs. Critical numbers of students and faculty for programs may be established in this manner.

For those variables which require faculty or student ratings and evaluations, absolute internal standards may be required. The rating by a faculty member or student of some aspect of a program as "excellent," "fair," or "poor" may be allowed to speak for itself without reference to any outside standard or criterion.

A Program of Program Quality Assessment

You may by now be thinking to yourself that the magnitude of what I have been proposing makes the undertaking of this type of systematic program quality assessment unfeasible, if not impossible and, to be sure I do not underestimate the magnitude of the task. However, despite the fact that we have been meeting our classes for one or two hundred years without such a program of quality assessment, we are convinced at the University of Missouri, at least, that such a program is essential. We recognize that it won't be set in motion in a day and are talking more in terms of years. I am confident that by the end of five years we will be well underway and that by then we will be making many types of academic and fiscal decisions on the basis of evidence of program quality. I challenge you to think about it in these terms, too.

I would pose one further question. Where should the responsibility for quality assessment lie? As I see it there will be some central system for recording the evidence and some uniform sets of guidelines that will be central to the effort. However, and this is fundamental, the quality assessment program must be both developed and applied on a broad base and with faculty understanding and, hopefully, acceptance and support. To this end we are now holding faculty seminars on the topic and are both communicating the intent of the effort and soliciting ideas and suggestions for it. Faculty participation is essential.

If program quality assessment is to be valid and useful, it cannot be imposed from on high. We expect that such a program will be carried out in departments in an essentially self-study manner. Specifically, responsibility will rest with the departmental faculty for each program to present through regular channels evidence of program quality in terms of agreed-upon variables and guidelines. Each department may add to the standard set of variables others which it considers relevant to its particular programs.

Central offices, for example, the office of institutional research, may serve to coordinate the effort and to serve as resources to departments for evidence that can be most readily collected centrally. But it will be the department's responsibility to assemble and present the evidence for the necessary central evaluation.

I fully expect that eventually the data base of the university will include a regularized and validated system of accounting for and reporting evidence of program quality and that this system will be as routine and as central in university management and planning as are our present systems of accounting for academic activities, students, and finances. I invite you to share this expectation with me.

UNIVERSITY REFORM AND INSTITUTIONAL RESEARCH

Frederick deW. Bolman
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Demographer Philip Hauser of the University of Chicago has posed an interesting problem for mankind. Let us assume an annual increase in population of one percent--a modest growth by world standards--and a starting population of 50 men and 50 women. After 5000 years the density of population of the land surface of the earth will be 2.9 billion persons per square foot. Bentley Glass brought this bit of intelligence to my attention, gently observing, "Obviously something is going to have to change!" In the same vein, we can say that something is going to have to change about our institutions of learning. The vital difference is that the campus explosion is now, not in the distant future.

I have a gnawing concern about the dilemma change seems to pose for the American character. We are often at one and the same time theoretical and yet wholly pragmatic in our approach to change of all sorts. By that I mean that we love to foresee the future to the nth degree, and we love equally well to do little or nothing until a crisis emerges which forces us to change. For example, urban planning in this country is as old as Pierre L'Enfant in the 18th century. But only riots in the inner cities of America have forced us to consider massive changes.

I am afraid that our approach to change in our colleges and universities is like our approach to change in the cities or our approach to the population explosion. Some 50 years ago Stephens College began institutional research in behalf of change. Since then, institutional research has grown, if not by leaps and bounds, at least fairly steadily. Both ingenious people and outside assistance have helped. Curriculum revisions and experiments in better utilization of teaching resources were sponsored by the Ford Foundation. John Dale Russell and A. J. Brumbaugh sought to bring rhyme and reason into the utilization of space and facilities. Sidney Tickton staged a one-man revolution in behalf of financial long-range planning. Recently the Esso Education Foundation has sponsored educational innovation under its program of Support for Promoting the Utilization of Resources (SPUR). The Carnegie Corporation has now undertaken a long, hard look at the future of colleges and universities. Planning for change was and is the order of the day.

Yet several crises we now face will bring us to change much more rapidly than any of our piecemeal approaches or anything of a theoretical nature. Most dramatic of these crises is the student revolt stretching from Berkeley in 1964 to Harvard in 1969. It seems that somehow our planning failed to limn the problems which have emerged as central in the minds of many of our students. Why? Has institutional research simply been lazy, or at any rate, drowsy? I am deeply disturbed by our neglect. Institutional research must be reoriented to prevent such lapses in the future.

Or consider a second crisis--the financial condition of higher education throughout the nation. Economists point out that the per student cost of higher education over the past decade has escalated somewhere between 7-1/2

and 10 percent--well ahead of the inflation factor. Certainly salary increases have been justified and, in the main, account for such escalation in unit cost. But my complaint is that I hear not enough from institutional research about increasing productivity while in other sectors of our society, such as industry, productivity increases some 3 percent per annum. I am not willing to accept the economists' pleas that education, like the arts, is labor intensive and that efficiency is therefore irrelevant. I shall have something more to say about this later. My point now is that the escalation of unit cost and the increase in our college population has brought us to a crisis in both public and private higher education. Once more institutional research did not work soon enough and hard enough to help avoid our present plight.

A third crisis, engendered by the two just mentioned, may be around the corner, yet few if any persons in or out of institutional research are sending out early warning signals so that we may meet the problem. I refer here to what may suddenly become a widespread public reaction against the entire performance of higher education in America. That may sound unduly fearful, but look to recent history regarding public attitudes toward secondary and elementary education. Arthur Bestor and others sounded the alarm, and suddenly outrage blistered all over the country. It is true that reform of lower education had already begun before Bestor and company began to beat the drum. But those reforms had not come soon enougn or pervasively enough to dampen the zealous attacks by the public and its lay boards of education.

The ivory towerism of our universities may stand them in poor stead. A gale if not hurricane wind of hostile criticism may soon surround our halls of learning if we do not make it abundantly clear to the public that we are in the process of making fundamental improvements within those halls. I foresee outrage of proportions to make the Bestor-engendered hostility look like a Boy Scout camp fire as ever larger parts of our society are dependent upon the output of higher education. Powerful segments of society, public and private, will demand reform. Once more institutional research has done little to help us face or ward off such a crisis.

You may feel that I am taking an unnecessarily dour view of the future of our colleges and universities. But the justification for my views is that institutional research must begin today to take a far broader and more penetrating look at our institutions of higher education, and our administrators and faculty must act quickly on the basis of sound planning and not just wait for each crisis to erupt. It is time that we begin to ask what some call "the dirty questions" and others refer to as "gut issues." Long ago, a Secretary of the Treasury had a little sign on his desk for his staff to note: "Don't tell me the answers. Tell me what the problems are." My interpretation of institutional research is that it must now more than ever guide us so we may really see what the problems are--and then, of course, help us to solutions.

The perennial first issue for all of us is "What should a university be?" The strange thing is that while a few men such as Clark Kerr or James Perkins or Jacques Barzun keep posing the problem, it has required student action to force the question before all members of the academic community. Actually, everyone inside and outside our institutions has both a stake in and hence, to some degree, a say about the nature of the university. I suggest that activities outside the halls of learning should share in the constant task of redefining the role of the university.

Looking ahead, we can surely see that three powerful human resources in our society must be articulated. I refer to higher education, industry, and government. These three foci of organized human activity and development must have increasing organic relatedness, but in such a way that none stifles the values of the others. It was none other than the late President Dwight Eisenhower who warned against too great dominance of "the military-industrial complex." The same warning must be issued for higher education and government. One problem in our society is balance and productivity among power centers.

Perhaps the role of the university which most needs clarification today is its relation to society and to social change. Here I must part company with some of my 18th-century-minded friends who say that the university has been destroyed by its contact with the world of living issues outside its walls. To me this is patent nonsense, unless a so-called community of scholars is an end in itself and scholarship has no relevance to reality. I take it that man developed his three-pound computer by solving important, not just trivial, problems.

The trouble is that administrators are worn thin, to the point where they cannot look at the whole of our institutions, let alone the whole of our social life, and so are unequal to the task of redefining the nature of the university. David Riesman has suggested that what in earlier days was the business of faculty, namely, attending to the nature and function of the university, the latter has given up in its retreat to the guilds. He then recommends that the task must now be undertaken by institutional research. This is a radical and an important prescription and one I wish to underscore.

One difficulty is that institutional research began and has waxed by attending to bits and pieces of the university, whereas its central and continuing role should be to define the nature of that university. Both by the limited nature of its work, as well as the technical skills of the personnel it has thus far attracted, institutional research has been limited and unaware of what it should be and do. Arnold Nash has recommended that more humanists should be placed in our offices of institutional research, and I concur with that suggestion. First and foremost, the problem of institutional research is that of human values and the search for what is good for man. Poets, historians, philosophers and others should direct or at least help direct our efforts to define the ever-changing nature of the university we want.

Only if institutional research can grapple, and grapple successfully, with the big issue of what a university ought to be can it bring any real light to the other two major tasks which I see for it and which it has more traditionally undertaken. I refer now to the matters of managerial efficiency and instructional effectiveness. Sound governance and good learning are what make a good university.

But governance and the learning process must be understood as interconnected, not separate parts of institutional research. Here once more I think institutional research has failed to stress the interconnection and to reveal that when one aspect of the university changes, so must other aspects. This failure probably arises when we have one group of people doing research on institutional data and a wholly separated group doing research on learning and learning resources.

Genuine institutional research should be the nerve center of the institution: it is an early warning system of impending crises, it helps redefine the university, and it aligns the modes of operation so as best to avoid disaster and to achieve goals.

Instructional effectiveness is--or should be--the core concern of the institution. In a sense, everything else is useless or at best meaningless if this is not so. Hardly anyone would dispute the 19th century aims of the university, which were teaching, research and service, although the priorities among them are frequently debated. Increasingly since World War II, faculty have, in fact, acted as if research were the primary function of the university. Recently students have attempted to dramatize their belief that the service of the institution to society is primary. There are moments when it appears that the learning function of the university is downgraded.

George J. Benston of the University of Rochester recently suggested that while universities have of late sought prestige through research, they will soon be forced to realize that their prestige--and support--in the future will be based on successful learning experiences of their students. For survival, universities may have to concentrate on student learning more than on faculty research. We may enter a new, post-research-oriented learning era. This in part is what the student rebellion is about. And present students are future determiners of the finances of our colleges and universities, both public and private.

The issue we are confronted with here is the effective use of human resources on campus--students and faculty. But there is a conflict of goals. The faculty goal is prestige, currently achieved through research and publication, whereas the student goal is successful learning. Questions are beginning to be asked about the need for radical alteration in the reward system for faculty. Should not the engendering of student learning be rewarded by advances in rank and salary equal to, if not greater than, those granted for research? Or at the very least, should we not evaluate research and publication far more carefully than we actually have done in the past?

Institutional research has the task of providing information so that student and faculty resources may best be utilized and fulfilled. Some radically new questions must be asked, and some equally radically new answers should be forthcoming. A new learning technology, a new systematic treatment of learning must come into being faster than is currently promised. We have assumed that a person who knows something can transmit his knowledge to others, but this is not always true and it is not sufficiently true to form the basis of our instructional processes. Worse yet, we assume the knowing man can teach everyone alike and in the same sequence of thoughts and at the same speed, which simply compounds the horrors of what we wish was a community of learning. Some students riot today because they say there is no learning and there is no community, and they feel they alone are asking the penetrating questions and, in the process, achieving for the first time some sense of community.

One great task for institutional research is to discover why there is so much resistance to innovative and creative change in the student learning situation. Paul L. Dressel and Frances H. DeLisle found recently that there is little mobility in the undergraduate curriculum of American higher education. That's one aspect of the problem. Perhaps more fundamental is widespread

faculty resistance to innovation in higher education, stressed recently by Richard I. Evans.

I suspect that at least two items account for our immobility in discovering and applying new methodologies of learning in higher education. The first is the faculty reward system that I have already mentioned. The faculty is really not primarily paid to improve the product, so to speak. And they are never or only rarely downgraded for failure to improve the product. All this seems to me the height of inefficiency and ineffectiveness.

But there is a second reason why innovation is hard to come by on the campus. The university has never really understood research into and development of better learning methodologies. Let me put the matter in terms of another form of organization in our society, namely, industry. In 1966 the electrical and communications industry spent 3.4 percent of net sales on research and development. Does any institution of higher learning spend even 1/2 of one percent of the cost of education on R&D? But the ignorance of universities is worse than that. Of the total expended for R&D in industry, 4.2 percent is expended on basic research, 18.8 percent on applied research, and 77 percent on development so the product may be manufactured. I have not talked to a single academician, even among those seriously committed to innovative improvement, who has known of the true dimensions of R&D or who has the foggiest idea what immense efforts have to be made between the search for an idea and its execution on a massive basis.

Faculty and administrators and the folk in institutional research are all guilty of misunderstanding the task of change in human learning. All tend to rest on the comfortable but potentially explosive assumptions that present methods are best, that teaching is labor intensive, that rewarding faculty for research will develop a better learning community, and that whatever new ideas do by chance come forth can easily be put into practice. The development of scientific agriculture in this country is a shining example of the vigorous pursuit of improvement. An originally dominantly agrarian society we shall soon have less than 20 percent of the population living on rural land and far less than that producing not just all of our food, but lots for the rest of the world. Agriculture succeeded because it had a reward system for improvement and it discovered the real meaning of R&D through experimental and demonstration stations. Higher education has not made even remotely similar progress. And this failure must be laid at the door of institutional research and lack of conviction about the dire need for real strength in institutional research.

Coupled with the need for greater understanding and use of R&D in the learning process is the need for greater investigation and insight into both the social and physical environment of learning. Pace, Stern, Riesman, Jencks and others pioneered the study of the culture of the campus. Affective learning, the process of value formation, and many other areas of undergraduate life have received increasing attention. Living-learning centers have come into being at institutions like Michigan State and Santa Cruz, and they are being evaluated. The Educational Facilities Laboratories, Inc. has helped greatly to revolutionize our thinking about the planning and structure of campus buildings. And architectural firms have done much to develop better campus plans. In all of these areas I see promise for real advance in knowledge about the necessary environment for learning.

The task here for institutional research is to penetrate further into the ecology of the students' and the faculty's lives. While it is often financially rewarding to make class schedules, space utilization, building design and location and all the rest more efficient, too often these activities assume that the present learning environment is generally satisfactory. Institutional research must not be so narrow, but must reach out for the knowledge to change and improve the whole environment of learning. It must be concerned here, as elsewhere, with effectiveness as well as efficiency. Psychologists, sociologists, anthropologists and others must become intensively involved in institutional research if it is to serve the university.

Closely correlated with the need for research into all areas of instructional effectiveness is the need for constant reexamination of all aspects of management. Earlier we suggested that as one part of a university changes, so must other aspects change. If F. M. Cornford was right when he said that the faculty conviction appears to be that nothing should ever be done for the first time, it is equally true that administrators and boards of trustees also often act that way. Once more it has taken the crisis of the student revolt to make many see that the management structure of the university may be completely outmoded.

Fortunately the whole area of the governance of our institutions is beginning to receive some scrutiny, and I only plead that institutional research take into consideration the findings to date and push ahead to further inquiry and analysis. Industry and government have long been working to develop better stratagems for management. Sociologists like Amitai Etzioni have studied complex organizations, but only rarely do they or their findings become involved in changes in the governance of universities and colleges.

Let me give an example of how snarled we may be in our thinking and consequently in our structuring and functioning. In a sense, administration begins close to the action, and the academic department is where the action is today. We justify the department on several grounds: it preserves a discipline, it encourages growth of knowledge in that discipline, it fosters greater excellence in scholarship, it promotes its discipline among students, it contains peers who alone can assess each other for advance in rank and pay. So far so good. But how does it work? Not very well, says Paul L. Dressel, who has just completed a study of the academic department in American higher education under a grant from the Esso Education Foundation. Dressel bluntly calls the function of departments "the confidence game." He finds that so-called professional relations on campus--and he includes faculty, departmental executives, and deans--are grounded as much or more in human, interpersonal relationships as in systematic and rational treatment of substantive issues. While a scholar today may live his ego life in what Riesman calls the guild, he gets his bread and butter and promotions from departmental success, through the personal confidence placed in him by a very few colleagues. It may be that our present structure and functioning of departments does little to fulfill what is claimed by and for departments.

If such be true of academic departments, it may equally be true that much else of governance up to and including boards of trustees is shot through with irrationality and malfunction. Robert H. Finch, Secretary of Health, Education and Welfare, commented recently that administrators were so used to facing attacks upon academic freedom from outside the institution that they were un-

prepared for attacks from within. What we call governance today frequently finds itself immensely tangled and in crisis simply because it leads an unexamined life. Institutional research has an immense job to do to discover the effective roles for students, faculty, department heads, deans, presidents, trustees and all the rest in the total organization and management of the house of higher education.

For administration to be effective once its structure and functions have been established, there is increasing need for management data for control and direction. Here the capabilities of institutional research have lately been much expanded. Many institutions, such as Duke, Emory, Rochester, and the University of Washington, with aid from my own and other foundations, have organized their data collection, made significant use of the computer, and begun to provide an abundance of organized information for management decision making. The availability of this expanded, better organized data may make apparent some new aspects of decision making, and this, in turn, may point to the necessity of reform in governance. Administrators may be jolted by information never before perceived, and that is all to the good.

One aspect which will need attention, and properly organized data for it must be secured, is the whole area of cost-benefit ratios. As we develop alternative ways of learning and management, cost-effectiveness analyses can be developed and economic decisions made. I suggested earlier that higher education must become more efficient, that the whole area of productivity must be searched into, and that only our thorough understanding of how we should operate will secure support from legislators, the federal government, individuals and foundations.

Finally, in the management area, institutional research must provide the tools and information for long-range planning of the university or college. Here again some new experiments are being tried and hopefully will aid in the sophistication of our whole approach to planning. Integrated information systems, resource allocation, modeling, and program planning and budgeting can all help to develop institutions into coherent, workable organizations articulated with their respective environments. An example of a systems approach of the kind I have in mind has been under way for four years at the University of Toronto under the direction of Richard W. Judy, with the aid of a major grant from the Ford Foundation.

What the public must realize is that the crisis of the campus today is part and parcel of the crisis, or rather the several crises, of our society. "These problems," says a recent statement of the American Council on Education, "affect all of society, not the university alone or the young alone. We must all be concerned to deal intelligently and responsibly with these problems that are neither the exclusive discovery nor the sole responsibility of the young." I would add that many of the feelings of conflict and polarization in society and on our campuses have been building and in existence for many years. Suddenly these feelings and these oppositions could no longer be contained. We had failed too long to be aware of them and to deal intelligently with them. And so a crisis now moves us to action.

But, as Associate Justice William O. Douglas once put it, "crisis" in Chinese contains two characters: one meaning danger and the other opportunity. In a crisis, there are moments of fluidity before a new event takes place when

directions may be radically altered. We must now in the face of very real danger seize the opportunity to do three things quickly. We must redefine the nature of the university and its relation to society. We must enhance the learning effectiveness of our campuses. And we must improve our managerial techniques. These are the three points I have tried to make and to show that these three areas must be treated as closely interrelated.

In this huge task, which should be an ongoing one, I cast institutional research in the central role--the inner think tank and nerve center of the university. This has not been its role to date for the simple reason that boards of trustees, presidents, other administrators, and faculty have been altogether too narrow-minded as to the real significance of institutional research. Many administrators thought they knew all the answers, yet they were too busy to ask "the dirty questions." They tended to look down at institutional research or to look to it only for material efficiencies. Unless administrators and their governing boards take seriously the need for an entirely new era in institutional research and recognize that sporadic investigations of university crises, such as the Cox report, will not save higher education, then the folly of their ways will lead to irrational reform of the university. It is not too pessimistic to say that that may take place.

Institutional research must become the catalyst of our philosophical as well as our methodological approach to the university. To do that job, it requires humanists and social scientists as well as mathematicians and systems analysts. This message must gradually be forced upon those concerned with the direction and governance of our universities and colleges. It must happen quickly, and the public must recognize that it is happening.

DEVELOPMENT OF CHICAGO CIRCLE CAMPUS

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Since reference is often made to the inadvisability of leaving planning to administrators, I feel obliged to offer a bit of justification for being included here. Actually, I have spent most of my thirty-nine year career as an engineer and engineering educator. I entered the field of academic planning quite by accident as chairman of a committee. (My experience prompts me to advise anyone to stay away from committee chairmanships unless he is prepared to follow through.) The next step, as in my case, is often deep involvement in administration.

I have frequently questioned the wisdom of this involvement. The president of the University of Illinois first asked me to move to Chicago almost nine years ago, when funds became available for the planning and construction of the new campus. He said to me then, "You can have the fun of implementing the planning and construction of the campus and of personally operating it."

May I advise you now, from my own experience, to exercise caution before jumping at the opportunity of living with your own mistakes. Whenever faculty or students complain about organization, buildings, or other matters, I reflect upon my decision.

I would like to review with you today some of the historical documentation on the Chicago Circle Campus. The campus is often called an "instant university," which is really a misnomer. That "instant" started in 1946, when the University of Illinois established a two-year branch at the Navy Pier in Chicago. The pier had been converted from a warehouse into a school for training Navy electronic technicians during the war. After the war the University of Illinois used it to accommodate the returning war veterans, who were enrolling in college under the G. I. Bill.

Classes actually began in the fall of 1946 with approximately 3000 students in the two-year program. It was established as a temporary institution. You are all well aware from your own experience of the meaning of so-called "temporary buildings" on college campuses. Such was the case at Navy Pier, except the University did not even own the pier.

By 1950, which had been the original target date to close the Navy Pier operation, it was very clear that there was a real need for a permanent branch of a state-supported university in the city of Chicago, the largest city in the United States without such a public institution. The University, in 1953, was directed by a commission of the legislature to begin the planning for a permanent four-year campus, and that is when I first became involved in the campus.

I was a member of the first committee that was established to start the planning and of nearly every subsequent committee. While the planning went ahead, the committee decided what it wanted to do. Many people, both in and out of Chicago, were in disagreement with our plans.

Those of you who may be familiar with the long and difficult search for a site will recall that we first engaged a real estate research corporation as consultants to assist in this site selection. We studied approximately 90 sites in the process.

It seemed rather easy to come up with the first five choices. We selected the number one site and made a recommendation, which the University board of trustees approved. Subsequently, we learned that the Forest Preserve of Cook County was not willing to release 320 acres in the western suburbs to allow us to build a new campus. At that time, we were thinking about a residential campus, 320 acres for 20,000 students was our projected need.

During the next two years we analyzed one site after another, selected one after another and, for one reason or another, failed to get any of them. In this process, however, we did find that a possible site next to the Miller Meadow Forest Preserve was a privately owned golf course which could be condemned. It was estimated that it could be condemned at $1.008 per square foot. This figure is important, because shortly thereafter the mayor of Chicago said, "Come into the city and I will see that you get a clearance site, and it will cost you no more than you will have to pay for the Riverside Golf Course."

That is how the cost to the University was set on the area of 106 acres, where the Chicago Circle Campus now stands. Of course, city and urban renewal funds provided the many million additional dollars required for the site.

However, there were many heartaches in acquiring it because it was in an area occupied principally by second generation immigrants--Greeks, Mexicans, and Italians. These people all faced relocation. Before the site was finally approved, the city council held four days of public hearings. Now, many of the people who violently opposed us welcome the University to the neighborhood. Many programs of interaction with the neighborhood have been developed by the University.

At an early stage in the planning, we faced the problem of deciding the kinds of educational programs which would be offered at the University in Chicago. Six colleges have been established: liberal arts and sciences, business administration, engineering, architecture and art, education (including physical education), and a graduate college.

A major question to be answered concerned the distribution of students among the disciplines. A second major question concerned the development of priorities for construction of facilities for the educational program. We had the advantage of some fifteen years of data gathering at the Urbana-Champaign campus and ten years experience at Navy Pier, all collected by the Bureau of Institutional Research.

Trend curves were prepared expressing as a percent of the total FTE enrollment, the full-time equivalent students that were taught, for example, within the department of German, the percent in architecture and art, and so on for each of the thirty-some departments comprising the educational program. These curves all have the common characteristic: they will go up or down with change in student choices of courses, but the variation is not very much. They are fairly accurate control curves, and will not vary more than ten or fifteen

percent. With these curves we were able to extend the projection from that date (1958) to 1963, which is when we hoped to have the first phase of the campus in operation; then they were extended to 1965, and then to 1969.

We entered upon this kind of a schedule in formulating our plans, preparing to move to the new campus in 1963 with some 6500 students in freshman and sophomore work. We planned to expand that work to four years in 31 departments by 1965. The enrollment would be expanded to 12,000 by that time, and then to 20,000 by 1969.

Because of difficulties in financing and site selection we lost two years of our time schedule. Thus Phase I was completed for us to move in in February of 1965 instead of 1963.

Once we had made the distribution of the number of full-time equivalent students for every department, it was a simple matter to estimate the ratio of full-time equivalent students to staff for each of the disciplines. These ratios varied from 10 in art and physical education to 20 in political science. Art and physical education had 10 because their contact hours are so very high in terms of the credit hours. The ratios for most of the laboratory sciences was 12, and most of the foreign languages and English was 15. In areas in which large lectures could be employed, such as political science, 20 was used.

These early-evolved standards were used to calculate the first estimate of staff required. With certain other factors adjunct staff requirements were estimated. From total personnel needs the number of offices required could be calculated (we used 150 sq. ft. per office). Professors and associate professors were given private offices, and assistant professors and instructors were housed two to an office. Using somewhat similar methods, classroom areas and laboratory areas were computed.

All of these were detailed in a document (the Parker-Edsall Report) which was given to the architects as the space planning estimate for building and campus design.

At about this time one of the first situations developed which made it necessary to alter the plan. The 50 million dollars that was available for Phase I would build the buildings that we had in mind for 6500 students in a two-year program, but the site was only partially cleared. Since the site for the physical education building was not cleared, the decision was made not to build the physical education building, but to take the money (about 3 million dollars) and build other academic facilities in an attempt to catch up with the two lost years of enrollment capacity. We would build the facilities which would produce the greatest enrollment accommodation.

One of the values of this kind of planning was the development of a table of the total net square feet per FTE student required for each academic area. It varied from 34 net square feet per full-time equivalent student of liberal arts, 54 for business, and on up to 210 in art and architecture. By use of the table it was possible to change Phase I intelligently. It was decided not to build a physical education building, but to continue to rent the old drill hall at Navy Pier, and to set up a bus system from the Circle Campus. With the 3 million originally assigned to physical education, we were able to build for

2500 more students, restricted to the college of liberal arts and sciences (the low space users).

After making these decisions, we came out with the Phase I design, which was for 9000 students in certain academic disciplines. But in Phase I the library was designed for 6000, classrooms and laboratories for 9000, and the student union for 15,000. These experiences emphasize the necessity of maintaining a posture of flexibility in academic planning.

Throughout the years, the University of Illinois has made full use of faculty consultation in order to get the broadest participation in academic planning. For each area that was planning new facilities, a building program committee was established. Thus each college has its building program committee and there is a campus-wide planning committee. These committees are composed mainly of faculty, some department heads, and now and then a dean. Hardly anyone in an administrative position, however, is a member of the committee as a voting member.

Appropriate personnel in the physical plant, the planning division, and space utilization office serve in staff capacities to provide advice. This arrangement does two things: it causes some trouble and slows things down through seemingly endless discussion; but once we do have a program, it has been thoroughly discussed, almost everyone knows about it, and it has satisfied a very real need for communication.

We moved onto the new campus in February of 1965, with 5400 students, mostly first and second and some third year students. We did not know it then, but we had about 200 who would be seniors in the fall of 1965. We had not accounted for the ingenuity of some students to put together programs that would satisfy graduation requirements.

In September of 1965, we opened with 8600 students (a 63 percent growth in enrollment) and with some 200 additional faculty, in a new campus, shaking down in what builders term "beneficial occupancy" in 15 academic buildings and a barely completed union building.

As of May 1969 enrollment is taking place for 16,000 students in September, 1969, distributed in 71 bachelors curricula, 17 masters and 7 Ph.D. programs. The physical facilities of the campus will represent an expenditure of over 140 million dollars. The faculty and staff will number over 1800 this fall. This remarkable growth in 55 months from 5400 students in two-year programs at Navy Pier was possible only because the campus, as part of the University of Illinois, had the guidance of the president and the board of trustees; the support of the competent general officers; the assistance, when requested, of the administrators and faculty from throughout the University; the cooperation of city, state, and federal agencies; and finally it had a complete plan, developed over several years, for initiating and expanding educational programs, enrollments, and physical facilities.

We have had over 5000 visitors per year to the campus from all over the world, and we have had much discussion about the campus. Most people like it, a few do not. No one who visits it ignores it. It is working out very well. There are of course some problems, some that we foresaw, some that the architects foresaw, and some that none of us foresaw.

Since the State Board of Higher Education of Illinois developed a master plan for the early 1970's with junior colleges to be located within a commuting distance of every potential student in the state, it became incumbent upon the board to develop more capabilities for training teachers for the junior colleges and for other colleges, as well as for the high schools. In short, the Circle Campus should develop major graduate components and minimize competing with junior colleges for lower division students.

Our planning now is all based on moving from our present enrollment of about 16,000 this fall to 25,500 by 1972-74, 3000-4000 of which will be graduate students.

Here again is a change which requires flexibility of planning. The first two phases were designed principally on what we call a functional basis. Offices are in high rise buildings, classroom buildings are three stories tall and are accessible from the ground and second floor levels. Laboratories are grouped together for functional and economic reasons. All original lecture rooms are in one basic center. The functional scheme does not work where graduate programs are an important component of the program. So Phase III construction and all future planning involves specific buildings for disciplines such as business administration, behavioral sciences, education and communication, science and engineering research, and architecture.

A final word on what we see for the future: at a place such as Chicago Circle, the hustle and bustle of our incredible growth may seem to occupy a disproportionate segment of our time. In the midst of this physical growth we all have been committed to the demanding task of adding that intangible substance to our student and faculty population and to our physical framework that will make us a university in a real sense of the word. The intangible substance is not readily defined nor is it easily obtained; it is the product of the adolescence of a university that can well be likened to the adolescence of man. It is a flexing of our muscles; it is a quest for depth and for a sense of permanence. It is at once community and an arena for spirited controversy, it is challenge and the facing of challenge, it is victory, and it is defeat. These, and other defining characteristics, which you may add to your own personal list, make a university. In the final analysis it is, of course, people--students, teachers, the administrators, the board of trustees, parents, the taxpayers--who make a university. The process by which the elements of people, buildings, and ideas come together to make a university is the process we are constantly developing and constantly trying to perfect. If the process is understood, the mission of the Circle Campus can readily be accomplished in the historical context of the University of Illinois, for it is a fact--recently emphasized by the observance of the centennial of the University--that the University of Illinois was created to teach, to perform research, and to serve the community of which it is a part.

We stand at the heart of Chicago in common view with one of the world's largest financial complexes and one of its largest, poverty-ridden ghettos. Both demand our attention. Our doors--and our minds--can never be closed to the problems of either world; the emphasis placed on our programs reflect our awareness; our resources are turned to the nagging problems of the day: transportation; air and water pollution; law enforcement; our program in the administration of criminal justice, which has received nationwide attention; the population explosion, with its concurrent explosion of rising expectations;

public health; housing; employment; business needs; automation; and, of course, education, which many view as the heart of the urban problem. We are moving ahead in programs for the training of teachers and the development of research and resource units for broad educational use. However, our concerns go far beyond research and teaching to entire vistas of community service that are uniquely challenging to the urban university. We have taken it upon ourselves as a university to step into our neighborhood to seek employees for university nonacademic positions from among the traditionally hard-core unemployed, and through cooperation with the concentrated employment program of the Chicago Committee on Urban Opportunity, we have turned some of our resources to providing training in skills for those who would otherwise fall short of minimum qualifications for employment.

Through the use of recreational facilities at hours when they are not in demand by our students and staff, we hosted nearly 15,000 young people from throughout the city this past summer. Some of these youngsters saw and used a shower and a swimming pool for the first time in their lives. We are continuing the program on weekends during the school year. We can report, from this program, no incidents--just gratitude and excitement, not uncommon characteristics among youngsters.

Our educational assistance program, designed to assist those young people whose educational experience has been minimally challenging and enriching, is in its third year. This year, for the first time, from among the nearly 350 new students participating, approximately 100 students were admitted to an experimental program designed to help us better meet the needs of those whose backgrounds are educationally impoverished. For that is a challenge we cannot ignore.

I believe that the American university faces in the remaining decades of the Twentieth Century a situation it must respond to with increased openness and candor. These years, in the words of the traditional black spiritual, will see "the walls come tumbling down"--the walls which cause an artificial barrier between the university and the city; the walls which prevent open communication between administration and faculty; the walls which have impeded both from continuing dialogue with the student portion of the university community. The tumbling of these walls, the articulation and development of a university whose overriding objective is, broadly, relevance--that is our mission.

ETHNIC GROUP ATTITUDES: A BEHAVIORAL MODEL FOR THE STUDY OF ATTITUDE INTENSITY

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Background of Study

Recent events occurring on college and university campuses across the United States have pressed college administrators into finding solutions to very taxing demands. Numerous and varied programs, including ex post facto self studies, pilot programs of reform and student-administration interaction models, to name but a few, have been directed toward finding needed solutions. Although much insight has been gained into campus problems, little attempt at generalization has resulted from studies conducted at various institutions. This is particularly true when these data are conceived of as part of a larger comprehensive effort of reform at institutions other than the original locus of study. This dilemma appears to be a function of a number of factors, among them being the fact that variables indigenous to each individual college or university influence the results. Consequently, it is not surprising that data and results derived from such studies as The Muscatine Report (Berkeley) find little application as valid bases for action at other institutions.

In any event, ongoing programs directed toward the identification of potential crisis areas as well as the assessment of the magnitude of present problems would seem to be an absolutely essential practice for problem solving and smooth functioning of any institutional enterprise. However, it appears that assessment models for the diagnosis and potential cure of campus ills have been given little attention. This is unfortunate because it is at the model level that generalization can take place. A well-constituted assessment model is as applicable at one institution as it is at another.

There have been numerous attempts to study the attitudinal characteristics of campus parameters, but their shortcomings relative to generalization as well as their practical use in valid problem solving is, in the minds of the present writers, directly proportional to the limits of traditional attitude assessment models. Administrative decisions based upon the results derived from such models may not be accurate due to the attitude model alone. The lack of clear understanding on policy decisions and a paucity of accurate information on which to base judgments can end in disaster, particularly in a multiversity where there is little effective internal communication with the student body.

Traditionally, attitude studies have employed a scalar device to assess magnitudes of feeling relative to a given attitudinal object. These models have found wide acceptance, use, and generalization. However, a number of assumptions have accompanied the use of the traditional model, particularly assumptions regarding the concept of "attitude" and the "use" of the scale. One primary assumption has been that the scale, regardless of its length, represents a continuum of attitudinal magnitude or response, the stimulus conditions of which are unknown to both the rater and researcher. Another assumption, and one which is perhaps more used and misused than the former, pertains to the use

of the scale. The literature contains many attitude studies which have assumed that the attitudinal event being measured, and which is to be scaled, is actually operative in the meaningful life space of the rater. This assumption has resulted in disappointing and rather expensive (money, time, and energy) studies demonstrating the neutrality or nonexistence of an attitude which, purportedly, was in operation. An example of the last fallacy would be a study to assess the attitudes of Canadian backwoods guides toward the use of LSD. The typical attitude scale would most likely yield results demonstrating that these men neither approved nor disapproved of LSD. In short, LSD does not operate within their meaningful life space. The example also demonstrates the sampling problem in attitudinal research. Lastly, and although not an assumption, most attitude scales fall short in the area of predictability, particularly in the prediction of overt behavior. By its very definition, an attitude is a "predisposition to respond," and the fact that it is a response in and of itself has been grossly overlooked. For this reason, most definitions of an attitude are followed by statements such as ". . . given the optimum conditions a behavior commensurate with the attitude will result." However, the optimum conditions are rarely specified nor are the stimuli which give rise to the attitudinal response outlined; both of which are necessary if attitude studies are to be useful in the prediction of behavior rather than just reporting the status quo. In the final analysis, the traditional model leaves a great deal to be desired. It can be generalized, but its inherent faults go with it.

The attitude assessment model presented in this paper attempts to improve upon the approach taken in attacking the previously outlined problems, and also takes into account two recent and very important findings: first, attitude studies can predict the scale of overt behavior (Astin, 1969); and secondly, the rather "innocent" existence of perceived volatile materials, issues, and objects in the life space of an individual have enough stimulus potency to precipitate hostile and aggressive acts (Berkowitz, 1968). Both of these findings seem to call for an attitude assessment model which would have its roots in the stimulus-organism-response paradigm commensurate with the same approach employed to express and predict overt behavior. That is, they call for a model which expresses the covert behavior in terms equivalent to those used to anticipate overt behavior. Consequently, the present paper addresses itself to the problem of attempting to construct an improved model for assessing the intensity of a given attitude toward or about campus life, one which attempts to avoid the faults of the traditional model. It presents the development of an attitude scale from "real life" phenomena based on the actual behavior of the individual, both covert and overt, within his environment. Secondly, it suggests an improved method of assessing the meaningful life space of a single individual as well as of a group of individuals. Further, it attempts to develop a reasonable degree of predictability into a model such that attitudes and manifest behavior can become connected in a predictable fashion. Lastly, it is believed that the model is capable of proposing and establishing a hierarchy of attitude intensity such that it will yield a scale tentatively termed a "volatile scale," or scale of volatile issues.

Of the various components of an attitude, perhaps the most important for helping to determine the point at which attitudes are manifested into observable behavior is intensity. The writers are tempted to say that, all other things being equal, the greater the intensity component of an attitude, the greater the probability that overt behavior commensurate with that intensity, or behavior in general, will find expression, provided the optimum

conditions present themselves. The present attitude model for the measurement of intensity attempts to define what those optimum conditions might be at one educational institution. Further, insofar as the definition of an attitude has traditionally been a predisposition to respond, an attempt will be made here to answer the question: Respond to what? The end result, hopefully, is that the present assessment model for attitude intensity will be of value because it can bring to awareness not only what sets the stage for behavior, but also where the stage is set and, more importantly, what the cues are which trigger aggressive or disruptive behavior.

The attitude model employed in the present study has its origin in the work of Gerald Whitlock (1963) at the University of Tennessee. Whitlock conducted research in the area of job performance evaluation designed to demonstrate the psychophysical basis of attitude intensity. Drawing from S. S. Stevens' (1958) article, "The Problems and Methods of Psychophysics," wherein Stevens demonstrated that the relationship between the magnitude of a sensation (or response) varied as a power function of stimulus intensity, Whitlock hypothesizes that the psychophysical law held true for areas calling for complex judgments, such as job performance evaluation and attitude judgment and intensity.

In the area of attitudes Whitlock felt that there were two major questions to be answered if a psychophysical basis for attitude intensity were to be established. These questions concerned, first, the stimuli for the responses, termed "attitude intensities," and secondly, the relationship between varying amounts of the stimulus and the resulting response.

In answering the first question Whitlock contended that the stimulus for the response, called an "attitude rating" was the <u>set</u> of observations which brought about the "valuative" reaction regarding the attitude object. In other words, response magnitudes or attitude intensity can be expressed in terms of stimulus magnitudes. Furthermore, he reasoned that those observations furthest from the means of a distribution of observations, plus and minus, would be more likely to produce the response reflected in the attitude rating. This being the case, his procedure was to collect both favorable and unfavorable attitude specimens from subjects within a specific group. The stimulus magnitude then becomes the number of actual observations in the set, or more appropriately, the ratio of plus to minus specimens, i.e., the ratio of the plus reactions to the minus reactions.

The response magnitude or attitude intensity is a power function of the plus to minus attitude, or observational specimens. In short, the overall evaluative response, attitude intensity, is a function of the number of prior valuative reactions. This relates stimulus to response.

In summary, Whitlock contends that, "An attitude is a psychological mechanism for coding experiences in such a way as to predispose one positively or negatively toward something. The <u>strength</u> of this predisposition is what is meant by attitude intensity, and the strength or intensity of the attitude is a function of the number and kind of (strongly) positive and (strongly) negative experiences relating to the attitude object."

Whitlock and his students have demonstrated and established the fact that the psychophysical law holds for attitude intensities; in brief, there

does exist a relationship between stimulus and response magnitudes in the area of attitude intensity which can be described as a power function.

The present study accepted the basic Whitlock rationale and the power function was assumed to be a valid description of the relationship between stimulus and response magnitudes. The present researchers were primarily concerned with adapting the Whitlock model and procedure for the assessment of attitude and the prediction of behavior.

The basic model has the advantages of describing attitudes in lawful stimulus and response terms, of assessing the relevant-operative attitudinal or behavioral life space of the subjects prior to attitude assessment, the description of an attitude as a response, and the additional characteristic of allowing one to partition the intensity of an attitude rating over its stimulus components to discover the potential crisis areas. The latter is equivalent to partitioning the various sums of squares across the total sums of squares in the analysis of variance to find where significance lies. Perceived in this way, the stimulus components or behavioral specimens with greatest magnitude can be assumed to be contributing the greatest degree of value to the response magnitude or attitude rating.

In the present investigation primary emphasis was placed upon the generation of a model, rather than upon the data to see if the model was feasible for programmatic implementation.

Procedures

With the previous material as a basis for a study of attitude intensity, five areas of student life at the University of Tennessee were chosen for investigation: (1) classroom conditions, (2) satisfaction with faculty, (3) satisfaction with the University administrators, (4) the total University environment, and (5) the student's present level of morale. These were considered to be "attitude objects" in the present study. It was felt that these five areas were representative of the behavioral specimens elicited.

Particular interest centered on the question of potential differences in attitude intensities and the stimulus magnitude as representative of the three major student factions: (1) white students, (2) black students, and (3) international students. Questions such as the overall average attitude intensity felt by UT students, the differences in attitude intensity among the three groups, the differences in concern toward the University and their associated intensity among the three groups, and the identification of potential critical issues were all areas which were explored.

Using the following methodology, interviews were conducted for the purpose of eliciting behavioral specimens to form a behavioral checklist. Students representing the three groups, white, black,and international, were chosen via stratified random sampling on the variables of race, sex, class, college, and grade point average from the student files at UT. They were contacted by telephone asking them if they would be willing to undertake a brief interview for the purposes of constructing an attitudinal measuring instrument. Three interviewers, two black and one white, conducted the interviews. These students were interviewed by members of their own race. All interviewees were asked the

following questions via a standardized interview guide:

1. Has anything happened to you as a student during the last quarter such that when it happened it made you feel very favorable toward the University or some aspect of your life as a student? Responses to this question were considered "positive" behavior specimens.

2. Has anything happened to you as a student during the last quarter such that when it happened it made you feel very unfavorable toward the University or some aspect of your life as a student? Responses to this question were considered "negative" behavior specimens.

A total of 337 attitude or behavior specimens were taken before interviewing was stopped at 132 interviews. The researchers had continued the interview process until the probability of receiving any new specimens was very slight (.05 level of probability). The importance of the interview item was indicated by the frequency of its occurrence.

There was considerable overlap among the three groups in the area of specimen type, and a rather confusing situation arose which necessitated a slight deviation from the Whitlock method. Whitlock's procedure maintained a verbatim reproduction of the specimens randomly arranged on a behavioral checklist, and the positive or negative characteristic of the specimen remained intact for the subjects to check providing they had experienced the specimen. However, in the present study, a positive specimen for one group often was a negative specimen for another group. In an effort to avoid stating both the positive and negative case of the same specimen, it was decided to state the specimen in neutral form and under it to place a nine point algebraic intensity scale. The subject was asked to check the item if he had experienced it and then rate the item as to his "felt" intensity of the experience--plus or minus. This procedure allowed the subject not only to state whether his experience had been positive or negative but also how intensely he had felt or experienced the specimen or item. By employing this method it was possible to consolidate the 337 attitude specimens into 108 statements which constituted the items for the behavioral checklist.

Following the formulation of the 108 items, they were arranged randomly in a behavioral checklist. At the end of each checklist, a series of five scales were included in an effort to assess the level of attitude intensity or response magnitude toward five major aspects of student life. These items as previously mentioned were

1. How satisfied are you with the conditions surrounding your classwork?
2. How satisfied are you with the faculty?
3. How satisfied are you with the University administration in general?
4. Considering everything which affects you as a student, how satisfied are you with the University of Tennessee?
5. Please circle the place on the scale that best describes your present level of morale.

All of the above items were accompanied by a nine point algebraic scale, and the subjects were asked to rate their level of satisfaction or

dissatisfaction.

The last item on the questionnaire was an open-ended question allowing the subjects to comment on events which they had experienced and felt were important, but which were not included as specimens.

The subjects chosen to respond to the checklist were all students at the University of Tennessee at the onset of the research program. A matched pairs design was chosen for use with black and white groups; and the smallest group, the international students, was used as the criterion group. All subjects were chosen and matched on as many of the following five characteristics as possible: (1) residence, (2) sex, (3) college, (4) class, (5) cumulative grade point average. A total of 852 checklists were mailed to the selected samples which were broken down as follows: (1) black - 298, (2) foreign - 245, (3) white - 310. A cover letter explaining the research and the guarantee of confidentiality accompanied each checklist. For purposes of identification, the checklists were coded.

A three-week waiting period elapsed after which three weekly "probes" were employed in an effort to increase the quantity of return. The probes were conducted by telephone where possible and by mail where a telephone was not available to the respondent. Of the 852 questionnaires sent out, 389 were returned, making the percentage of return 46 percent. The number returned per group was as follows: (1) black students - 100, (2) foreign students - 111, (3) white students - 153. Twenty-five were returned for which the code number had been removed.

The primary analysis employed in the present research consisted of computing the response bias ratio plus/minus observations in an effort to determine attitude intensity. All analyses were computer assisted via the program analysts at the University computer center.

Non-Statistical Hypotheses

The following non-statistical hypotheses were examined:

1. A meaningful hierarchy of attitude intensity or stimulus magnitude can be ascertained by computing the plus to minus ratio of favorable to unfavorable observations. Ascertained by observation only, this hierarchy should relate well with the response magnitude of the five attitude objects: classroom, faculty, administration, student life space and student morale.

2. From the above analysis a "volatile scale" comprised of specific issues which had been checked and rated by at least 50 percent of any one group can establish potential crisis points within and between the various groups of students. This scale can suggest how critical overt behavior may manifest itself on campus.

Analysis of Results

Plus to minus bias ratios (+/-) were computed for all behavioral specimens

TABLE 1

BEHAVIORAL SPECIMENS AND ATTITUDE OBJECTS

Number	Behavioral Specimens	Attitude Object
1.	I have received special consideration or recognition because of my race.	Student Environment
2.	The large size of my classes.	Classroom
3.	Interracial dating.	Student Environment
4.	The refusal of the U.T. administration to allow Dick Gregory to speak on the U.T. campus.	Administration
5.	The existence of a Black Student Union on the U.T. campus	Student Environment
6.	Compulsory dormitory hours for girls.	Administration
7.	The policy of admitting all graduates of Tennessee high schools to U.T. has enhanced the opportunity for minority group students to attend college.	Administration
8.	Discussions about interracial dating.	Student Environment
9.	The increase in the number of Negro students on campus this year.	Student Environment
10.	Black Student Union display at the Student Center.	Student Environment
11.	The manner in which the administration has handled the open speaker policy issue.	Administration
12.	The friendliness of U.T. students toward me on the campus.	Student Environment
13.	The performance of members of another racial group in class as compared to my own group.	Classroom
14.	The playing of the song "Dixie" at U.T. athletic events.	Student Environment
15.	The non-existence of Negro fraternities and sororities at U.T.	Student Environment

Con't.

TABLE 1 (CONTINUED)

Number	Behavioral Specimens	Attitude Object
16.	The lack of demonstrations on the U.T. campus	Student Environment
17.	The passage of an open speaker policy with some administrative or faculty restrictions.	Administration
18.	The passage of an open speaker policy with no administrative or faculty restrictions.	Administration
19.	My relationship with other racial group members in class.	Classroom
20.	Interracial dating of white female and Negro male.	Student Environment
21.	The creation of a Black Studies program on the U.T. campus.	Classroom

TABLE 2

PERCENTAGE OF FAVORABLE AND UNFAVORABLE RESPONSES FOR FIVE ATTITUDE OBJECTS PER GROUP

Attitude Object	Black		White		International	
	% Fav.	% Unfav.	% Fav.	% Unfav.	% Fav.	% Unfav.
Classroom	50	35	60	24	57	19
Faculty	61	23	71	17	63	22
Administration	38	42	47	35	51	23
Student Environment	60	30	76	14	65	18
Overall Morale	56	20	67	20	65	15

TABLE 3

VOLATILE SCALE - BLACK STUDENTS

Rank	Behavioral Specimen Number	Behavioral Specimen		Scalar Response Extremes % Neg. (1,2)	% Pos. (8,9)	Bias Ratio (+/-)
1	11	Handling Open Speaker Policy	(A)	72	3	.057
2	14	The Song "Dixie"	(S)	69	1	.074
3	4	Dick Gregory's Speech	(A)	74	5	.076
4	6	Compulsory Dorm Hours	(A)	50	5	.090
5	15	Negro Frat. & Sorority	(S)	74	5	.095
6	2	Large Class Size	(C)	19	7	.400
7	1	Special Racial Recognition	(S)	20	4	.500
8	17	Restricted Speaker Policy	(A)	29	18	.780
9	16	Campus Demonstrations	(S)	9	15	.920
10	7	High School Admission Policy	(A)	11	43	4.060
11	18	Open Speaker Policy	(A)	5	46	4.060
12	3	Interracial Dating	(S)	5	32	4.360
13	12	Student Friendliness	(S)	7	29	4.840
14	19	Class Race Relations	(C)	5	39	7.700
15	8	Interracial Dating Discussions	(S)	3	30	8.500
16	13	Racial Group Performance	(C)	2	14	10.500
17	20	Dating of White Female and Black Male	(S)	4	29	11.500
18	5	Black Student Union	(S)	1	76	23.250
19	9	Negro Enrollment Increase	(S)	2	74	30.000
20	10	B.S.U. Display	(S)	0	66	43.000
21	21	Black Studies Program	(C)	1	76	47.000

TABLE 4

VOLATILE SCALE - WHITE STUDENTS

Rank	Behavioral Specimen Number	Behavioral Specimen		Scalar Response Extremes % Neg. (1,2)	% Pos. (8,9)	Bias Ratio (+/-)
1	6	Compulsory Dorm Hours	(A)	52	10	.20
2	20	Dating of White Female and Black Male	(S)	24	4	.27
3	11	Handling Open Speaker Policy	(A)	54	14	.34
4	4	Dick Gregory's Speech	(A)	49	20	.42
5	3	Interracial Dating	(S)	17	5	.44
6	2	Large Class Size	(C)	21	4	.45
7	15	Negro Frat. & Sorority	(S)	7	6	.58
8	1	Special Racial Recognition	(S)	3	3	.75
9	10	B.S.U. Display	(S)	13	7	.81
10	18	Open Speaker Policy	(A)	26	34	.93
11	5	Black Student Union	(S)	13	17	1.20
12	8	Interracial Dating Discussion	(S)	12	8	1.20
13	17	Restricted Open Speaker Pol.	(A)	20	25	1.86
14	9	Negro Enrollment Increase	(S)	6	12	2.17
15	21	Black Studies Program	(C)	9	18	2.67
16	14	The Song "Dixie"	(S)	15	47	2.70
17	7	High School Admissions Pol.	(A)	9	16	3.00
18	16	Lack of Campus Demonstration	(S)	5	41	3.33
19	13	Racial Group Performance	(C)	1	8	3.42
20	12	Student Friendliness	(S)	4	42	6.33
21	19	Class Race Relations	(C)	1	16	8.80

TABLE 5

VOLATILE SCALE - INTERNATIONAL STUDENTS

Rank	Behavioral Specimen Number	Behavioral Specimen		Scalar Response Extremes % Neg. (1,2)	% Pos. (8,9)	Bias Ratio (+/-)
1	11	Handling Open Speaker Policy	(A)	34	13	.38
2	15	Negro Frat. & Sor.	(S)	12	4	.40
3	2	Large Class Size	(C)	23	3	.42
4	4	Dick Gregory's Speech	(A)	29	13	.45
5	6	Compulsory Dorm Hours	(A)	24	11	.54
6	17	Restricted Open Speaker Pol.	(A)	17	17	1.07
7	18	Open Speaker Policy	(A)	16	21	1.11
8	14	The Song "Dixie"	(S)	8	14	1.13
9	16	Lack of Campus Demonstration	(S)	8	14	1.15
10	20	Dating of White Female and Black Male	(S)	8	8	1.25
11	7	High School Admission Policy	(A)	6	5	1.28
12	10	B.S.U. Display	(S)	5	11	1.80
13	1	Special Racial Recognition	(S)	7	8	1.90
14	3	Interracial Dating	(S)	10	19	1.92
15	8	Interracial Dating Discussion	(S)	8	18	2.16
16	21	Black Studies Program	(C)	4	15	3.12
17	5	Black Student Union	(S)	5	19	5.00
18	13	Racial Group Performance	(C)	0	8	5.66
19	12	Student Friendliness	(S)	5	29	7.88
20	19	Class Race Relations	(C)	2	27	14.25
21	9	Negro Enrollment Increased	(S)	2	28	18.00

checked by at least 50 percent of the respondents of any of the three groups. These ratios were computed by dividing the number of positive specimens checked by the number of negative specimens checked. This process yielded 90 specimens, a quantity difficult to analyze in a meaningful way. This being the case, the specimens were individually scrutinized in an effort to eliminate those items which were considered to be of low potency relative to establishing a hierarchy of volatile stimuli. This procedure left 21 specimens for the final analysis; all of which were considered individually potent as well as cumulatively volatile. A list of these 21 specimens, subjectively selected, appears in Table 1. Table 1 also includes a category type statement indicating in which of the four major response categories the stimulus or specimen was grouped. The four major categories or attitude objects were classroom, faculty, administration, and student environment. Student morale, a fifth attitude object category, was considered to be comprised of all stimulus (specimen) components, and is thus considered to accompany each specimen.

The analysis of the data concerned not only the establishment of a scale of stimulus potency, but also the discovering of the relationship of the stimulus specimens to the response magnitudes or attitude intensities. Mean attitude intensities were computed for each of the five previously mentioned attitude objects. This allowed an analysis of the relationship of a single specimen or stimulus to the attitude object as well as providing insight as to the manner in which the stimulus magnitude was partitioned across the attitude intensity for any given object. In short, it provided a visual analysis of the stimuli which precipitated the attitudinal intensity response.

Table 2 presents the percentage of favorable and unfavorable responses elicited from the three groups on each of the five attitude objects. These percentages were derived from a nine point scale having a midpoint of 5.0. All scores falling at the scalar midpoint were excluded. This accounts for the two presented percentages (favorable and unfavorable) not equaling 100 percent. As the percentages demonstrate, each of the attitude objects had a rather moderate attitude intensity. That is, the percentage of favorable responses was larger than the percentage of unfavorable responses, with one exception--the black group's attitude toward the administration. Here, the percentage of unfavorable responses outnumbers the percentage of favorable responses.

The Volatile Scales appearing in Tables 3, 4, and 5 present the rank order of bias ratios for the three student groups, black, white, and international respectively. The rank of "1" was assigned to the most potent or volatile stimulus (specimen), which had been computed via the bias ratio of the plus to minus response. The lower the ratio, the more negative the assumed potency of the specimen, hence the rank of 1 for the lowest ratio.

An initial observation of these tables demonstrates that the black students had greater bias ratios on nearly all specimens. This was true for both the positive and negative ends of the scale.

Interestingly, although each specimen was included in the scales of each of the three groups, the rank order of specimen or stimulus potency is markedly different. In short, by visual inspection alone, one may observe a low rank order correlation among the three groups, even though at least one of the three groups had to have reached the criteria of 50 percent or more responding before the specimen could be included in the scale. Said in another way, the three

groups differed considerably in their perception of what constituted a potent stimulus or specimen.

Inspection of the three scales in Tables 3, 4, and 5 allows one to ascertain those stimuli or specimens which have the greatest probability of precipitating overt behavior commensurate with the response bias ratio, as well as providing an idea of the target area or attitudinal object toward or about which the behavior might take place. For example, the most potent stimulus or specimen for the black student groups was specimen 11 (the manner in which the administration has handled the open speaker policy issue), which had the bias ratio of .057, and the attitudinal object or target area for overt behavior would be the administration because the specimen is in the administration category of attitudinal objects (see Table 2). The analysis of attitude intensity and the partitioning of the stimuli arousing or eliciting that intensity becomes merely a matter of moving down each of the three scales.

The negative side of the stimulus magnitudes has been the only side mentioned up to this point. There is, however, the positive side, that is, those specimens at the bottom of each scale are highly positive in potency. Perhaps these are stimuli which should be emphasized to retard the effects of the negative end of the scale. For example, the black students found specimen 21 (the creation of a Black Studies program on campus) to be very positively potent.

Taken as a conglomerate, a comparison of the three scales, Tables 3, 4, and 5 does point up one very important finding: student factions cannot be considered as a homogeneous group with homogeneous attitude intensities relative to the same stimuli. In short, stimulus magnitudes are only homogeneous for specific groups even though, in the present case, all three groups perceive the target area attitudinal object as important and have observed it as so. This is evident for specimen 17 (the passage of an open speaker policy with some administration restrictions) where 78 percent of the black student sample and 82 percent of the white student sample checked it. However, their ratios were considerably different (.93 and 1.86 respectively) and the rank order was respectively 8 and 12. In other words, the specimen was a negative stimulus for the black students, but a positive one for the white students.

The international student sample comprised an interesting and quite different group. For the most part they had the highest across the board mean attitude intensities for all of the attitude objects listed in Table 2. Furthermore, they generally had the highest bias ratios across all specimens, which would lead one to conclude that they are rather impotent as a volatile group.

In an effort to present and conceptualize the relationship of the stimuli magnitude to attitude intensity or response magnitude, each of the Volatile Scales can be compared with the percent favorable to unfavorable response for each attitude object including morale for each specimen by referring to Table 3. Interestingly, the morale level for the black student sample appears higher than it is for the white student sample, but not as high as the international student sample. One may observe subjectively that although the stimuli are more intense or potent for the black students, there are hopeful solutions and feelings of intensity about the attitude object in this group. On the other hand, the white students' morale level might indicate the opposite, that is,

they do not have high stimulus magnitudes nor high attitude intensities.

Conclusions

Although this presentation and discussion of results does not exhaust all possible analyses of the data, it does demonstrate the applicability of the psychophysical S-R model for the analysis of attitude intensities. It does appear to have the methodological advantages of being based on behavior which, even though covert, is potentially predictive of overt behavior. Furthermore, it extracts from the student via interview what he observed or experienced as important stimuli and uses these as the components for assessing the response magnitude or attitude intensity toward or about a global area such as the administration of a university. Commensurate with this, the model does allow the partitioning of the stimuli involved in attitude intensities in such a way that they can be ranked in potency to yield a hierarchy of areas deserving administrative attention.

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HOW OBJECTIVE ARE MEASURES OF CAMPUS CLIMATE?

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College faculty, administrators, student personnel workers, and, in many cases, student groups are vitally concerned about the environments within which the educational enterprise is transacted. No fewer than 14 hypotheses, for example, have been suggested (Halleck, 1968) to account for student unrest. It is interesting that each of these hypotheses acknowledges, implicitly or explicitly, the impact of the college environment, or climate.

The wide acceptance of the measures of college climate developed by Pace and Stern (1958) and, more recently, Pace's College and University Environment Scales (1962) is a function of the widespread need and interest in this area of study. Another factor in the acceptance of these scales is the claim of objectivity and representativeness of the content of the Scales and of their potential usefulness for comparisons among different institutions.

The Scales are designed "to describe the prevailing atmosphere or climate of the campus" (Pace, 1962, p. 1). The purported objectivity permits the use of relatively small samples with the attendant claim that the Scales appear to be free of much of the sampling bias of other scales. It is reported in the CUES manual that "small and even presumably unrepresentative groups have been found from past experience to answer CUES statements in ways which do not differ very much from a larger more representative sample" (p. 11). This purported objectivity is placed into question by some of the empirical data presented in this report.

A second claim for the CUES instrument is that the Scales are uncorrelated with the characteristics of individuals (McFee, 1961 and Pace, 1962). Again, empirical data presented in this paper, along with the results of an earlier study by Yonge (1968), call this claim into question.

An assumption underlying the use of the CUES instrument seems to be that student and environmental characteristics are separate and distinct domains which, perhaps in their interaction, influence behavior. This separation does make it possible for researchers to talk about student mix and fit between college and student characteristics. But this assumption and, often, research focussing upon student and climate characteristics fail to acknowledge that a fundamental, reciprocal relationship exists between the individual and his environment.

Meanings, once they have been formed, tend to be self-reinforcing and enable the individual to conceive of his world as being reasonably stable despite the fact that new events are continually occurring. The relative stability of the person's orientation toward his world is a product of human perception. Although it is generally assumed that what is experienced is a mirror-like reflection of what is "out there," (and this is the assumption Pace apparently makes) in reality, all perception is selective, cumulative, and constructive. Perception is not only a reaction to "objective" stimuli but it is a process in which the individual notes and responds to cues to which he is already sensitized. The organization of the perceptual field is such as to

maximize the possibilities of attending to stimuli that are relevant to the expectations and to minimize attending to stimuli that are not. Thus, as Shibutani points out,

> Perceiving is never just receiving; there is always discrimination and selection. The manner in which anyone perceives his environment depends upon the meanings that various objects have for him as well as upon what he is doing. Since meanings are products of past experience, people from different cultural backgrounds and/or personality structure should perceive identical situations in somewhat different ways (1961, p. 109).

Yonge (1968), describes the interaction which exists as follows:

> Assume that I am confronted with a problem I cannot solve. My lack of ability manifests itself in the light of this problem situation, and the environment is difficult of problematic in the light of my inability to handle it. These are but two ways of expressing the same state of affairs. My characteristics (abilities) cannot be defined apart from some situation (problem), and my situation cannot be defined apart from my characteristics. From the above, one can say that my abilities are modes of being-in the world, and, as such, they should not be conceived as static attributes analogous to the physical attributes of objects. A more radical way of stating the above thesis is that without an environment there is no individual and without an individual there is no environment. Each requires the other as part of its definition.

The purpose of this study was to determine whether the CUES are free from the limitations of sampling bias and whether "small and even presumably unrepresentative groups . . . answer CUES statements in ways which do not differ . . . from a larger more representative group." A second objective was to determine whether the CUES are, in fact, uncorrelated with the personality characteristics of the "reporters."

Procedure

Three samples of students at a private Midwestern university were drawn for participation in this study. The first sample (N = 152) was a random, stratified sample of university undergraduates (freshmen excluded). The second sample (N = 52) was drawn from a population of general psychology students (which included sophomores, juniors, and seniors), and the third sample (N = 58) was drawn from the same population of general psychology students. The CUES were administered to each of the three sample groups and the responses scored and tallied according to the "66 plus method" advocated by Pace (1962, p. 5).

If the purported objectivity of the Scales is valid, then the general null hypothesis of no difference in response tendency among the three samples, "reporters" to use Pace's term, would be supported.

The strategy for data analysis was to focus only upon the items which were answered in the keyed direction by 66 percent or more of the students in at least one of the samples. This is consistent with the recommended "66 plus

method" of scoring.

In addressing the question whether CUES are uncorrelated with the personality characteristics of the respondents, the Edwards Personal Preference Schedule was administered to the subjects in the random, stratified sample.

Results

Of the 150 "climate characteristics," or items on the CUES, 88 were answered in the keyed direction by 66 percent or more of the students in at least one of the samples. Of these 88 items, there were 23, or 26 percent, for which no statistically significant differences were found among the three samples. Thus, on 26 percent of the CUES items all students tended to describe the environment in the same way. On the other hand, there were 65, or 74 percent, for which statistically significant differences were found among the three samples. Using a Chi-square test with 2 degrees of freedom, three items were significantly different at the .05 level, six at the .01 level, and 56 at the .001 level.

These data would tend to place into question the suggestion that CUES is free from the limitations of sampling bias and that small and even unrepresentative groups answer CUES in ways which do not differ from a larger more representative sample. In fairness to the CUES instrument, it is essential to point out that while the statements cited above regarding sampling bias and unrepresentative groups appear in the CUES Manual (1962, p. 11), it is suggested that the CUES user "select a reasonably representative group of qualified reporters" (p. 11).

A second approach to data analysis yielded results which have relevance to the differential pattern of scale item endorsement which has been shown to exist among the sample groups. In order to ascertain whether the 5 scales produced differential rates of agreement for all possible combinations of the three samples, a ratio called the index of agreement was computed for each of the five CUES, i.e., Practicality, Scholarship, Community, Awareness, and Propriety. These possible combinations include (1) the three samples (A, B, and C), (2) Sample A with Sample B, (3) Sample A with C, and (4) Sample B with C. Sample A was the stratified random sample (N = 152), Sample B was one group of general psychology students (N = 58), and Sample C was the second group of general psychology students (N = 52).

The index of agreement represents the ratio of item endorsement agreement among or between the sample combinations to the total number of items endorsed by the samples comprising the combinations. These ratios are presented in Table 1. Thus, for example, on the Practicality Scale there was a total of 17 items endorsed by one or more of the three samples in the "A, B, and C" group. Of these 17 items, however, on only 4 was there agreement among the three samples. This provided the fraction 4/17, or the ratio .222. Similarly, for the group "A and B" on the Practicality Scale, 15 items were endorsed by one or both groups. Of these 15 items, there was agreement on 10 of them. This provided the fraction 10/15 or the ratio .667.

TABLE 1

RATIOS OF ITEM ENDORSEMENT AGREEMENT FOR THE CUES SCALES BY THE VARIOUS SAMPLE COMBINATIONS

	Sample Combinations			
Scales	A+B+C	A+B	A+C	B+C
Practicality	.222	.667	.267	.250
Scholarship	.263	.625	.368	.333
Community	.238	.813	.300	.250
Awareness	.105	.800	.167	.111
Propriety	.090	.500	.200	.111
Average of Ratios	.184	.681	.260	.211

Inspection of the data in Table 1 indicates that a high degree of item endorsement agreement exists between Sample A and B, i.e., the stratified random sample (N = 152) and the first group of general psychology students (N = 58). On the other hand, a low degree of item endorsement agreement exists among the three samples.

Data which tend to nullify the claim that CUES scores are not affected by student characteristics are presented in Table 2 which indicates the correlations between Edwards Personal Preference scores and CUES.

TABLE 2

CORRELATIONS BETWEEN EDWARDS PERSONAL PREFERENCE SCORES AND CUES

(N = 150)

	Practicality	Community	Awareness	Propriety	Scholarship
Achievement	-23**	-11	02	-01	10
Deference	-11	16	12	23**	13
Order	03	-01	05	17*	18*
Exhibition	-01	06	03	-06	02
Autonomy	-18*	-36**	14	-16*	-21**
Affiliation	08	20*	19*	10	12
Intraception	02	+21**	09	-01	04
Succorance	-01	17*	19*	-03	18*
Dominance	13	02	-10	-04	04
Abasement	00	03	10	-02	07
Nurturance	-07	20*	19*	09	14
Change	-28**	-09	13	-22**	-06
Endurance	-08	-01	03	11	08
Heterosexuality	05	07	-01	-05	-27**
Aggression	15*	-11	-18*	-25**	-23**

* Significant at the .05 level.
** Significant at the .01 level.

Inspection of Table 2 indicates, for example, that a high negative relationship exists between the tendency to be independent of others in making decisions (Edwards' autonomy) and the tendency to perceive the environment as being friendly, cohesive, supportive, and sympathetic (CUES' community).

In Yonge's paper, "Personality Correlates of the College and University Environment Scales," (1968) CUES were compared with Omnibus Personality Inventory scales. There are striking parallels in the results of the data presented here and Yonge's earlier results.

Discussion

This paper focussed upon the serviceability of CUES as a dependable measure of campus climate. The data presented tend to bring into question the purported objectivity of the Scales and the efficacy of using "small and presumably unrepresentative groups" to describe a given campus climate. A secondary consideration was whether CUES are uncorrelated with personality measures.

The data presented in this study would support the conclusion reached by Berdie (1968, p. 775) that "an instrument such as CUES can be used to generalize about parts of a University, but only to a lesser extent can it be used to generalize about the entire University." Indeed the fact that the two samples of general psychology students used in this study differed so greatly may be used, in the presence of additional empirical data, to support a stronger conclusion which would bring into question the objectivity of CUES even for subgroup description and analysis. Data of this nature are crucial to the issue of the adequate description of the campus environment. If the researcher takes the position articulated by Becker (1966, p. 64) that "all students are subject to the discipline of the college's system of grades, credits, and degree requirements," i.e., that the common orientations that result are the important ones, then a measure of campus climate that elucidates these common orientations but which may be insensitive to subgroup differences is necessary. On the other hand, along with Clark and Trow (1966), if the researcher is impressed by subgroup variation and regards it useful to consider a finer set of distinctions which point to several different subcultures, then a measure of campus climate capable of eliciting subculture differences is necessary. It would seem that CUES falls short of both marks.

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"COPRA": COST OF PHYSICAL RESOURCE ALLOCATION

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Although widely applied in business, industry, and the military, the concepts of operations research have only recently gained acceptance for application to problems of college and university organization and management. More often than not, many of us have backed into the notion of a "university planning model" after having been sold the necessity of using computers, hence a management information system, Q.E.D. the necessity of first specifying the model of the college or university in order to identify the information required and so on. Less fortunate institutions are those in areas where municipal or state authorities have specified the information required, often with little or no consultation concerning the needs and uses of the data by the schools themselves.

The particular model to be described in this paper is for the analysis and projection of the economic costs of new construction. Its name, COPRA, is the acronym for Cost of Physical Resource Allocation. In its earliest conception, it was to be used independently as a management tool for a rapid evaluation of the cost implications of decisions relating to the timing, structural and functional type, and size of university buildings. This original purpose has not been lost. It is, however, secondary to the present primary purpose of COPRA as an integral unit of the overall university planning system.

At this level of generalization, I am sure that many of the elements depicted will be familiar to readers. The identification of the goal sets are those of Gross and Grambsch[1] and the calculation of required areas by function would, for example, be amenable to treatment by the "numeric method" of Bareither and Schillinger.[2] Within the generalized system, each institution must specify its own needs by component. At the University of Pennsylvania, the Office of Planning and Design in concert with the Management Science Center and Information Systems Group presently has under development the components needed.

One such component is COPRA, whose function in this position is to estimate the economic impact of academic decisions as they affect physical resources. The important distinction between this use of COPRA and its earlier conception is that it is an integrated part of a dynamic system keyed to the academic process. The implications of modifications in educational policy on physical resources can be tested; true total costs of program changes identified; and the physical constraints of time, money, and space can be explicitly related to the academic program.

COPRA consists of two parts: a computer data file of cost data on physical facilities and a model to predict cost of construction and related noncon-

Editor's note: Space limitations have unfortunately required the elimination of many extensive and useful graphs. Readers interested in more details about COPRA are asked to contact the author.

struction costs at selected bid periods in the future. Two types of costs will be considered simultaneously--project cost and operation and maintenance costs. For the purpose of this model, project costs are considered to consist of construction contracts, contract furnishings and equipment, and related nonconstruction costs (e.g., fees, permits, site surveys, test borings, etc.). Operation and maintenance costs are yearly costs to maintain the structure and to operate water, electrical, heating-ventilating, and air conditioning systems within the building.

In keeping with the introductory comments, the State of Pennsylvania introduced a common data format and required all institutions to conduct a space inventory, including costs. Although the data specifications created some confusion in data collection and the cost data was, in many cases, incomplete, the availability of compatible data is greatly enhanced. With twenty-six colleges and universities within the Philadelphia metropolitan area, a relatively large data base exists.

Data from other colleges and universities can be accepted by the model, but must be adjusted for differences in geographic location, as would be the case if local data were to be applied outside of the immediate region. We have, in fact, allowed for four different data source options. In this way, we hope to make the model generally useful to the academic community.

In the second phase of our model, we identify and input the particular features which will serve to identify the structure which we will attempt to evaluate. Function, construction type, floor area, and height are the key indicators. Lastly, we move into the prediction phase wherein an attempt is made to project costs of construction and related costs on the basis of three trend equations, each requiring the specification of the initial escalation rate to be used and the time at which the projection is to begin. The resulting calculation will produce the escalated cost for each of twenty quarters and a single figure for each five years following the quarterly period. An option which will produce an amortization schedule based on a preselected interest rate and an amortization period of 10, 20, 30 or 40 years is also available.

The input data are organized onto a single header card and one or more inquiry cards. Each inquiry card is intended to frame a single question; a series of inquiry cards is needed to produce several alternatives for comparison. This is purposeful; there are more than 1100 combinations possible. By requiring the variables' limits to be explicitly stated, we hope to limit administrators to options which they view as reasonable and thus avoid the confusion and consternation attendant to receiving a veritable mountain of data as a result of having asked for all of the possible options.

The header card will contain the number of inquiry cards which follow: the Qq's, a vector of factors for separating construction cost, (RCX), into its components, labor (RL), materials (RM), contractor's overhead (ROH), and contingencies (RCO). Also on the header card will be from one to six escalation rates, the first four of which pertain to the component costs of construction, the last two relate to the cost of furnishings and equipment (REX) and nonconstruction costs (RNX). Thus, using the aforementioned variable designations, total project cost (RPX) equals the sum of RCS, REX, and RNX; i.e., RPX = RCX+REX+RNX, where RCS = RL+RM+ROH+RCO. Lastly, the header card permits specifi-

cation of up to three interest rates for construction financing, if the amortization option is desired.

Each inquiry card contains a vector identification W* which becomes the basis of the search and edit routine of the basic data file. The W* vector contains a code for building function, construction type, size by floor area, height, age, and geographic location. The first four are of primary use for analytic and predictive purposes; the latter two are of interest to assist in determining whether or not certain data may be included in the pool, and additionally for geographic location whether the data can be adjusted for inclusion in a general pool or segregated into a specific subunit. One of four data source options must be indicated in the inquiry card as well as the options to predict, to amortize or, to print the escalation factor matrix. If the prediction option is selected, the variable, L, indicating an upper limit for one of three predicting equations must be selected. Lastly, two predictive criteria must be specified: n_W the minimum number of buildings acceptable as a data base, and the maximum coefficient of variability acceptable. Either or both of these criteria may be used to terminate the prediction routine. These criteria can be overridden by setting the criteria so low as to allow virtually any data to pass; however, their presence provides an indication of the reliability of the prediction.

The first inquiry card is read into the system. The appropriate data source for interrogation is identified. At the present time we are using data from the compilation of the National Association of Physical Plant Administrators, the State of Pennsylvania survey previously mentioned, data from our own university, and a combination of all three. The first three vary mainly in the level of detail available; the fourth must necessarily be at the lowest level of detail available from the other three. The University of Pennsylvania has within the last fifteen years completed more than 88 construction projects at a cost in excess of 110 million dollars. Very detailed information exists on these projects. This data forms the basis on which data from other sources is split into its component parts for subsequent analysis and projection.

Having identified the appropriate data source, the inquiry search routine begins. The first descriptor set W is read and compared to the inquiry cards W*. If a match occurs, cost data is stored and accumulated, the building identification is stored for subsequent printout and the number of matching buildings tallied for printout and use in calculations. The data is tested for "end." If the end of data has been reached, the inquiry search terminates.

As each W vector is found matching the W*, the year of construction is read and depending upon the data source option, an adjustment factor is applied to convert the data to a current year base. At the present time a composite construction index must be entered annually, a relatively minor effort. The present index on a 1968 base is constructed from data supplied by the Department of Commerce Composite Cost Index, E. H. Boeckh Associates, Engineering News Record, the George A. Fuller Company, and the Turner Construction Company.

At this point the accumulated adjusted data are used to calculate average costs per gross square foot construction, equipment and furnishings, nonconstruction and total project costs. Standard deviations for each are also calculated. These average cost figures are next reduced to estimates of average component costs by application of the Qq's previously mentioned.

If, on the inquiry card, we have not elected the prediction option, the system picks up the next inquiry card and the cycle is repeated until the prediction option is selected or until all the inquiry cards have been exhausted. An affirmative decision on the prediction option immediately requires a test against the criteria established on the inquiry card. You will recall that failure to meet either of two criteria will terminate the prediction routine.

Again, the criteria are the number of elements, n_W, which fulfill the description, W*, or, the coefficient of variability of the n_W elements (i.e., the standard deviation divided by the average). Both are, perhaps, more intuitively useful than statistically sound measures of predictive reliability. One can, however, make reasonable arguments for their statistical validity and both are readily comprehensible to the laymen; a merit not to be gainsayed, particularly when dealing with a professor of Indic philosophy who may also be president of your institution.

A priori, there is little to determine the appropriate criteria. For unusual buildings of a type for which there is little precedent, the n_W must necessarily be low. The criteria may be established after an initial run of the model since both the number of elements satisfying a particular W* specification and the elements of the coefficient of variability are printed out for all inquiry cards regardless of subsequent options to be exercised. Although not presently programmed, it is intended to permit the operator the option specifying the prediction criteria on line if or when remote terminal access can be provided after reviewing visually the results of the initial phase of operation.

If the predictive criteria are satisfied, the prediction phase proceeds with the calculation of the several escalation rate factors R(J), J=1, . . ., 6, to be applied to the six component parts of total project cost (RPX). From these annual rates are calculated the quarterly rates QRATE(J) for twenty quarters of predicted costs. A three dimensional matrix of escalation factors E(I,J,K) with 450 elements is calculated and stored, where I=1, . . ., 20 quarters, plus 5 years 21, . . ., 25; J=1, . . ., 6 escalation rates; and, K=1, . . ., 3 equations. By applying these E(I,J,K) to the average adjusted costs calculated previously, an escalated cost is obtained. For example, for the escalated cost of labor, third quarter using equation 3:RL(3,1,3)=RLxE (3,1,3). Note that for the cost of labor (RL), J will always equal 1; for RM, J=2; for ROH, J=3; for RCO, J=4; for RCX, J=5; and, for RPX, J=8 by definition.

Both escalated construction cost and escalated total project costs, RCX (1,5,K) and RPX (1,8,K) are derived from the summation of their respective component elements. Two output options are available at this point; one of which is automatically called for when the prediction routine is indicated. This is a matrix of predicted costs consisting of eight columns and 25, 50, or 75 rows depending upon whether one, two, or three predictive curves are called for.

The second output option which may be requested on the inquiry card is for the matrix of escalation factors. This particular option is likely to be mainly of academic interest to the analysts maintaining the basic routine. The matrix shows the escalation factor applied at each of the time periods for which an escalated cost per square foot is projected for each of the three trend curves. It is immediately useful in viewing the changes in the factors over time, in comparing factors within time periods, and in verifying the

arithmetic of the system by applying them by hand to test costs and comparing the results to the machine calculation.

Instead of precomputing and storing the matrix of escalation factors, the factors are recomputed for each new header card. This permits the luxury of indulging oneself in speculation about the future of the construction industry, as well as the more productive alternative of developing a range of cost estimates by varying the factors of escalation and rerunning a deck of inquiry cards without other change.

The three equations used are a parabolic arc with upper asymptote, L, specified on the inquiry card; a straight line; and, a curve representing the compound interest formula. Respectively, they are

(1) $E(I,J)=KL+(1-KL)\ \underline{/}\ 1.0-R(J)\ \underline{7}^{I}$ where K is a scale which determines how rapidly E(I,J,1) approaches L; K > 0

(2) $E(I,J)=1+R(J)I$

(3) $E(I,J)=\underline{/}\ 1.0+R(J)\ \underline{7}^{I}$

Again, at this point, an additional option becomes available: the calculation of an amortization table similar to that which one might expect to receive from a bank after successfully placing a home mortgage. If this option is not requested, the next inquiry card is read and the cycle continues. If this option has been selected, a table is calculated and printed out showing annual payback figures for 10, 20, 30 or 40 years. These figures are based upon the escalated average total project cost for each of the three predicted costs, RPX(K), K=1, . . ., 3, using an assumed interest rate for financing specified on the header card. Up to three interest rates may be specified simultaneously for comparative purposes or for establishing a range of financing possibilities. Partial financing of a project may be investigated by inducing an artificial RPX at the start of the amortization routine and a mixed package of financing at a variety of rates might also be examined in this manner.

To recapitulate briefly, COPRA is intended primarily as a subroutine within a university planning system. It is generally flexible within what seem to us to be reasonable limits. It is programmed in FORTRAN for use on an IBM System 36/75 with 512k bytes of core memory. However, the program should be compatible with most 360 systems which contain a FORTRAN G processor. We expect to use it in a time-sharing mode for remote access--at which time we expect it to quickly answer questions which plague us every day about our physical plant. Questions such as what have we got?; what do we need?; how much is it going to cost us to get it?; if we don't have that much, what else can we do?; and how are we going to have to pay for it? Until we have the remote input-output capability, COPRA improves our capacity for complex and rapid analysis of some of the problems of physical resource allocation. No model can replace the necessity of making judgments about resource allocation, but models can and should improve our ability to exercise this judgment. COPRA gives the decision maker a broader range of physical resource alternatives from which to select on a systematic basis after the academic constraints have been established.

Footnotes

1. Based on Gross and Grambsch listing; Academic Administrators and University Goals: A Study in Conflict and Cooperation. Prepared for the Office of Education.

2. Harlan D. Barcither, and Jerry L. Schillinger. University Space Planning, Urbana: University of Illinois, 1969.

THE COST-REVENUE-MODEL APPROACH TO A FORMULA FOR THE DISTRIBUTION OF STATE SUPPORT TO PUBLIC COMMUNITY COLLEGES

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The growth of community colleges within the American educational system is already recognized as phenomenal. The operating expenditures associated with this growth have expanded even more rapidly, and pressure to meet this advancing cost continues to increase on the three major revenue sources: local taxes, tuition revenues, and state support. Though we identify the community college as an institution of higher education, its early history as a part of the K-12 school district has produced methods of implementing state support which resemble elementary and secondary education state-aid formulas.

This situation is similar for Michigan public community colleges. Though the community college movement began in the K-12 districts, almost all of the institutions are now independent. Yet the state's share of financing operations in these colleges is still based upon a fixed dollars amount for each full-time equated (FTE) student.

There is nearly universal agreement among college administrators, educators, and legislators that the present method is not adequate. Yet each administrator feels that the formula should be changed in a different way, each desiring alterations in the formula that more effectively meet his own college's particular need. At the same time, legislators have altered the present formula in patchwork fashion in an attempt to provide some equalization in distribution of state funds. In all cases "equalization" has been the ultimate end. What has not been seriously considered is the rationality or logic of the proposed formulas or their ease of implementation. Equalization has been all pervading. So our discussion here will attempt to add logic to a state support formulation and to indicate a method of painless implementation. The proposed formula under discussion within the Michigan Department of Education will be the focal point of demonstrating these other considerations. Let us begin by examining what is meant by equalization.

Equalization, of course, has something to do with equalizing--equalizing state support, or educational opportunity, or operating costs. Such concepts have produced many alternatives for financing community colleges across the country, such as line-item appropriations to each institution, foundation grant methods, percentage equalizing grant methods, partial instructional costs reimbursements, and numerous "criterion" formulas.

Two examples of the more sophisticated formulas exist in Illinois and California. In Illinois, recommendations are being made for a proposed formula which would be based on both "equalization" and "flat grant." The basic equalization factor is intended to provide a comparable revenue to all community college districts. What is unique about this formula is that the percentage of the population served by the community college district is taken into account.[1] Although it was presented by the Illinois Junior College Board in quite a different form, the formula, on an FTE student basis, is equivalent to

Total Public Support Per FTE Student = Tax Rate x ($4700 - $\frac{EAV}{Population}$) + 345

Population is the college district's population, EAV is the Equalized Assessed Valuation of property within the district, and Tax Rate is that rate levied in the district. If the college serves more than 1.0 percent of the district the first product in the formula is multiplied by the factor:

Population ÷ (FTES x 100)

Although communication and understanding of the Illinois formula is difficult, the formulation displays an ingenious attempt at equalization by considering the proportion of the population that is served.

In California, a slightly more explicit formula is being adopted that also emphasizes equalization. This formula is

State Support/Student = Total Cost/Student - Local Revenue/Student

Local revenues are determined by the district's assessed valuation times a systemwide computational tax rate.[2] This formula has an advantage in that it resembles actual cost-revenue relationships and the implicit assumption is that the portion of the total cost of educating a student which is not financed by local revenues should be financed by the state. Equalization occurs by allowing state support to vary inversely with local revenues.

In these examples we see two considerations for equalizing state support to community colleges: merit (how well the college is serving the district and what tax effort is being made) and need (how poor the district is). Apparently then what is meant by equalization is that each college should receive what it needs as well as what it deserves. This is quite all right. However, criteria for determining equalization have usually been intuitive and have resulted in formulas which credit local tax efforts, weight district wealth, and average enrollments in mysterious ways and do not necessarily bring about the desired equalization. For example, where state support is to be inversely proportioned to factor X, the right-hand side of the state-aid equation may be divided by factor X. This may get more dollars to different colleges, but is this equalization?

Need and merit need not be intuitive. Since we are talking about equalizing dollars we may as well define them in terms of the entire cost-revenue picture within a community college. That is, they may be defined rationally within a model that demonstrates the relationship between costs and revenues for a hypothetical community college. It may then be possible to arrive at an equitable formulation of state support from this model. The California formula suggests just such a model. It says that the state share is that amount of total cost which is not financed by local revenues. We can expand this formulation into a more complete model to include not only local support, but also tuition and other sources of revenues. Thus we have

State Share = Total Cost - Local Revenues - Tuition - Other Revenues

From this model we should be able to describe (grossly) any individual college's financing, hypothetically, and arrive at a state share which reflects

the most desirable (equitable) state of affairs among these variables.

The above model is the basis of the state-aid formula being proposed in Michigan. The formula takes each of the factors in the model and defines them specifically to meet the needs of the college system. This means, for example, that where the model shows "total cost" the formula defines the term specifically as X dollars per full-time equated student. Many formulations are possible with this model but what is described here is that particular formulation which suits the Michigan community college system. Having a rational model to guide us we can examine each of the factors to be considered in equalizing and arrive at suitable coefficients for the state-aid formula.

It should be clear at the outset that our formulation must conform to the cost-revenue model and as we demonstrate the form that each of the factors takes it should be kept in mind that that form relates directly to the total cost-revenue picture.

For our purposes here we will speak of state support per full-time equated student (FTES). Hence each of the other factors on the right-hand side of the equation must also be in terms of dollars per FTES. Although arguments may be made against formulation on an FTES basis, or any unit basis, they would not be relevant here nor would their consideration be even crucial.

The first factor in our model is "total cost" and in our formula it will be termed "total cost per FTES." The "total cost per FTES" need not be a single quantity, but the amount of detail and complexity that makes up this factor is of less importance than by what approach we arrive at the quantity. There are a number of alternatives to arrive at a figure which we may represent as a "total cost" factor. This approach would represent the real cost instead of the ideal cost and would have the defect of perhaps rewarding inefficiency and wealth while punishing efficiency and the lack of wealth. In our model the college with a low total expenditure figure, due to either efficiency of operations, lack of program diversity, or lack of wealth, would receive a smaller amount of state support than a college with a larger total cost figure which might be due to inefficient operations or surplus programs.

The other extreme of this possibility is to take as a "total cost" a state average of <u>all</u> community college expenditures for the prior year and then adjust this figure upward for rising costs. This approach implies that the mean represents the most desirable figure. Of course it may not, and although it equalizes by implying equal costs across colleges this approach may be too extreme in not recognizing individual differences among the colleges.

In both the approaches stated above, the use of prior-year figures tends to establish a pattern of costs which may not be desirable at all. Prior-year budgets may have been totally unjustified. An alternative to these methods may be a "cost of the product" approach where costs of various programs are determined. This approach is dependent upon cost studies, program differentiation, and continued cost analysis. As an example of this approach let us assume only two programs, the general academic and vocational-technical programs, and let us assume that their costs have been determined by cost studies to be $1000 and $1200 per student, respectively. In our formula the "total cost" factor for a particular college would be determined by the number of students in each of these programs times their respective costs divided by the total number of students,

which gives us an average "total cost" for the community college. We have compromised the "individual" and "average" college costs problem by looking at another dimension of "total cost," that is, individual program costs, so that cost differences among colleges result from the different proportions of each program they offer.

Further recognition of individual college differences may be reflected in a "small college" factor which recognizes the fact that higher costs per student are unavoidable for new and small colleges. To determine this factor it may be necessary to do some research on the exact functional relationship between students and expenditures. Once a mathematical function has been found to describe the quantitative expression, it may be used as the adjustment factor. For example, this "small college" factor might take the form

$$\frac{\text{FTES} + 25}{\text{FTES}}$$

This would mean for a college with 250 FTE students there would be a 10 percent increase of the "total cost" when this factor is multiplied by the "total cost" factor. For a college of 1000 FTES the increase would be only 2.5 percent. In Michigan the "total cost" per FTES would take the form

$$\frac{(\$1000 \times \text{Gen. Aca. FTES} + \$1200 \times \text{Voc. Tech. FTES})}{\text{Total FTES}} \times \frac{(\text{FTES} + 25)}{\text{FTES}}$$

The second factor in our model represents the local tax revenues. In reality local tax revenues are a function of the local tax rate and the assessed valuation of property in the district. In Michigan the tax rate is called "millage rate" and the assessed valuation is called the "state equalized valuation" or SEV. It is usually with assessed valuation that most state-aid formulas attempt equalization among districts. Much could be said about the degree to which local revenues represent local ability and local effort to finance the community college but this topic is beyond the scope of this paper. A good discussion of local ability and effort can be found in the California publication "Financing California's Public Junior Colleges."[3]

Let us assume that we want to equalize ability in terms of wealth and reward effort in terms of tax rates. Using the model it can be seen that a larger state share will result when the local revenue factor is smaller. Thus, equalization will occur in our formulation if the less wealthy districts can substitute a smaller number for this factor. This of course is possible by using the district's actual SEV per student. But our model says that this quantity has to be multiplied by the millage rate to get the total local revenues, and if we use the district's rate, the greater it is the less will be the resultant state share, which is undesirable. So in our formula the district's SEV per student needs to be multiplied by some fixed millage rate which has been determined to be adequate, necessary, or minimum local effort. Now it can be seen that districts levying less than the fixed millage rate are losing revenues by the formula since the formula assumes more local revenues than actually exist. At the same time districts levying greater than the fixed rate have revenues above that proposed by the formula, and, in fact,can support a total cost per student much higher than is assumed

in the formula. In the Michigan formula discussions, we are using one mill. So for the local revenue tax deduction we would insert the local district's SEV per FTES multiplied by one mill, and this determines the amount of dollars per student financed by the local district.

In Michigan tuition rates are set independently by the colleges. The State Plan for Higher Education in Michigan indicates the desirability of lowering tuition rates in the community colleges.[4] With this in mind, we can see from our model that to discourage higher tuition rates the formula must result in lower state support where higher tuition rates exist, and this can be accomplished if we allow the tuition deduct in our model to be represented in the formula by simply the tuition rate of the college. In this way a college increasing the tuition charge by a given number of dollars will lower its state support by an equal number of dollars. For that matter charging any tuition at all produces zero gain in revenues, so it is conceivable that all the colleges could immediately abolish all tuitions and by this formula increase the state share by an amount equal to lost tuition revenues. Consequently, the state would have to carry an increased burden which the state treasury might not be able to afford. In order to prevent this, a realistic tuition rate, perhaps an average rate, can be fixed as a lower bounds, such that the tuition deduction factor would amount to the college's rate or the fixed rate whichever is greater. In this way there would be no advantage for the college to reduce the tuition below the fixed rate. In Michigan we are discussing a lower tuition bounds of $250. Lowering this bound may be possible in succeeding years as it slowly becomes possible for the state to carry more and more of the "total cost" burden for the student.

The final revenue deduction in our model represents the conglomerate called "other revenues" which, in fact, may have been represented in more detail in the model. However, these revenues are often insignificant and unpredictable. Therefore, they have been combined for convenience. Though this deduction may be insignificant our formula must include it to be a paradigm of our cost-revenue model. In Michigan an average of approximately six percent of community college revenues comes from federal funds, gifts, and grants. This factor of six percent, or whatever percentage is found suitable, is a fixed factor in the formula and can be applied to the "total cost per student" factor as previously defined. Now it should be noted that colleges receiving more than six percent of these sources can enrich their programs by the extra revenues, while colleges receiving less than six percent are assumed to have more revenues than they actually have. Thus there is an implicit encouragement to seek these additional revenues.

It should be noted that the cost-revenue model itself as a whole takes into account a number of factors which vary from college to college. Yet in our formulation which we have derived from this model we have allowed some of the factors to be direct quantitative substitutions from college data while other factors we have set as constants. The factors we have held constant, however, are those which as deductions are regarded favorably when they are numerically large. Conversely when the factor is viewed unfavorably with larger quantities, a direct substitution of the college data is used. The total formula, then, takes the following form

$$\text{State Support/FTES} = \frac{\$1000 \times \text{G.A. FTES} + \$1200 \text{ VT FTES}}{\text{Total FTES}} \times \frac{(\text{FTES} + 25)}{\text{FTES}} -$$

$\frac{(SEV)}{FTES}$ x 1.0 - ($250 or college's tuition) - 0.6 x cost factor.

This formula has two distinct advantages over other formulations for financing community colleges as well as providing equalization. It has the advantage of being based on a cost-revenue model which bears some resemblance to the real-life situation and hence is logical. Thus there is an observable rationale in the determination of state support. It means that an alteration in the formula can be viewed in terms of the model it parallels. It means that the relationship between cost and revenue factors is visable.

Probably the most important advantage of this formula is that it can be implemented immediately and be so adjusted as to provide the same dollar amount as would have been provided by any previous formula. This is possible by inserting bounds or limits upon the variable factors which are allowed to fluctuate from college to college. This would mean, for example, that SEV, which in the freely functioning formula is determined strictly by the college SEV data, would have imposed upper and lower bounds thus allowing less fluctuation of this factor among the colleges. We have already suggested a similar use of a lower bounds on tuition. By narrowing these upper and lower bounds we make the formula more static. The extreme example of this procedure would have only fixed factors within the formula, thus providing the same dollar value per student for each college. This may seem contradictory to the original intent of this formulation. However, the freely functioning formula which provides maximum equalization would cause drastic changes in state distribution of dollars if implemented immediately. For practical reasons there must be little or no dollar difference with formula changeover and the ideal can only be reached through an evolutionary process. By beginning with a formula with strict and narrower bounds, one which distributes money similar to a present formula, the freely functioning formula can be evolved by slowly receding the bounds on each of the factors. Thus over a number of years the relative impact of large amounts of money or the loss of large amounts of money in one year is avoided. For those familiar with the difficulty of gaining any change in formula distribution this long-range implementation is recognized as one of the key factors in achieving acceptance of any new formula.

The formula presented here based upon the cost-revenue model cannot be, and is not intended to be, the final and best formulation for determing state support to public community colleges. However, it does appear to suit Michigan's community college system, and a great deal of diversity of formulation is implicit in this approach. The "total cost" factor, for example, has not been dealt with very extensively here, but clearly the cost portion of this model need not be restricted to only one term. We have spoken of revenues as deductions from the total cost figure. We might just as well have spoken of additives to the cost figure, such as certain instructional expenditures, faculty salary increases, student services, and so on. But regardless how complex the final formulation, what we are doing is applying hypothetical, as well as actual, data to a cost-revenue model-based formula in order to obtain a rational equalization of state support to each community college.

Footnotes

1. Illinois Junior College Board, "A Program of Equalization Plus Flat Grant for the Distribution of State Financial Support to Illinois Public Junior Colleges," November 22, 1968.

2. Coordinating Council for Higher Education, Financing California's Public Junior Colleges, Chapter V, June, 1967.

3. Ibid., Chapter III.

4. Michigan Department of Education, State Plan for Higher Education in Michigan (provisional), Chapter IV, September, 1968.

A STUDY IN PARTICIPATIVE MANAGEMENT: THE TEACHING ASSISTANT

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Introduction

Rensis Likert (1961) identifies four management systems: (1) The Exploitative Authoritative, (2) The Benevolent Authoritative, (3) The Consultative, and (4) The Participative System. He and others (Black and Mouton, 1964; Lesieur, 1959; McGregor, 1960; and Marrow, et al., 1967) have demonstrated that when an industrial firm's workers are involved in the operational decision-making process, morale improves and the firm's production increases.

Industrial measures of a better organization, such as production, scrap loss, tardiness, and turnover are all alien to the academic community. Although such measures are foreign, one wonders if Likert's theory of a participative system of management would still not apply.

The traditional role of the Teaching Assistant[1] in the academic community has been that of an apprentice. Under the watchful eye of the master, he gradually develops his skill as a teacher. Decisions are made by the master and communicated to the apprentice. An arrangement such as this is not too distant from the subordinate-supervisor dyad commonly found in business and industry.

Looking at Likert's four systems of management, one would probably guess that the master-apprentice arrangement would likely appear as a Benevolent or an Exploitative Authoritative system. The questions we face today are, first, do other management systems exist in the academic community, and second, if the Consultative or Participative are present, will they result in noticeable differences in the Teaching Assistant's morale and productivity.

Three hundred and seventy-eight Teaching Assistants (TA's) in nine departments in the College of Literature, Science and the Arts at the University of Michigan were surveyed to see if the other management systems were present. The amount of participation in the decision-making process by people at all levels of the organization is one of the essential criteria used to identify the various types of management systems. In this study, two measures were employed as indicators of the degree of participation. The first indicator was a general description of the TA's functions as a TA. Each TA was asked to identify which description of his duties best fit his own appointment. The scale ranged from a situa ion in which the TA designed his own syllabus, chose his own texts, wrote his own examinations, and gave his own grades to the other extreme in which the TA did none of these things. Table I presents the results of this question.

Table 1

FREQUENCY DISTRIBUTION OF THE DESCRIPTION
OF THE WORK OF A TEACHING ASSISTANT

Item	Bot	Econ	Engl	Germ	Hist	Phil	Phys	Soc	Zool
1.*	1	1	13	0	0	8	1	5	0
2.	4	1	21	1	1	5	3	9	2
3.	2	3	5	1	3	5	3	2	5
4.	15	5	12	10	10	8	5	1	18
5.	12	17	5	17	10	5	22	0	23
Total	34	27	56	29	24	31	34	17	48

*These numbers correspond to the choices given in the following request:

"Circle which item best describes your work as a Teaching Fellow.

1. I write my own course syllabus (within the framework of the department's curriculum of course), choosing my own texts, selecting my own manner of presenting the material and giving my own examinations.

2. Somewhere between numbers 1 and 3.

3. I participate in the discussions of the course's outline, may use a text from among those recommended by the department, have flexibility in order of the presentation of the units, and suggest questions for the course's examinations.

4. Somewhere between numbers 3 and 5.

5. I follow a standardized syllabus, using a departmentally selected set of texts, give departmentally prepared tests, with some flexibility in presenting material in the discussion or laboratory section."

The second indicator of participation deals with the degree of "voice" that the TA feels he has in the operation of the department's curricular affairs. The question's items were grouped into two categories: administrative matters and teaching matters. Administrative matters refer to the decisions made at departmental level concerning scheduling and staffing the instructional program. Teaching matters refer to those aspects of teaching which are associated with a given course in the department's curriculum.

While Teaching Assistants feel they have an active voice in the realm of daily classroom activities, their "voice" was rather passive when it comes to influencing their respective department's administration about the type of section they taught. Sociology's TA's reported the highest degree of participation among the nine departments when it came to the items in the teaching portion of the questionnaire.

Table 2

THE MEAN RESPONSE SCORE TO THE QUESTION "BELOW IS A LIST OF VARIOUS ASPECTS OF DUTIES OF TEACHING FELLOWS. PLEASE INDICATE THE VOICE YOU FEEL YOU CURRENTLY HAVE IN EACH . . " WHERE 1 = TOTAL VOICE AND 5 = NO VOICE AT ALL

	Bot	Econ	Engl	Germ	Hist	Phil	Phys	Soc	Zool	TOTAL
Administrative Matters:										
Course You Are Assigned	3.12	3.78	3.68	3.59	3.58	3.13	3.74	3.00	2.60	3.36
Assignment of Section	3.97	3.11	3.16	2.62	4.79	4.23	3.60	3.76	4.13	3.67
Type of Section	4.21	3.41	4.31	4.11	4.65	4.45	4.35	3.75	4.17	4.19
Time the Class Meets	2.71	3.22	3.16	3.10	2.79	3.00	3.86	3.25	3.02	3.13
Teaching Matters:										
Course Content	2.74	3.22	2.65	4.24	3.04	2.39	3.30	1.50	3.63	3.04
Reading List	3.09	3.96	2.84	4.24	3.83	3.03	3.32	1.81	3.73	3.35
Type of Teaching Method	2.12	1.74	1.45	3.86	1.96	1.71	1.89	1.13	2.27	2.02
Composition of Quizzes	2.53	2.59	1.39	1.69	2.17	1.68	2.92	1.19	2.46	2.09
Composition of Mid-Term and Final Examination	3.15	3.59	2.30	2.66	2.78	2.29	3.91	1.63	3.47	2.92
Determination of Final Grade	2.18	3.70	1.11	1.72	1.38	1.71	2.51	1.19	3.00	2.08

The two departments of Botany and Sociology were selected because they represent extreme positions on both of the participation criteria mentioned above. In Table 3 it will be noted from the two frequency distributions of each department that nearly four-fifths (79 percent) of the TA's in Botany describe their teaching duties as that of following the department's predetermined course outline (i.e., the sum of items 4 and 5). Conversely, four-fifths of the TA's in Sociology (82 percent) felt that they had a good deal of autonomy in the operation of their particular sections.

Table 3

A COMPARISON OF THE BOTANY AND SOCIOLOGY TEACHING ASSISTANTS ON THE DIMENSIONS OF THEIR JOB DESCRIPTION AND THE AMOUNT OF "VOICE" THEY REPORT EXERCISING IN THEIR DEPARTMENT'S CURRICULAR MATTERS

Item	Botany		Sociology	
	Freq.	Percent	Freq.	Percent
1.	1	3	5	29
2.	4	12	9	53
3.	2	6	2	12
4.	15	44	1	6
5.	12	35	0	0
Total	34	100	17	100

$x^2 = 26.1$, df = 4, $P < .001$

	Botany N = 33		Sociology N = 17		Diff. of	t
	Mean	S.D.	Mean	S.D.	Means	Value
ADMINISTRATIVE MATTERS:						
Course Assigned	3.09	.98	3.00	1.36	.09	.26
Section Assigned	3.94	1.27	3.76	1.44	.18	.44
Type of Section	4.18	.95	3.53	1.37	.65	1.92
Time Class Meets	2.73	1.10	3.06	1.20	-.33	.95
TEACHING MATTERS:						
Course Content	2.73	1.18	1.41	.71	1.32	4.15*
Reading List	3.06	1.22	1.71	.85	1.35	3.99*
Type of Teaching Method	2.09	1.23	1.06	.43	1.03	3.28*
Composition of Quizzes	2.48	1.28	1.12	.49	1.36	4.13*
Composition of Mid-Term	3.12	.82	1.53	.80	1.59	6.42*
Grade	2.15	1.23	1.12	.60	1.03	3.19*

*Significant at the .01 level

In a similar manner, significant differences appear when a t-test is applied to the degree of "voice" that the TA's in these two departments express concerning matters related to their own courses. Note, however, when it comes to the TA's influence over the administrative matters, neither department's TA's seem to have much of a voice. This reflects the TA's relative position in the organizational hierarchy of the academic community.

Likert, in his book, The Human Organization (1967), mentions that one of the critical features of management is the extent and character of the communication between the supervisor and his subordinate. Having now identified the two departments, we can examine the nature of this supervisor-subordinate interaction. Two sets of questions were asked the TA to obtain some information about these variables. First the TA's were asked a series of questions about the degree of reward they perceived they were receiving from their appointment.

In terms of satisfaction or reward, the Teaching Assistants were asked to respond to the following questions: To what degree do you feel that the work which you are now doing as a Teaching Assistant is personally rewarding? (1 = very rewarding, 5 = very unrewarding); and, to what degree do you feel that the work which you do as a Teaching Assistant is professionally rewarding? (Again, 1 = very rewarding and 5 = very unrewarding.)

Second, the obverse of satisfaction was measured. Overload, according to J. R. P. French, Jr. (1965), could stem from quantitative or qualitative sources. Quantitative is the sense that the TA simply does not have enough time in the day to do all that is expected of him. Qualitative overload refers to the condition in which the TA does not feel fully qualified to do what is asked of him. The former type of overload was examined here. Three varieties of quantitative overload were examined: 1) overload coming from too much of one's own academic work to be done; 2) overload coming from the TA's students; and 3) pressure coming from social obligations created by family and friends.

For our analysis Pearsonian correlation coefficients were used to determine the degree of association between two variables. At the same time, a Z transformation was used to compare the two groups of individuals. As Table 4 indicates, the TA's in the Botany department exhibit many significant correlations between the variables dealing with satisfaction and overload, while the TA's in the Sociology department have virtually no significant correlations.

A Technical Word about the Table

The table dealing with the correlation coefficients of the supervisory variables and the two sets of dependent variables needs a word of explanation. Within each of the two departments the correlation coefficient reflects the degree of concommitant variation between the TA's responses to pairs of questions. Here we are examining the relationship between the degree of clarity of the supervisor's messages to the TA and the TA's feelings of reward and overload. A significant correlation coefficient demonstrates that the paired responses are associated to a high degree.

The interpretation of a measure of the difference between two correlation coefficients is precisely the opposite of the interpretation of a significant

Table 4

CORRELATION COEFFICIENTS AND Z TEST SCORES OF THE BOTANY AND SOCIOLOGY DEPARTMENTS COMPARING THREE SUPERVISORY VARIABLES TO TWO REWARD AND THREE OVERLOAD VARIABLES

	Clarity of Supervisor's Expectation			Job Related Problems			Access to Supervisor		
	Bot. N = 34	Soc. N = 13	Z	Bot. N = 34	Soc. N = 15	Z	Bot. N = 34	Soc. N = 12	Z
Personal Reward	.537***	-.510	1.161***	.646***	-.318	1.098***	.686***	-.346	1.201***
Professional Reward	.601***	-.190	.885*	.686***	-.041	.881***	.724***	.000	.916*
Own Studies Overload	.432**	-.164	.628	.495***	-.070	.611	.290	-.664**	1.098***
Social Overload	.417**	-.025	.468	.432**	-.221	.686*	.375*	-.439	.863*
Demands of Students Overload	.457***	-.574*	1.146***	.513***	-.237	.806*	.456***	.000	.492

Internal Consistency of the Supervisory Variables

		Sociology Supervisor's Clarity N = 13	Sociology Job Related Problems N = 15	Sociology Access to Supervisor N = 12
Botany	Supervisor's Clarity N = 34		.506	.588*
Botany	Job Related Problems N = 34	.512***		.640**
Botany	Access to Supervisor N = 34	.655***	.658***	

* = significant at the .05 level
** = significant at the .02 level
*** = significant at the .01 level

correlation. To have a significant correlation Z is to demonstrate that these two sets of TA's responses (i.e., departments) are not the same.

Comments on the Correlation Table

The two satisfaction measures and the three overload measures were correlated to the three supervisor measures. The three supervisor measures read as follows: "To what degree does your current supervisor make clear what he expects of you in carrying out the functions of your appointment as a Teaching Assistant?" "How free do you feel about talking over lecture section or laboratory section problems with the professor who currently supervises or coordinates the course you teach?" "From a purely mechanical point of view, how available is your current supervisor or coordinator? (i.e., does he keep regular office hours? Can you make an appointment to see him?)" In every question, the smallest numeral represents the most desired condition (i.e., 1 = the supervisor is very clear in his expectations, he listens to your problems and he is accessible). A "5" represents undesirable conditions. In a similar manner, the scales of satisfaction and overload go from "1" representing satisfaction and no overload to "5" representing dissatisfaction and extreme overload.

Interpretation of the Table

We see from the table that the Teaching Assistants in the Botany department exhibit many clearly significant correlations between the supervisory variables and the variables of satisfaction and overload. This means that those TA's in Botany who know what their supervisor expects of them, and who are able to get to their supervisors to talk over teaching problems have the highest amount of satisfaction and the least amount of overload. The more ambiguous a supervisor in Botany is, the more inaccessible he is, the less he is willing to discuss teaching problems, the more dissatisfaction the TA in Botany has and the greater feelings of overload he expresses.

Sociology, on the other hand, shows no such association. Few significant correlations exist among the TA's responses in the Sociology department. Although few significant correlations appear, we can take note of the direction of the correlation. There is a very slight association going in the opposite direction to that of the TA's in the Botany department. This suggests that those TA's in the Sociology department who have clear knowledge of what their supervisors expect of them and are able to discuss teaching problems with their supervisors have a tendency to be somewhat dissatisfied, and to express mild feelings of overload, while those who operate in a more nebulous supervisor-subordinate environment seem a bit more satisfied.

In contrasting the departments, it becomes evident that significant differences appear between the positive correlation of the TA's in the Botany department and the negative correlations of the Sociology department's TA's. This particular test serves to highlight the fact that the TA's in the Botany department are dependent upon their supervisors for satisfaction, while the TA's in the Sociology department seem to derive their satisfaction from some other source.

One Final Word on the Table

As a check to see that the supervisory variables were related, an intercorrelation matrix of the three variables is presented. As can be seen, only one of the correlations is less than the .05 level of significance, and this one has a probability level of 10 percent. This implies that the three variables are not totally inseparable, and consequently, our measurements of the variables of satisfaction and overload may have been treated by essentially only one variable.

The Production Variables

What about the Teaching Assistant's production? One might suggest that the Botany Teaching Assistants' higher expressions of dissatisfaction are due to a large teaching load. Is this the case?

The question of the teaching load was approached from three perspectives: 1) the number of student/credit hours the TA teaches, 2) the number of classes or sections he teaches, and 3) the number of hours he reports working in a typical week as a Teaching Assistant.

The average student credit hour load for the Botany Teaching Assistants is lower than that of the Sociology Teaching Assistants, viz.,

	No.	Average SCH	Stand. Dev.
Botany	31	111.55	145.56
Sociology	13	183.85	52.12

Diff. of Means = -72.30
df = 42.00
t = 2.02 (sig. at the .05 level)

In both the number of sections taught and the average number of hours worked a week the Botany Teaching Assistants again demonstrate significant differences, viz.,

Sections Taught	Botany		Sociology		Total	
	No.	Percent	No.	Percent	No.	Percent
1	34	92	2	13	36	69
2	3	8	7	47	10	19
3	0	0	6	40	6	12
	37	100	15	100	52	100

$x^2 = 33.00$, df = 2, $P < .001$

Hours Reported Worked in a Typical Week

	No.	Average	Stand. Dev.
Botany	33	14.55	5.21
Sociology	17	20.60	7.84

Difference of Means = -6.05, df = 48, and t = 3.19 (.01 level)

It seems paradoxical that Sociology, the department classified as having the highest degree of participation by the Teaching Assistants, reported a higher number of hours worked with the greater degree of satisfaction and a lesser feeling of overload or encroachment of "duty" upon their own studies. Botany TA's reported fewer hours worked per week, higher dissatisfaction with the assistantship, more overload, and saw the assistantship as impinging on their own academic progress. The striking feature here is combination of effort (i.e., hours expended, etc.) and satisfaction. Participative management does have an effect upon the performance and attitude of Teaching Assistants. While the reader is cautioned not to make too many predictions about the outcomes of these findings, it would appear reasonable to assume that service to the undergraduate varies directly with the amount of time the Teaching Assistant spends in his teaching function.

The reader should not presume that there is anything indigenous to the disciplines of Botany and Sociology which would make them more or less conducive to a given management system. The participative and authority systems seem capable of operating in any organizational setting.

Conclusion

One striking feature of participative management is the amount of involvement subordinates have in the management of the work tasks. In looking at the first-line teacher, the TA, we sought to see how much governance he felt he had, and how this degree of governance might affect his attitude towards his work situation.

We took extremes on the governance scale in order to see if these two groups of individuals would react to their position as a TA differently. Our hypothesis is that the participative management group would be more satisfied with their duties and express less overload than the TA's under an authoritarian system of management.

We found that the Botany department, the department defined as under an authoritarian structure, had a lighter teaching load yet showed many significant correlations between the independent variable of the supervisory relationship and the dependent variables of satisfaction and overload.

In recent years the administrators of colleges and universities have investigated and adopted more sophisticated management techniques. Model Simulation, Long-Range Planning, and PPBS are managerial approaches designed to improve the operating potential of the institution, both now and in the future. Since instruction is one of the basic functions of higher education, and is an activity performed by a group of people whose salaries generally consume two-thirds of an institution's operating budget, it would seem a waste if college and university administrators did not also consider reviewing the particular management systems used in their institutions.

Footnote

1. The University of Michigan uses the title "Teaching Fellow" to designate the graduate teaching assistant. Throughout this paper, the more common term "Teaching Assistant" will be used.

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DIFFERENTIAL WEIGHTING OF TEACHER EVALUATION CRITERIA

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The study reported here is actually but a part of a larger study initiated by the faculty of Western Michigan University and carried out by a committee of the Faculty Senate. The purpose of the larger study was to investigate measures of teaching effectiveness with the aim of incorporating any relevant measures into the current merit system of faculty compensation.

The committee's basic task was to investigate the various methods that have been and might be employed to measure teacher effectiveness. The initial phase of the investigation concerned itself with an analysis of previous research in the area. This analysis found that reports by such people as Remmers (1963), Gage (1963), McKeachie (1958), Anderson (1963) and others indicated the following opinions regarding prospects for measuring teacher effectiveness:

(1) The problems of rating teachers are difficult because (a) teaching is complex, (b) teaching proficiency is multidimensional, and (c) students, faculty and administrators differ in the selection of the significant attributes of effective teaching.

(2) The present condition of research on teacher effectiveness holds little promise of yielding results commensurate with the needs of American education.

These kinds of opinions, as negative as they seem, have not however discouraged these and other researchers. Most writers in the field continue to hold out some hope and even some expectation for the development of a teacher evaluation system. Howe (1957) goes even further and indicates that,"It is imperative that ways of improving college teaching be devised and evaluated." This seems to be the essence of the attitude of those sincerely interested and concerned for the improvement of teaching in colleges and universities. Certainly this was the attitude of the committee assigned the task of investigating methods of evaluating teaching proficiency.

The efforts of this committee to investigate measures of teacher effectiveness inevitably led to the examination of student rating as a potentially fruitful technique. Such ratings have been and continue to be the most frequently used and discussed methods reported in studies on this subject. Student ratings of instructors have been found by Remmers (in Gage, 1963) and others to be relatively reliable as well as easy to use. However, as noted earlier, agreement cannot always be reached as to which attributes of teachers should be rated. It was therefore the purpose of this particular investigation to study this problem; that is, to study the basis, if any, for the differential selection or weighting of the criteria of effective teaching.

Previous research has shown, as reported in Gage (1963), that student rating and probably criteria selection as well are unrelated to the instructor's sex, popularity, or rank. However, the fact that instructors, students, and administrators disagree on the selection of these criteria (Anderson and Hunka 1963) suggests that there must be some basis for such differences. It

was therefore the aim of this study to investigate the academic subject area as a potential factor in criterion selection or weighting.

This study started with a list of 35 criteria of effective teaching previously selected by the total faculty of the University. This selection was made in response to an initial screening by the teacher evaluation committee to establish some base for determining whether or not student ratings might be accurately employed and if so what criteria should be used. These 35 criteria items were then resubmitted to selected faculty and student groups representing six "basic" academic or subject areas of the University. These areas were business, education, engineering, English, mathematics-physics, and sociology. It was felt that these areas would provide the maximum opportunity to identify significant differences in the rating or weighting of the criterion items. These groups were asked to rate each of the 35 criterion items on a five point scale from most to least important in identifying the effective teacher. Item weights were then computed for each group represented in the study.

Results

A summary of the findings of this study are presented in Tables 1 and 2. These tables provide a comparison of the various academic groups used in the study. Significant differences among the groups were computed for each criteria item. The statistic used in computing these differences was the Tukey procedure of multiple comparisons, described in Winer (1962). The procedure employs a pooled error term and attempts to maintain the same significance level (.05) for all comparisons.

The basic information from this study is presented in Table 1 showing the weights assigned to each criterion item by each academic group. The items are ordered in the table as they were presented to the faculty member for rating. The names for each item have been abbreviated, but it is hoped that the major idea remains. These comparisons show that each group's weighting of criteria differs to some degree. Some groups differ significantly on weighting of 13 of the 35 rated criteria items, others differ on as few as 1. The essential feature of these data is that there are a number of significant differences among groups as well as within groups.

As a result of these differences, an attempt was made to see if some pattern of criteria weighting could be identified for each group. One way of doing this was to examine the data for any pattern identifiable in the most heavily weighted items for each group. This analysis should describe, at least in part, any value system associated with teaching in each of the academic areas. These data revealed the following items as being most heavily weighted and unique for each group:

Business	Stimulates Students
English	Intellectually Curious Stimulates Independent Thinking
Education	Enjoys Teaching Respects for Rights of Others

Table 1

ITEM WEIGHTS FOR TEACHER EVALUATION CRITERIA
BY ACADEMIC AREA

Item	Bus.	Educ.	Engin.	Eng.	Math-Phys.	Soc.
Knowledge*	4.11	3.90	4.68	4.21	4.48	4.58
New Developments in Field*	4.00	4.05	4.32	3.58	3.70	4.05
Related Knowledge*	3.00	3.10	3.00	2.92	2.48	2.63
Intellectual Curiosity	4.33	4.15	3.26	4.50	3.43	4.26
Contagious Enthusiasm	4.67	4.41	4.26	4.54	4.00	4.42
Enthusiasm for Teaching	3.88	4.75	3.89	3.75	3.65	3.79
Stimulates Learning*	4.55	4.55	4.47	4.45	4.04	4.37
Communicates	3.67	4.50	4.16	3.58	2.96	3.47
Listens to Student	3.78	4.45	3.53	3.83	3.17	3.74
Explains Problems	3.22	3.55	3.89	3.79	3.65	4.10
Organizes Course	3.00	3.45	4.42	3.54	3.35	3.68
Selects Important Information	3.00	3.25	4.21	3.33	3.56	3.53
Explains Applied Theory	3.33	3.20	4.18	3.29	3.26	3.68
Makes Facts Relevant	3.11	4.10	3.18	3.08	2.48	2.84
Encourages Questions	3.44	4.05	3.27	3.96	3.56	3.84
Respects Rights of Others	3.89	4.65	3.72	3.96	3.39	3.84
Stimulates Independent Think.	4.11	4.55	3.80	4.62	4.09	3.95
Stimulates Additional Study*	3.44	4.05	3.37	4.09	4.00	3.84
Knows Each Student	3.78	4.35	3.95	3.71	3.09	3.05
Helps After Class*	3.22	3.50	3.72	3.45	3.61	3.16
Respect for Other Opinions	3.78	4.45	3.45	3.83	3.04	3.79
Patient	2.67	3.45	3.36	3.46	3.78	3.00
Energetic	2.67	2.85	3.27	3.04	2.61	2.05
Accurate Self-Perception	2.55	4.20	2.89	3.12	2.65	2.95
Self-Assured	3.22	2.95	3.63	3.00	2.91	2.47
Sense of Humor	3.00	3.85	3.05	3.50	2.91	2.63
Is Not Perfect*	2.67	3.25	3.21	2.92	2.78	3.05
Attends Class	2.22	3.05	4.21	3.04	2.74	2.53
Fair Student Evaluation	3.11	4.10	4.16	3.71	3.43	4.21
Uses Variety of Tests	2.33	3.00	3.00	2.46	1.96	2.58
Returns Papers Promptly*	2.67	2.95	3.16	2.79	2.48	2.53
Responds to Papers	2.44	3.15	2.89	3.67	2.65	3.32
Tests for Understanding	3.11	3.10	4.18	3.91	3.65	3.74
Updates Tests	3.00	3.20	3.68	2.88	2.74	3.26
Prevents Cheating	2.00	2.20	3.10	1.79	2.61	2.42

NOTE: .82 Diff. is significant at .05 level for all comparisons.
*Item with no significant differences.

Engineering	Knowledge of Subject Organizes the Course
Math-Physics	Knowledge of Subject
Sociology	Knowledge of Subject Contagious Enthusiasm

It would appear from this form of analysis that each of the academic areas has its own somewhat unique pattern of values so far as the most heavily weighted teacher evaluation criteria items are concerned.

Another kind of pattern was noticeable in examining the lowest rated criteria items. Here the indication was, of course, that the lowest rated items were the least valued teacher evaluation criteria. In this instance, the Business faculty placed the lowest value on activities related to testing and their own class attendance. The Education faculty rated the traits of being energetic and self-assured along with preventing cheating as low. English seemed to be a combination of these--they rated using a variety of tests low along with prevention of cheating. The faculty in Engineering rated few items extremely low. Sociology, however, rated having related knowledge, being energetic and being self-assured lowest. The Math-Physics faculty rated using a variety of tests, making facts relevant to the students and the prevention of cheating as their lowest. In all of these, as in the highest rated items, one factor seems obvious: each subject or academic area seems to be unique with a pattern of values (expressed as criteria weights) which is distinct and different from most, if not all others.

A further attempt has been made in Table 2 to summarize the number of significant differences in item weights obtained when comparing the various academic groups. The data in this table indicate the extent of the difference among groups, although obviously not the nature of the differences. It may be seen here that the Business faculty differed from the Education and Engineering faculties in its weighting of roughly one-third of the criteria items. They do not, however, differ greatly from the other groups. On the other hand, both the Education and Engineering faculty groups differed from every other group on the weighting of 6 to 10 of the criteria items; and these two groups further differed between themselves on the weighting of 13 of the 35 items. The remaining groups differed to some extent from each other, but in no instance did such differences reach the levels of the above.

In compiling the data for Table 1, it was noted that there were nine items for which there were no significant differences between groups. This agreement might be construed by some to be one reason to select such items for a teacher evaluation scale. However, if such items were to be used they should probably not only represent agreement, but should carry the heaviest weight or occupy the same position for every group. This unfortunately is not the case for these nine items. Four of these nine are heavily weighted, but the other five are not. Also, the heavily weighted items do not represent the most important factor or criterion to each group. Therefore the only conclusion that may be drawn from this agreement is that these items should carry similar weight for all groups and most of these items should probably be in any evaluation scale.

Some further data was collected but is not represented in these tables. This was the data collected from students in most of the academic areas above. The student data confirms, in general, the previous findings, i.e., a pattern of differences among academic areas. The students differ only slightly from the faculty in their weighting of criteria items. The differences in these instances were in the direction of heavier weighting to student-oriented items such as returning papers, fair testing and evaluation, and preventing cheating. The general impression gained from the student data is that students expect different things from different instructors based on the type of subject being taught, and that these expectations can be and are expressed as differential weights assigned to criteria of effective teaching.

Table 2

NUMBER OF SIGNIFICANT* DIFFERENCES BETWEEN GROUPS
FOR THE TOTAL OF 35 TEACHER EVALUATION CRITERIA ITEMS

	Bus.	Educ.	Engin.	Eng.	Math-Phys.	Soc.
Business	X	8	8	3	1	3
Education	8	X	13	4	10	6
Engineering	8	13	X	7	7	7
English	3	4	7	X	3	2
Math-Physics	1	10	7	3	X	1
Sociology	3	6	7	2	1	X

*Significant at .05 level.

Conclusions

This study represents an attempt to explore the differential weighting of teacher evaluation criteria. Previous publications and observation have suggested that faculty members disagreed on the selection of such criteria. However, few studies have dealt directly with such disagreement. The findings of this study indicate that the weighting of evaluation criteria does differ significantly, and that these differences are dependent upon the academic area or group represented. Therefore, it is suggested that the weighting and probably the selection of the teacher evaluation criteria should be made by the academic or subject group upon which the evaluation instrument is to be used. There is also another reason for such a suggestion. The acceptance of any evaluation plan is normally enhanced when the group being evaluated select the criteria as well as the evaluation instrument. Thus, this study suggests that teacher evaluation scales or instruments should be tailored to the needs and peculiarities of the particular academic group upon which it is to be used.

The data suggests that the observed differences in instructors' weighting

of criteria items may be related to a set of more deeply seated differences in instructional aims or goals. It appears that each discipline has its own methods of teaching and that these are closely tied to the goals or aims of the instructor and the subject area in which he is teaching. This latter observation seems particularly appropriate for at least two of the academic areas studied here, Engineering and Education. In the case of Education, this observation seems especially noteworthy. The fact that professional educators differ in the values they place on teacher effectiveness criteria from all other groups suggests that educators have adopted a set of aims or goals that is best suited to their own instructional area, and that these differ from those adopted by other groups.

While the results of this study are in no way conclusive, they do offer two basic suggestions. First, that more research into the basis for selecting and weighting teacher evaluation criteria is needed. (This is particularly true if progress is to be made in rewarding effective teaching.) Second, if new teacher evaluation instruments are to be developed, the necessity of tailoring the instrument to the characteristics of the teaching situation should be carefully examined.

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A SURVEY OF FACULTY WORKLOAD POLICIES OF SELECTED UNITED STATES UNIVERSITIES

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Mississippi State University

On October 24, 1967, the President of Mississippi State University established an ad hoc committee to investigate current practices and to make recommendations for a firm university policy on faculty loads and overloads. To be included in this investigation would be faculty involvement in consulting, official assignment in professional organizations, etc. The Vice President for Academic Affairs, Chairman of the committee, called the committee to action during the fall of 1967. In an attempt to gain information as to other universities' practices in relation to their faculty loads, a subcommittee was established to prepare the questionnaire used to solicit the information summarized in this report.

This report follows closely the general scheme of the questionnaire that was distributed. Preceding the three data-presenting sections is a brief description of the procedures used to gather the information. The first section is a description of the universities and the regions responding. The second, a general one, summarizes the information gained about limits placed on nonteaching, nonresearch activities of the faculty. The third section is a summary of the information gained about the administrative handling of research personnel and research time.

In each major section the question of interest is presented. Next, the table related to this question follows, if necessary, a description of how the data were summarized or a list of definitions is provided.

Procedures

The questionnaire was developed by the subcommittee through a series of meetings during the fall of 1967. After construction of the questionnaire, sample copies were sent to the other members of the committee for their comments and recommendations. The final product was then reproduced along with a cover letter sent under the Vice President for Academic Affairs' signature. The questionnaire and cover letter, along with a stamped self-addressed return envelope, were sent to eighty-one colleges and universities throughout the United States. The population frame used to select the sample of respondents was the Education Directory.[1] In most cases our inquiries were addressed to the Academic Vice President or the Dean of Faculties at the institutions selected.

The analyses were very simple. In most cases only a frequency and a percentage of total number responding are reported. In general, it should be noted that although we had approximately a seventy-five percent return, in virtually no case did we have complete data from all seventy-five percent. Therefore, if a percent is reported, it is a percentage of those schools responding to that particular question. In many cases a school responded for one section but not for another. In general, the tallying procedure was highly subjective. This was due, in part, to technical imperfections in the questionnaire. Many of the

administrators reporting found the questionnaire format not always flexible enough for them to report their school's activity. As an indication of their professional interest, these administrators supplied narrative statements of their schools' policies. The present investigator attempted to read these narrations and catalogue them into the restrictive format of the questionnaire. Any errors or poor decisions are his and not those of the respondents.

General Information

In the process of carrying out the charge given the general committee, the question arose as to whether a university had any right of control over the activities of its professional personnel. The result of the discussion within the committee eventually polarized around "working hours" and "spare time" activities. Tables 1 and 2 summarize the data obtained for these two somewhat unclear distinctions.

Table 1 is a summary of the responses to the question: Are limits placed on the nonteaching activities of the faculty during "working hours"?

Table 1

ARE LIMITS PLACED ON NONTEACHING ACTIVITIES OF THE FACULTY DURING "WORKING HOURS"?

	Responses					
	Yes		No		Omits	
Type of Activity	Percent	No.	Percent	No.	Percent	No.
Consulting	52	32	13	8	35	22
Business participation	50	31	13	8	37	23
Avocations	40	25	23	14	37	23
Research	8	5	52	32	40	25
Scholarly writing	5	3	56	35	39	24
Community service	18	11	43	27	39	24

The categories used in Tables 1 and 2, we believe, are self-explanatory with the possible exception of business participation and avocations. The former means the participation of the faculty member in a business endeavor, as either owner or employee. Avocations mean such things as operating farms, investment counseling, real estate development, etc. Community service is considered to be community service in the broadest sense and is to include such things as church work.

In response to the question about limitations placed on nonteaching activity during "spare time," Table 2 is presented.

Table 2

ARE LIMITS PLACED ON NONTEACHING ACTIVITIES OF THE FACULTY DURING "SPARE TIME"?

	Responses					
	Yes		No		Omits	
Type of Activity	Percent	No.	Percent	No.	Percent	No.
Consulting	35	22	37	23	27	17
Business participation	34	21	39	24	27	17
Avocations	23	14	48	30	29	18
Research	2	1	71	44	27	17
Scholarly writing	2	1	74	46	24	15
Community service	3	2	73	45	24	15

The data presented in the preceding two tables indicate the trend is not to place limitations on "spare time" activities of any type. However, Table 2 indicates consulting, business participation, and avocations activities are more likely to have limitations placed upon them than are research, scholarly writing, and community service activities.

One general remark,.which may be of interest, is that one respondent noted that it was very difficult to define "spare time." Another indicated that "spare time" had no meaning in their concept of faculty activities. Both of these are good points. "What are working hours?" and "what is spare time?" are questions at the base of this problem. It is a philosophical point about how much influence should a university or any employer have over the "spare time" of their professional employees.

If the university operates an eight to five shop, then "spare time" is relatively easy to define. But since very few institutions of higher learning operate on this base, "spare time" becomes a nebulous entity. It would be of interest to see if the respondents could provide a definition of "spare time" and "working hours."

Activities Other Than Teaching and Research

The problem of work loads seems to divide itself into three nonmutually exclusive compartments. These are teaching, research, and "other university activities." The present section will be concerned with the last category--activities other than teaching and research.

Activities other than teaching and research are defined here as consulting; active owner or employee of a business; writing for which compensation is expected; and avocations such as farming, real estate development, etc. Here again, these are not mutually exclusive categories. One can easily think of

examples that cut across all categories. However, they do help organize this section. Consulting and writing are rather clear examples of a university professor's activities. The owner of a business and the pursuit of avocations are not quite so clearly related to the university life, but it is common knowledge (at least on our campus) that these activities are pursued with some vigor by our colleagues.

The tables in this section are the result of our attempt to discover trends in the attitude towards and control of these four classes of activities. Since it was generally agreed that consulting was one of the most perplexing problems, some added effort was expended to gather information about this activity.

Table 3 is a summary of responses to the inquiry of how consulting work is encouraged. Here subjective judgment was used in categorizing the responses into the five general areas presented.

Table 3

HOW IS CONSULTING WORK ENCOURAGED?

Method	Percent of total responses	Frequency
Policy statement	42	9
By permitting it	38	8
Salary raise evaluations	5	1
Efforts of dean	5	1
Recognition	10	2
Total	100	21

Table 4 summarizes the responses to a question that attempted to establish the methods that the universities used to account for the limitations placed upon consulting work and other activities. It may be of interest to note that four universities considered it important enough to note that the accounting system was used for consulting only. The exact reason for this was not uncovered through the questionnaire. It may be of interest to find out exactly why these universities felt that consulting should be considered different from some of the other activities described in Table 2.

In an effort to gain information as to how effectively these limitations operated, the question was asked: Do these restrictions satisfactorily provide protection of quality teaching? A summary of these responses is found in Table 5.

Table 4

BASES USED TO ACCOUNT FOR LIMITS PLACED ON CONSULTING AND OTHER ACTIVITIES

Method	Percent of total responses	Frequency
I. General		
1. Days per week	35	18
2. Days per month	6	3
3. Days absent	4	2
4. Class meetings missed	2	1
5. Various combinations of items 1 through 4 listed above	11	6
6. Contact hours	2	1
7. Not applicable	8	4
8. No response	25	13
II. Consulting only		
1. Days per week	4	2
2. Days per month	4	2
Total	100	52

Table 5

DO THESE RESTRICTIONS PROVIDE SATISFACTORY PROTECTION OF QUALITY TEACHING?

Response	Percent of total responses	Frequency
Yes	59	34
No	9	5
Don't know or uncertain	14	8
No response	19	11
Total	100	58

Those universities which felt that there was *a* distinction between scholarly writing and professional consulting were asked to provide us with the major basis for the distinction. Table 6 summarizes these responses.

In summary, this section attempted to draw together various dispositions toward activities other than research and teaching. The focus of this section was primarily consulting. The general trend appears to restrict consulting in a formal way, such as one day a week. The other three categories are limited informally through the general control device of nonhindrance of official duty. The respondents felt that the restrictions placed by them do help protect qual-

Table 6

BASES OF DISTINCTION BETWEEN SCHOLARLY WRITING AND PROFESSIONAL CONSULTING

General Category	Percent of total responses	Frequency
"More scholarly"; "requires more precision and on a higher level"; "writing brings more scholarly distinction to the university."	39	12
"Writing enhances teaching"; "more intimately related to teaching."	16	5
Writing is part of normal university requirements. Consulting is not.	13	4
"Writing is less likely to interfere with university duties."	10	3
A variable distinction. They are considered the same for some colleges, different for others.	10	3
No comment.	13	4
Total	100	31

ity teaching. Over one-half of the respondents viewed writing as different from consulting work, and most of these indicated that writing is on a higher professional level.

Research Activity

How important is research's role in the university's activity? Table 7 summarizes the responses to the question: To what extent is research expected of the faculty?

Table 7

TO WHAT EXTENT IS RESEARCH EXPECTED OF THE FACULTY?

Extent	Percent of total responses	Frequency
Required	7	4
Necessary for promotion to senior faculty	2	1
Major factor for advancement	68	38
Minor factor for advancement	14	8
Dependent upon terms of contract	2	1
A factor but unclassifiable	7	4
Total	100	56

It was at this point that consideration was given to dividing the responses to the next question. The responses of the universities which considered research a major factor are summarized in Table 8.

Table 8

SUMMARY OF RESPONSES OF THOSE UNIVERSITIES THAT EITHER REQUIRE RESEARCH, MAKE IT NECESSARY FOR PROMOTION, OR CONSIDER IT A MAJOR FACTOR

A. Is time for research released from teaching?

Response	Percent of total responses	Frequency
Yes	83	36
No	5	2
Other	12	5
Total	100	43

B. Summary of responses related to rate of compensation of research.

Category	Percent of total responses	Frequency
Higher than for teaching	0	0
Same as teaching	92	33
Lower than teaching	0	0
No response	8	3
Total	100	36

Some general comments by the respondents on released time may be of interest. In some cases released time could not be specified in "cut and dry terms." Also, for example, "sponsored research was always yes," and "departmental research was sometimes." And if departmental research was part of the required workload of a faculty member, it was released.

Is government-sponsored research ever assigned to faculty members who have a "full teaching load"? The summary appears in Table 9. For those persons who answered yes, the question was asked: If yes, is compensation in addition to that paid for teaching? The summary of these responses appears in the second portion of Table 9.

The bases for the additional compensation were 1) A rate of one-tenth of the nine month salary. 2) The other responded that it was done through a contract with the Academic Dean.

Is there a difference in the compensation base for research as compared with teaching? The summary of the responses to this question can be found in Table 10. For the five people who indicated there was a difference, the bases for the differences are summarized in the second portion of Table 10.

Table 9

IS GOVERNMENT-SPONSORED RESEARCH EVER ASSIGNED TO FACULTY TEACHING A "FULL LOAD"?

Response	Percent of total responses	Frequency
*Yes	14	8
No	81	47
No response	5	3
Total	100	58

*If yes, is compensation in addition to that paid for teaching?

Response	Percent of total responses	Frequency
Yes	25	2
No	63	5
No response	12	1
Total	100	8

Table 10

IS RESEARCH COMPENSATED AT THE SAME RATE AS TEACHING?

Response	Percent of total responses	Frequency
Yes	86	50
*No	5	3
No response	9	5
Total	100	58

*If no, what is the nature of the difference?

Response	Percent of total responses	Frequency
For externally sponsored research:		
1. Higher (1/3 academic year salary for research vs. 1/4 academic year salary for teaching)	66	2
2. $1,000/course taught vs. 2/9 academic year salary	33	1
Total	100	3

In summary, it appears that research is an important faculty activity in the schools surveyed, as indicated by a trend to provide release time for research. In the majority of cases, research pay was the same as for teaching; and extra compensation for research was not generally permitted.

Footnote

1. Department of Health, Education, and Welfare, Education Directory, 1966-1967, Part 3, Washington: U. S. Government Printing Office. 1967.

SURVEYS INTO DEMAND CONDITIONS FOR POST HIGH SCHOOL EDUCATION AND TRAINING IN THE NORTH: A REPORT ON RECENT ALASKAN EXPERIENCE WITH COMPARATIVE IMPLICATIONS

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Forecasting the demand for continuing education beyond high school by analysis of plans is only modestly well developed as a research technique in urban markets and the highly industrial states.[1] Efforts in this same direction of forecasting demands and interest levels of youth graduating from rural areas are even less sophisticated. This article summarizes four years of survey research into these demand conditions in Alaska on a state-wide basis and with particular emphasis upon the rural population and persons of Native origin.[2]

In 1964, initial surveys were developed and market testing was begun among pretest samples of high school seniors in the Fairbanks, Alaska area. At six months intervals these test groups were gradually expanded to include extreme cases of social, economic, and cultural background. By spring 1967 a fully tested questionnaire was in its third major revision. It could be mass administered to smaller groups in rural areas and still provide in-depth information well in excess of experiments accomplished annually in most other states.

Scope, Method of Research and Design of the Study

The present survey, covering educational plans of high school seniors in Alaska, was accomplished on a state-wide basis. The sample was drawn from all high school units in the state--private and parochial--and specifically included Bureau of Indian Affairs-operated schools where Alaskan Natives were in residence. Thus, the results comprised a relatively large, stratified random sample of the state high school senior population in terms of geographic coverage.

In the major urban areas of the state, questionnaires were personally distributed to the students and administered locally. For all other units, including remotely situated schools, direct mail questionnaires were dispatched to the individual residences, along with return mail provisions. Overall, some 1,004 responses were received which represented 72 percent of the questionnaires dispatched. Analysis of the response rates by geographic region strongly suggested that the results were relatively free of sampling error. In addition, comparisons to earlier pretest groups demonstrated a strong correspondence in the profile of senior classes for specific units.

Basically the study was designed to provide basic background and expectational information on each senior, noting of course, that it is provided by himself rather than verified through formal records. Spot checking of individual cases against school records revealed no deviations in student reporting as opposed to the available facts. This basic information is (a) social and economic background of the student in terms of age, sex, race and occupation of his/her parents; (b) school unit from which he is graduating in terms of its location, class size, legal organization and city size in terms of its population drawing capacity; (c) a logical profile or set of post-high school plans incorporating the alternatives of college-bound expectations, technical and

Table 1

SUMMARY OF 1967 TEST GROUP AND 1968 STATEWIDE SURVEY OF ALASKAN HIGH SCHOOL STUDENTS PLANNING TO ENTER COLLEGE, AS OF EACH RESPECTIVE SPRING

Type of Plan or Expectation	Sex: Males 1967	Sex: Males 1968	Sex: Females 1967	Sex: Females 1968	Race: Natives 1967	Race: Natives 1968	Race: Non-Natives 1967	Race: Non-Natives 1968	Total Respondents Percent 1967	Total Respondents Percent 1968
(1) College Plans: (No. Persons)										
To Attend	111	298	121	322	37	60	195	553	57	62
Not to Attend									43	38
Total									100	100
(2) College to Attend: (In percent)										
4-year College	88	88	90	87	89	76	89	89	89	88
Jr. College	11	10	6	9	11	22	8	8	8	9
Other	1	2	4	4	0	2	3	3	3	3
	100	100	100	100	100	100	100	100	100	100
(3) Subject of Interest: (In percent)										
Sci. and Tech.	30	40	15	15	22	28	22	19	22	27
Art and Hum.	3	13	7	22	0	13	6	14	5	17
Soc. Sci.	32	28	49	52	49	40	39	41	41	41
Undecided	35	19	29	11	30	19	32	15	32	15
	100	100	100	100	100	100	100	100	100	100
(4) Plan to Teach: (In percent)	18	14	38	35	22	26	30	25	28	25
(5) Location of College: (In percent)										
U. of A.	40	32	43	24	35	42	42	26	41	28
Lower State	42	50	46	57	32	42	47	56	44	54
Unknown	16	12	10	8	27	7	10	10	13	10
Other	2	6	1	11	5	10	1	8	1	8
	100	100	100	100	99	100	100	100	99	100
(6) Reason for Entering a College Outside: (Unlimited choices)										
Preference									61	57
Better Education in Field									30	30
Family Leaving									15	2
Scholarship									7	6
Other									32	49
(In percent of respondents)										

Source: Alaska High School Expectations Study (1968).

Table 2

SUMMARY OF 1967 TEST GROUP RESPONSES AND 1968 STATEWIDE SURVEY OF ALASKAN STUDENTS WITH VOCATIONAL PLANS, AS OF EACH SPRING

Preference of Non-College Bound Respondents	1967 Percent	1968 Percent
Work Full Time	27.7	22.5
Military Service	25.4	16.1
Vocational Training	22.0	26.3
Marriage (for Females)	11.3	16.9
Youth Programs	2.3	1.3
Other or Unknown	11.3	16.9

vocational interests, military service, full-time work, etc. (Part-time participation in these activities is also designated); (d) the subject matter field of study, or vocational interest; (e) varying degrees of interest and apparent motivation (or uncertainty).

Taken altogether the study design provided adequate detail from the survey results for an in-depth statistical analysis for the state and many component subregions. In addition, it represented the basis for additional study of the student groups, especially in terms of academic prediction and follow-up during a continuing educational life cycle.

Summary of Findings

There are several significant findings of the 1968 state-wide survey. These are also substantiated by prior studies. Much of the overall quantitative detail is available by examining Tables 1 and 2. The major findings are these:

(1) Over 70 percent of youth surveyed indicated college or vocational training aspirations. College-bound persons accounted for approximately 60 percent, and vocational programs the remaining 10 percent.

(2) Considering continuing educational interests as comprised of college and vocational programs, the overall level of interest per capita expressed by Natives and non-Natives might be considered similar, about 70 percent of each group.

(3) Fifty percent of college-bound youth expected to leave the state to continue their education. A similar emigration was apparent in vocational training. Marginally significant differences appeared among Natives and non-Natives with the Native youth demonstrating slightly higher tendencies to remain in Alaska following high school graduation. Conversely, a majority of aspiring students were planning not to attend the State University.

(4) The overall rate at which students reported college and vocational interests varied by region and race more than according to the other variables tested. The regional differences were not large by comparison, except that rural areas, typically containing smaller secondary schools, reflected in their graduates a lower propensity to attend college and training programs.

(5) High school seniors of age 19 and older were predominantly Native (by a 5 to 1 ratio), male (by a 2 to 1 ratio), and in the majority cross-correlated with parents in industry/occupational codes 8, 9 and 30 (unknown or unemployed). It is obvious from the evidence that a significant number of Natives are "held back" in school on an age-wise basis. Native respondents expressed a level of interest in vocational programs of roughly 6 to 1 by comparison to the non-Native persons. Similarly, the number of non-Natives who planned participation in college programs was materially higher.

(6) High school graduates who were not planning to attend college or vocational programs immediately, by and large recognized a delayed interest in returning to such programs after military service, on a part-time basis, etc. A mere 6 to 7 percent were uncertain of their plans as reported in the survey.

(7) Twenty-five percent of college-bound persons indicated an interest in teaching as a career, although women outnumbered men in this respect by a 2 to 1 ratio.

Some Implications

The surveys provided a wealth of basic information which is highly useful and pertinent to a great variety of questions and public policy problems of Northern primary-secondary-continuing educational systems. The practical uses of these data in educational planning are many, including the forecasting of programs desired, the "needed" extent and location of facilities and estimates of the students who will attend. A survey of these young adults, of course, sidesteps important questions about the "adequacy" of their counseling, and likelihood that they will pursue academic and vocational programs successfully. Therefore, additional and more detailed, factor-oriented analysis and in-depth studies are appropriate.

In this report, the Northern manpower resources have been viewed principally in terms of new additions to and upgrading of the labor force from secondary school graduation.[3] Other major segments of the regional labor market remain important, but relatively unexplored. In particular, persons leaving primary and secondary schools (exclusive of migration to other schools) prior to graduation and many out-of-school youth, who had earlier completed secondary school, warrant special consideration for manpower and training programs. Also, the factors of immigration and emigration, which are clearly apparent and important in certain urban communities, are questions of fact about which currently available statistics provide limited understanding of the magnitude of these factors in Northerly areas.

The flow of aspiring youth from smaller school units generally was so limited that the question--What is the minimum effective high school enrollment size?--became apparent in the paucity of college recruits and obviously large dropout rate prior to grade 12. Regional high school units, more prevalent in the Canadian North than Alaska, are a first major step in improving efficiency in the cost and quality of secondary education.[4] The second logical step in further inquiry would be additional research into the curricula followed and student performance of these same social-economic groups. Finally, comparative studies might be instituted on an international scale concerning these aspects of Northern education,[5] beginning at first with Canadian-American projects.

Footnotes

1. A relatively long and continuous series of regional high school expectations, covering 17 years, is available for Hawaii. See Secondary School Status Survey, Honolulu: Department of Education Reports No. 30 and 50. In terms of nation-wide data, for example, Education Testing Service, Follow-up Study of a National Sample of High School Seniors: One Year After Graduation, Princeton, N. J.: College Entrance Exam Board, Statistical Analysis Report SR - 65 - 62, 1965.

2. R. C. Haring, Alaska High School Expectations Study: Survey Research on Demand Conditions for Post-Secondary Education and Training in Alaska. College: University of Alaska, 1968. The term Native, as used in this article and research reports cited, refers to persons one-fourth (or greater) Eskimo, Indian or Aleut origin.

3. For comparison purposes, see Organization for Economic Co-operation, Manpower Policy and Programmes in Canada, Paris: OECD Reviews of Manpower and Social Policies No. 4. 1966.

4. A dated but adequate descriptive comparison may be found in Joan Ryan, "A Comparative Survey of Native Education in Alaska and the Northwest Territories," College, Alaska, University of Alaska, unpublished thesis, 1959.

5. A prelude to such an effort is, in fact, on the drawing board at present. It is the International Conference on Northern Education, sponsored by the Ford Foundation, which will be held in August, 1969, at Montreal.

LONGITUDINAL ANALYSIS OF SELECTED ACHIEVEMENT, APTITUDE, AND INTELLIGENCE FACTORS OF VIRGINIA PUBLIC SCHOOL GRADUATES WHO MATRICULATED AT THE UNIVERSITY OF VIRGINIA, FALL 1967

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Even though more students are applying for and are entering the University of Virginia and other colleges each year, the nature of the entering college student has received little attention other than through an analysis of data accumulated in the late years of the secondary school and through followup studies in college. In order better to understand the intellectual and achievement measurements traditionally taken at the secondary level, an analysis of information accumulated over a longer period of time would provide a longitudinal profile from which changes in student achievement patterns could be observed and more dependable predictions of academic performance in college could be made. It is on the premise that if complete and comprehensive information about college applicants were available over an extended period of time, then problems associated with decisions required of admissions officers could be reduced and selection would be more dependable.

Stability and Change of Selected Behaviors

Bloom began investigating research reports on stability and change in human characteristics during the year he was a fellow at the Stanford Center for the Advanced Study of the Behavioral Sciences. After examining years of research on stability and change in human characteristics, Bloom (1965) suggested that data collected over a period of years by the public schools provided a valuable source for longitudinal studies and could be analyzed for practical educational purposes. He showed that the ability to predict long-term consequences of environmental forces and developmental characteristics is increasing and, thus, the responsibilities of the home, the school, and society can be more clearly defined.

Bloom observed that "The relation between parallel measurements over time is a function of the levels of development represented at the different times" (p. viii). This means that human characteristics develop at varying rates for an individual and reach a maximum peak at which time there is minimal or no additional change in behavior. For example, parallel measures of human growth in height tend to show definite changes from about age 2 to age 12, but little or no change in height occurs from 15 to 20 years of age.

Odum (1940) investigated the stability of achievement differentials as revealed by scores recorded from objective tests administered during the four years of high school. He reported that the relative performance of pupils in the same subjects was fairly stable after the tenth grade. This means that tenth-grade scores are as good as eleventh-grade scores to predict twelfth-grade scores in the same subject.

Humphreys (1968) studied the stability of college student performance from the freshman year to graduation. He reported that the academic performance of college students was very unstable from the first year in college through the

senior year.

A series of independent observations have been taken during the public school history on each student in the population used in this study and under conditions that make the observations comparable at different points in time for the same individual. Often these observations measure the same human characteristics. The record of these independent observations of the population permit an analysis of change in the selected human behaviors over an extended period of time.

Prediction of Academic Success

Admissions officers at the University of Virginia, and in colleges and universities across the country, have the task of selecting from multitudes of applicants the students who not only can but will successfully complete the college academic program, as well as those students who will develop optimally in social and physical features. Many colleges continue to rely upon high school achievement and aptitude measurements as prime indices for admission. These indices have been adequate for a large part of the applicants.

Numerous studies have predicted college grade point averages from aptitude and achievement data collected at the secondary level. Fishman (1963) related that the current state of affairs in college selection and guidance research is disturbing because the predictions have left so much to be desired. He further exemplified that predictive studies on college students have not changed over the past two decades, and that when high school achievement scores and class rank measurements were used, no significant changes in the findings of college predictive studies have occurred over the past four decades.

Byrns and Hennon (1935) recommended that college predictive studies consider independent factors obtained prior to high school attendance. They stated that "The four-year high school average and the psychological tests given during the senior year in high school are both obtained so late in the educational career of the student that on the basis of these factors he (the student) can be given only a hasty and often negative guidance" (p. 877). Byrns and Hennon also concluded that successful college work can be predicted from an intelligence test taken at the fourth-grade level.

A. J. Brumbaugh (1960) supported the importance of knowing more about college students than the standard age, sex, geographical origin, rank in graduating class, and performance on achievement and aptitude tests. He suggested that a much broader basis of information was desirable in order to understand the intellectual and personal characteristics of college students.

A. W. Astin (1965), in suggesting potential uses of data collected through massive testing programs, recommended studies of complex relationships among basic psychological and demographic variables, e.g., detailed analysis of the relationships among academic ability, achievement, and socio-economic status. He contended that the results of such comprehensive analyses should provide a wealth of basic information for future research and theory.

The University of Virginia, like many other state universities, is undergoing a period of active growth. In the past, about one-half of the entering

undergraduates were residents of the State of Virginia. It is possible that in the future the proportion of undergraduates entering the University of Virginia from the State of Virginia will increase. Such a development will increase the importance of identifying those factors which contribute the most to successful academic achievement at the University of Virginia on the part of those students who reside in the State. This does not minimize, however, the importance of factors associated with the academic success of out-of-state applicants, but the availability of antecedent measurements does not permit such a comprehensive analysis.

Objectives of the Study

The objectives of the study were (1) to analyze selected behavioral changes during the public school attendance of graduates from Virginia public schools who entered the University of Virginia during the fall of 1967, and (2) to identify selected characteristics recorded over the educational history of first-time enrollees from Virginia public high schools who entered the University of Virginia in the fall of 1967 which significantly influence the prediction of academic performance during their first year in the University.

Procedures

Population of the Study

The population of the study consisted of graduates from Virginia public high schools in the spring of 1967 who matriculated at the University of Virginia in the fall of 1967. Complete data were collected on 489 (84%) of the 585 students in the population.

Data Collection

The Virginia State budget provides funds to support standardized testing programs in the local school systems of Virginia. The State testing program supports the administration of many different types of tests beginning at the first grade and extending through the twelfth grade. For this study, selected standardized test scores of Virginia public school graduates of June 1967 who enrolled at the University of Virginia during the fall of 1967 were collected directly from the public schools by the Office of Institutional Analysis at the University of Virginia. Scores from the following tests and at the designated grade level were obtained for each of the 489 students used in the study.

A. Lorge-Thorndike Intelligence Test (3A) administered at the 4th grade level.

   1. Verbal IQ
   2. Non-verbal IQ
   3. Total IQ

B. SRA (Science Research Associates) Achievement Tests (Form C) administered at the 4th grade level.

1. Work-Study Skills
   a. References
   b. Charts
   c. Reading Comprehension
2. Language Arts
   a. Capitalization and Punctuation
   b. Grammatical Usage
   c. Spelling
3. Arithmetic
   a. Reasoning
   b. Concepts
   c. Computations
4. Composite

C. California Test of Mental Maturity (Level 3) administered at the 7th grade level.

1. Verbal IQ
2. Non-verbal IQ
3. Total IQ

D. Iowa Silent Reading Test (Form DM) administered at the 7th grade level.

1. Rate
2. Comprehension
3. Directed Meaning
4. Word Meaning
5. Paragraph Comprehension
6. Sentence Meaning
7. Alphabetizing
8. Use of Index
9. Total

E. Differential Aptitude Tests Battery (L) administered at the 8th grade level.

1. Verbal Reasoning
2. Numerical Ability
3. Abstract Reasoning
4. Clerical
5. Mechanical Reasoning
6. Space Relations
7. Spelling
8. Grammar

F. School and College Ability Test (SCAT) administered at the 9th grade level (3A).

1. Verbal
2. Quantitative
3. Total

G. Sequential Tests of Educational Progress (STEP) administered at the 12th grade level (2A).

1. Reading
2. Writing
3. Mathematics
4. Science
5. Social Studies
6. Listening

H. CEEB - Scholastic Aptitude Test (SAT) administered at the 12th grade level.

1. Verbal
2. Non-verbal

Data obtained with the cooperation of the Virginia State Department of Education, Division of Educational Research and Statistics, included the following: (a) percentile rank in graduating high school class (PR), (b) number in graduating high school class, and (c) percent of graduating class going to college.

In addition to the aforementioned data, grade point averages for first and second semester at the University of Virginia were obtained.

Analysis of the Data

A zero-order correlation coefficient establishes the relationship between two factors. A correlation between two tests will be very high (r approaches 1.00) if a group of students retain their relative positions among the two test scores, i.e., the student who scores highest on the first test scores highest on the second test, the student who scores second highest on the first test scores second highest on the second and so on. A zero-order correlation coefficient will be very low (r approaches .00) if students' scores on two tests have no consistency in rank from high to low on both measures.

Frequently one may examine the relative standing of students' scores between one or more measures without computing correlation coefficients. One way to accomplish this is to examine a student's percentile rank on two or more measures. The percentile rank (PR) is used to describe the relative standing of a student with respect to other students. If, for example, a student has a PR of 80 on some test, this student's score is higher than the scores of 80 percent of the students in a specific comparison group. The publishers of the tests used in this study have established national norms upon which the percentile ranks have been based. For example, a student who has a PR of 80 on some test has a score better than 80 percent of all students across the nation who were administered the same test.

The analysis of this phase of the study attempts to identify stability and change of selected characteristics of the population by examining the mean

percentile ranks of the population on selected tests.

The test scores obtained from the SRA Achievement, Iowa Silent Reading, Differential Aptitude Test, the STEP Battery, percentile rank in graduating high school class, and percent of high school class going to college were recorded in percentile rank score form. These percentile rank scores were transformed into T-scores in order to meet the linearity assumption for regression analysis. The other measurements were recorded in converted score form--Lorge-Thorndike IQ, California Test of Mental Maturity, SCAT, SAT, and number in high school graduating class.

General Multiple Regression Analysis

A general multiple regression equation is a means by which one can predict a student's score on a certain test by knowledge of the student's scores on two or more different tests. In this study, grade point averages of the population were predicted for the first semester and second semester of the first year. Construction of regression equations were attempted for the students in the population who enrolled in the School of Architecture, School of Engineering and Applied Science, College of Arts and Sciences, and for the total group.

Stepwise Regression Analysis

A second regression analysis, stepwise regression analysis, was conducted using the same dependent variables (grade point averages) and the same independent variables that were used in the general multiple regression analysis previously mentioned. The stepwise regression routine selects test scores of the independent variables used in the general multiple regression equations until the accuracy of the regression equation is as good as the general multiple regression equation which contains the 48 independent measures. The routine used in this study selected the different tests only if they significantly influenced the accuracy of the regression equation at the .05 level.

Findings

The findings of this phase of the study should be considered in relation to differences attributable to variability inherent between the standardized tests used. The variance due to differences between each test has not been identified, and it has been assumed that differences in the achievement patterns of the population are due to individual variability.

Intelligence

Student performance on the intelligence measures was relatively stable from grade four to grade seven. The mean intelligence scores for the population were as follows.

	Grade 4 (Lorge-Thorndike)	Grade 7 (California Mental Maturity)
Verbal IQ	123	125
Non-verbal IQ	117	122
Total IQ	121	124

The mean total IQ of the population was 121 (90.49PR) at the fourth grade level and increased to 124 (93.32PR) at the seventh grade level. The performance pattern of intelligence for the population appeared to increase only slightly after grade four.

Reading Achievement

The achievement measures of the population were relatively stable from grade 4 to grade 12. In an effort to compare the mean percentile rank of the population on reading achievement from grade 4 to grade 12, the results were as follows:

	Grade 4 (SRA)	Grade 7 (Iowa Silent Reading)	Grade 8 (DAT)	Grade 12 (STEP)
Reading Comprehension	82	78	-	-
Paragraph Comprehension	-	76	-	-
Vocabulary	82	86	-	-
Reading Rate	-	73	-	-
Directed Reading	-	75	-	-
Sentence Meaning	-	72	-	-
Verbal Reasoning	-	-	83	-
Total Reading	-	85	-	89

There was a decrease of 4 points between the mean PR of the population on reading comprehension tests administered at grade 4 (mean PR = 82) and grade 7 (mean PR = 78). An increase of 4 points between the mean PR of the population on vocabulary tests was noted between grade 4 (mean PR = 82) and grade 7 (mean PR = 86). Also, an increase of 4 points was noted on total reading achievement between grade 7 (mean PR = 85) and grade 12 (mean PR = 89). These changes in reading achievement may, of course, be due to differences inherent to the tests.

Work-Study Skills

Achievement by the population on work-study skills was somewhat unstable from grade 4 to grade 8. The findings were as follows.

	Grade 4 (SRA)	Grade 7 (Iowa Silent Reading)	Grade 8 (DAT)
References	89	-	-
Charts	83	-	-
Use of Index	-	81	-
Clerical	-	-	71

There were no comparable tests measuring work-study skills at different grade levels. The population's general pattern of achievement decreased from the fourth grade level on references (mean PR = 89) and charts (mean PR = 83) to the 71st mean PR on clerical achievement at grade 8.

Language Arts

Achievement by the population on language arts measures were relatively stable from grade 4 to grade 12. The findings were as follows:

	Grade 4 (SRA)	Grade 7 (Iowa Silent Reading)	Grade 8 (DAT)	Grade 12 (STEP)
Capitalization and Punctuation	82	-	-	-
Grammar	83	-	84	-
Spelling	83	-	77	-
Alphabetizing	-	79	-	-
Writing	-	-	-	89

Performance patterns of the population remained very stable on grammar achievement from grade 4 (mean PR = 83) to grade 8 (mean PR = 84). There was a decrease in the population's performance patterns on spelling from grade 4 (mean PR = 83) to grade 8 (mean PR = 77).

Mathematics

Achievement by the population on mathematics was somewhat unstable from grade 4 to grade 12. The findings were as follows:

	Grade 4 (SRA)	Grade 8 (DAT)	Grade 12 (STEP)
Arithmetic Reasoning	84	-	-
Arithmetic Concepts	90	-	-
Arithmetic Computations	76	-	-
Abstract Reasoning	-	81	-
Space Relations	-	74	-
Numerical Ability	-	81	-
Mechanical Reasoning	-	68	-
Total Math	-	-	93

There was a slight decrease between arithmetic reasoning achievement at grade 4 (mean PR = 84) and abstract reasoning achievement at grade 8 (mean PR = 81). Arithmetic concepts achievement (mean PR = 90) did not differ very much from total math achievement at grade 12 (mean PR = 93). Arithmetic computation achievement at grade 4 (mean PR = 76) was lower than numerical ability achievement at grade 8 (mean PR = 81).

General Achievement

Performance by the population on measures of general achievement was relatively stable from grade 4 to grade 12. The findings were as follows:

	Grade 4 (SRA)	Grade 7 (Iowa Silent Reading)	Grade 9 (SCAT)*	Grade 12 (STEP)
Total General Achievement	88	-	89-94	-
Reading	-	85	-	89
Verbal	-	-	83-94	-
Quantitative	-	-	86-95	-
Writing	-	-	-	89
Math	-	-	-	93
Science	-	-	-	89
Social Studies	-	-	-	93
Listening	-	-	-	90

*SCAT scores were recorded in percentile bands.

The population's performance on general achievement and in specific areas of reading, verbal, quantitative, writing, mathematics, science, social studies and listening remained very high (mean PR ranged from 83 to 95) from grade 4 to grade 12.

Summary and Discussion

The patterns of student achievement which were established early during the elementary grades and remained relatively stable throughout the public school history of Virginia public school graduates who matriculated at the University of Virginia during the fall of 1967 included (1) intelligence, (2) reading, and (3) language arts. The patterns of student achievement which were relatively unstable during the public school history of the population included work-study skills and mathematics. Further study is desirable to follow the population through college in an attempt to analyze patterns of student achievement beyond high school. Such an extended investigation could show if patterns of achievement established at the elementary and secondary school levels change while attending college. The ability to predict changes in patterns of achievement by subject area at the college level would be invaluable to student advisers in planning courses and majors for their advisees.

A general multiple regression analysis and stepwise regression analysis show that when using independent variables recorded from measurements taken at the fourth-grade level to the twelfth-grade level to predict first and second

semester grade point averages of the population in their first year in college there still remains much variance unaccounted for. The partial correlation analysis showed that percentile rank in graduating high school class continues to have the largest relationship with academic performance in college. The need is evident, therefore, that future prediction studies of academic achievement at the University of Virginia should consider personal, social, and environmental measures of students.

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INSTITUTIONAL CHANGE: ITS EFFECT ON STUDENT ROLE ORIENTATION AND PERSISTENCE IN COLLEGE

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Within American higher education certain institutions, primarily public, have undergone change during the last decade. These institutions have been in the previous category of teacher's colleges, state colleges, and city colleges, and now have become respectively state colleges, state universities, and city universities. More probably they are now a part of the state's more comprehensive system of public education and are rapidly growing in enrollment, facilities, and budget.

The characteristics of certain changes that occur in these institutions can be somewhat documented in a statistical sense; that is, amounts of budget or number of students can be compared. Generally both have grown. However, like all numerical data the real changes may or may not be occurring in other ways; many of which are difficult to measure. Changes in curriculum can be reported as changes in number of courses, but the impact on student learning is less susceptible to simple numerical manipulation. Too, the measurement of change in student values or attitudes and the goals of the faculty involve major methodological problems for assessment.

Change, then, is the researcher's dream and nightmare, for assessment appears to be simple and obvious but cause and effect relationships remain elusive and deceptive. The evaluation of change asks what was, what is, and what will be. In many cases, the "what was" for the institution can be described but only partially documented. An objective of those in planning and research is the establishing of certain guidelines for assessment of past, present, and future change and to formulate definite criteria for determining change.

The more formal change in an institution is signified by a change in the name, usually representing an already established change in objectives. Of concern for the researcher is the impact of the change in name, if concurrent with change in objectives, and the change in students' enrolling in the institution. Usually the change in name signifies change in objectives, subsequently the enrollment increases and new or developing curricula emerge. A small university may grow larger without real change in curriculum or students, except there are more of the latter. Another college may grow and change to a university, with wide changes in curriculum, enrollment, and students.

Student Role Orientation

Significant change for some institutions is almost nonexistent or very gradual, reflecting a stability in purpose and objectives (the very private liberal arts college in New England). The student body can be very similar in certain measured characteristics from one year to another. Change in other institutions may reflect a different student body than those previously attending; changes may occur very rapidly, that is, within five years. Where

new curricula or expansion of some majors occurs, the total student body may be modified; as for example at a certain state university there has been a decline of undergraduate majors in agriculture and an increase of majors in liberal arts. Thus changes in the objective or name of the institution may affect the major of the student and the enrollment in certain curricula. Such changes may also reflect the increase in number of students; those who ten years ago might not have attended college are now attending and in greater numbers. This latter circumstance is more striking in the junior colleges and large urban universities as well as in the extension or evening division enrollment.

The researcher in his analysis of the student body may then be a witness to change at a lesser or greater extent--change in the student role orientation. The student role orientation is the total psychological and social factors indicative of behavior and attitude among college students. For some the term "culture" has been used to describe and analyze the college and the students. A central thesis of this paper is that the student body of an institution is composed of many different subcultures of students, each with a different role orientation. These subcultures can be and have been defined in the past by sex, major, socio-economic group, geographical location, or by subsection scores on attitude tests. A second thesis is that for each subculture or different role orientation there is a varied possibility for persistence in college. Persistence not only encompasses withdrawal and dismissal but also academic achievement, and eventual graduation. The question asked is whether different subcultures of students can be identified, assessed, and determined to be indicative of differences in persistence in college. Assessment of why the student is in college is predictive of whether he will persist in college and it has a distinct effect on enrollment studies.

Previous studies in enrollment predictions and dropout studies have not directly investigated the particular student typology groups or subcultures used in this study. Previous studies may have investigated the same basic cause and effect relationships by use of basic categories such as sex, class, and major in college. The new methodology for classification of student subculture should be researched as to its validity in predicting persistence in college. The problem to be investigated in this study was whether the distinctive role orientation scales found in the CSQ would give a valid indication of persistence in college and be indicative of a better methodology for assessing persistence in college and in enrollment calculations. These scales may be helpful in the further definition of certain subcultures to better understand their characteristics.

Procedures

The 1966-1967 freshman class at State University College at Cortland were given the College Student Questionnaire (CSQ) as part of a research study on student characteristics. Additional admission data were available, including achievement and aptitude test scores. Persistence-in-college records were maintained for this group for three years, noting the student's record in school and if classified as a dropout (in the broadest sense of the word), follow-up procedures were maintained.

From the student typology or role orientations on the above data several classifications were prepared for analysis. Several classifications from the

student role orientation were prepared. The first series was the traditional classification of students by sex and general major, as seen in Table 1. The latter provided a 14 grid square approach in use of the cohort-survival method for predicting enrollment and persistence in college. The second series was the use of roles as defined on the CSQ by the student and reported in Table 2. The third series used a 15 variable selection from the CSQ and admissions data for use in multiple discriminate function to determine differences between criterion categories.

Five categories of independent variables were identified. These were defined as (S) successful persisting students with a college grade point average of 2.1 and above, (M) marginal students with a college grade point average of 2.0 and below, (AD) academically dismissed students, (W/S) withdrawn students who left with a successful grade point average of above a 2.0 and (W/F) withdrawn students who dropped from school with a grade point average of below 1.9.

The study was conducted in three separate stages, corresponding to the three series of role orientations. The underlying construct for such a procedure was to compare the validity of (1) the sex and major code for determining persistence and enrollment, (2) the validity of the four-typology classifications from the CSQ in determining persistence and enrollment, and (3) the validity of multivariate analyses of various classifications of 15 continuous variables in a classification of role orientation in determining persistence and enrollment.

The first series of sex and major and the second series of sex, major, and CSQ were separated as shown in Table 1.

TABLE 1
Categories for Series 1

Sex:	Male
	Female
Major:	Liberal Arts-Science
	Liberal Arts-Social Science
	Liberal Arts-Humanities
	Elementary Education
	Secondary Education
	Physical Education
	Health and Recreation Education

TABLE 2
Categories for Series 2

CSQ	Academic
	Collegiate
	Social
	Non-conformist

Table 3 lists the continuous variables from the CSQ and admissions data that were used in the third series of role orientations.

TABLE 3
Variables Used in the Multivariate Analysis

College Board Test Score (T)	Motivation for Grades
High School Grade	Family Social Status
Regents Test Score (T)	Family Independence
Level of Academic Motivation	Peer Independence
Father's Educational Level	Liberalism
Mother's Educational Level	Social Conscience
Typology Classification	Job Satisfaction
Preferred Career Area	

For the third series, the proposed discriminating variables were first tested with a multivariate analysis of variance to determine significance between the five categories of classification of persistence. The discriminant function analysis (part of the same computer program) had as its purpose the factoring of these variables. The classification program was used to determine for each individual the probability of hits and misses, using the last series of role orientation.

Results

The use of the traditional variables of sex and major for determining persistence proved to be valid inasmuch as different groups in Table 1 did have different persistence ratio figures. Using the cohort-survival technique, it would be possible to arrive at a percentage figure for those persisting in college; that is, the (S) successful and (M) marginal student as well as for any designated group. This technique does not provide any insight into why there are some differences for the special groups but it does provide a talking point when discussing the enrollments with other interested persons.

Students' classification of themselves into four categories on the CSQ did not prove valid in differentiation among groups. The non-conformist choice was too limited in sample size for analysis. The percentage of persistence among the other three groups was not significantly different, most probably due to the heterogenous classification within each group, at least for the sample at this institution.

The analysis of the 17 variables for the five criterion categories shows that the scales Motivation for Grades and Family Independence, along with the high school average, provide significant difference among the categories of persistence in college. As would be expected, the grade point average in college is highly correlated with the high school grade and motivation to seek grades. The Family Independence scale may suggest a maturity factor for discriminating among some role orientation groups.

The study was conducted in three separate stages, corresponding to the three series of role orientations. The underlying construct for such a procedure was to compare the validity of (1) the sex and major code for determining persistence and enrollment, (2) the validity of the four-typology classifications from the CSQ in determining persistence and enrollment, and (3) the validity of multivariate analyses of variance classifications of 15 continuous variables in a classification of role orientation in determining persistence and enrollment.

HUMANIZING HIGHER EDUCATION

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For many years, ever since the post-war college enrollment boom, we have heard complaints about the dehumanization and depersonalization of our colleges and universities. We are all familiar with the saying: "The only way you can get any individual attention around here is to bend your IBM card." We have listened to everyone from trustees to undergraduates voice their concern and offer solutions to the problem of dehumanization of higher education. We have seen some notable efforts to solve the problem with devices such as the cluster college.

Not only do complex organizations such as large universities tend to neglect the individual but the system itself becomes resistant to change. Our federal government is a prime example. Note the difficulty a new administration has in making any significant dent in the federal bureaucracy (Sidey, 1969). Clearly, we need new techniques to deal with the problem.

One of the most interesting phenomena of recent years is the development of group methods for the purpose of facilitating change. Our vocabulary has been enriched by terms such as change agent, sensitivity training, encounter, T group, and so on. Indeed, a whole new area of study, considered by some to be a discipline in itself, has arisen. It is known as humanistic psychology (Rogers, 1965). Its purpose is to consider the role of attitudes, values, feelings, and emotions in interpersonal relations. In this view, noncognitive aspects of human behavior are given equal, if not superior, status to cognitive, intellectual factors. Education is planned change, traditionally emphasizing cognitive materials. Group methods foster planned change by nurturing interpersonal relationships which will allow change to take place (Miles, 1964). These techniques appear to have great potential for bringing about change in higher education.

To find out where we're going, let's look at where we've been. The history of group training may be traced to the establishment of the First National Training Laboratory on Group Development in the summer of 1947, almost 22 years ago (Butterworth and others, 1947). The Laboratory was sponsored by the Research Center for Group Dynamics of Massachusetts Institute of Technology and by the National Education Association, along with a number of cooperating universities. As you can see, the group training movement rose from the very heart of American higher education. Evidence of the influence of the first Laboratory is given by the fact that the group training approach is often referred to as the "laboratory method."

The sponsors of the first Laboratory began to search for a suitable location. They wanted a site sufficiently isolated so that participants would not be disturbed while in group activities. However, they needed facilities to feed and house the more than one hundred participants. They found a nearly ideal site at the campus of Gould Academy in Bethel, Maine. The location of the Laboratory at Bethel gave rise to the term "the Bethel Method." The National Training Laboratory, as it is now known, continues to operate at

Bethel. NTL became an affiliate of the National Education Association in 1952 and maintains a small, permanent staff at the NEA headquarters in Washington, D. C. It has grown over the years, has trained hundreds of individuals, and now operates a number of training centers. Many of these "graduates" have returned to their home communities to establish and lead groups.

The emphasis in the early National Training Laboratories was on training "trainers" to continue laboratory work in their home areas. Professionals in the behavioral sciences have created many "growth centers" where the emphasis is on the individual as "client." One of these centers is Esalen, located at Big Sur, California. There are approximately three dozen such centers in operation in the United States today.

Other centers emphasize research on interpersonal processes. An example is the Western Behavioral Science Institute at La Jolla, California. During the past year, a number of individuals formerly with the Institute have set up their own research centers. For example, Carl Rogers of the Institute for the Study of the Person is currently doing research on the application of group methods in elementary schools.

Most college and university campuses are the scene of some laboratory training activity. Laboratory training is widely used as a technique in the training of educational and psychological counselors, social workers, and other students in the so-called helping professions. Seminaries also use laboratory training a great deal. Many centers for the rehabilitation of drug addicts or prisoners use laboratory training (McKean, 1969). One such center is Synanon in Oakland (Kobler, 1969).

Laboratory training is only one technique in the social science of group dynamics. Other techniques are lectures, discussion groups, role playing, and so on. Laboratory training is perhaps the least structured of all these techniques. It brings together ten or fifteen people in a situation with no agenda, no rules, and no formal structure. Members of the group are usually strangers to each other; their only information about their fellows is that they are members of the same group.

Let's take a look at the goals of group training. A major goal is to increase awareness of our emotional reactions and the effect these have on others. A major complementary goal is to increase the awareness of the emotional reactions of others and the effects these reactions have on us. These goals are reflected in the use of the term "sensitivity training." When we become sensitive to the feelings of others, we can better predict the consequences of our actions, that is, anticipate the effect of our actions on others. When we become aware of these consequences, we will be better able to bring about change and to reach our goals. At the same time, we may find that we want to change our goals and perhaps even change our value systems. Training groups emphasize understanding of feelings and values as a prerequisite for successful interpersonal relations. Group activity may provide an individual with developmental crises, a point from which rapid growth may take place. Training groups are classrooms in which noncognitive learning is stressed and the values of democracy are practiced.

Every training group has its own pattern of development but there are some phases through which most groups generally progress (Bradford and others, 1964).

First of all, the members of the group must learn about each other as individuals. They must be sensitive to each other's behavior and to the development of their group. This unfreezing process is often a difficult one for people who are used to structure and direction. Secondly, individuals must learn to help other members of the group to assess the results of their behavior. This feedback must be nonevaluative in nature and must take place in an open and supportive group atmosphere. Thirdly, group members must learn to recognize growth in their group and to gain insight into the nature of group development. They must learn to collaborate with other members of their group in determining the structure and goals of their group.

Laboratory training may seem quite like group psychotherapy. However, its goals are conscious sensitivity to oneself and to others, rather than the resolution of unconscious conflicts (Katz and Kahn, 1966). Laboratory training assumes that group members can reach solutions to problems by observing, analyzing and guiding the behavior of their group. Argyris (1968) notes that therapy and competence acquisition, that is, the gaining of interpersonal skills, have similar objectives. Competence acquisition is more appropriate when individuals are open, trusting, and able to learn by communicating with each other. Therapy is indicated when individuals are closed, conflicted, and defensive, and therefore require a professional with whom to communicate.

So far, we have concerned ourselves with laboratory training focussed on the development of the individual. We have briefly considered the goals of such activity and the extent to which it is practiced. We have little solid evidence that the participation of individuals in laboratory training is of significant benefit to organizations. There is considerable evidence that individuals often derive a deep emotional experience from their group membership but there is little evidence that they are able to maintain significant personality changes once the encounter experience has ended. This implies that we live compartmentalized lives and the probability of generalizing from a brief encounter experience to our professions and careers is very small.

A possible solution to this dilemma is to focus on the organization as client rather than on the individual as client. In this way, the encounter experience will be shared by individuals who will be in subsequent professional contact with each other. The probability of bringing about a significant change in organizational climate is greatly increased.

There are a number of fundamental ways in which group training might affect an organization. One of these is to improve the organization's ability to solve problems. In developing an awareness of our own and others' feelings and values, we increase the probability of open communication. This, in turn, allows greater exposure for creative and innovative ideas. Conflicts which are discussed may be solved; those which are suppressed will never be solved.

Secondly, an open climate is likely to increase the flow of data within an organization. Members of an organization will become more aware of what others are doing and how the results may be used. I think this is especially true of a large university.

Hopefully, an end result of group training will be a change in the style of administration or management. Many of us have at one time or another been a member of an autocratic, authoritarian system. The advantages of a more open

system for producing change are evident. Some consider an open, democratic system to be the only possible way to deal with the problems of a rapidly changing society (Bennis, 1966). In this view, an autocratic system is not capable of surviving in a period of such rapid change as we experience today. Another predicted characteristic of changeable systems is that they will be temporary (Bennis, 1966). Focussed on a particular problem, they will cease to exist when their task is completed. An encounter group might be considered as an example of a temporary system.

An interesting variation of group methods for application to organizations is the confrontation design developed by Golembiewski and Blumberg (1968). Confrontation design involves the comparison of "images" developed by two or more organizational groups. The images make explicit how we see ourselves, how others see us and how we see others. The organizational groups then meet or "confront" each other to share the images they have developed. The goal is to solidify areas of image agreement, explore areas of disagreement, and, in the process, improve inter-organizational communication.

Let me tell you about some applications of group methods to organizations. These examples are not representative in any sense, but happen to be examples that I've become aware of and published in the literature. A most interesting example is given by Argyris (1962). He describes the process of applying group techniques to a division of a large corporation, a division with annual sales of over half a billion dollars. The program involved the division's top executives. First, the executive system was analyzed. Then the resulting information was fed back to the executives. The third step involved a laboratory experience for the executives and the final step was an evaluation of changes. The results of the program were considered to be positive; that is, interpersonal relations were improved. It was pointed out that the process of change is a continuing one and therefore the diagnosing-feedback-evaluation cycle must be continuous.

It may be a common practice in the near future to involve group trainers in the development of new business concerns. In this way, the whole management style, the personality of the organization, may be developed by the new executives. Each individual would have a better idea of his place in the organization when he gets feedback from his colleagues. Dayal and Thomas (1968) give an account of one such intervention in a new company.

Not all laboratory training applications in business and industry have been successful. Bennis (1966) cites an instance where the major outcomes of laboratory training were the firing of the trainer, reduction of the training program to technical training only, and the resignation of the vice-president for personnel. It is important to note that the upper echelon management was not involved in the training and had only a vague notion of what the training program was all about.

An interesting application of group theory to a civil rights organization is reported by Nadler (1968). He cites the difficulty of getting an organization to realize that it needs help. Members of the organization's executive committee met and moved rapidly toward mutual trust and openness. Nadler describes the session and the positive changes that resulted, including clarification of roles and an improved plan of organization.

Grinnell (1969) describes the activity of an informal action group in a large university. He notes that power tends to be reactive and cites the need for change-inducing groups, in this case for the purpose of bringing about major educational improvements. The group successfully worked toward the development of shared goals and, especially important, toward shared values. Members felt that they had grown in their ability to work in groups. Each member of the informal action group participated in one or more training groups. On the negative side, a number of innovations were later discontinued, and action group members found a great deal of resistance toward training group values from the academic community.

An application of group methods to induce change in a public school system is reported by Benedict and others (1967). They assumed that a more viable organization which can cope with its problems is more likely to produce creative, innovative behavior. The project centered on the theme of organizational self-study with the triple goals of increased ability to solve problems, increased flow of data within the organization, and the changing of administrative norms. This particular intervention was not considered to have been successful.

Suppose for a moment that you perceive a need in your organization for a type of change-inducing activity such as laboratory training. How do you determine whether your organization will benefit from such an effort? First of all, your organization and its individual members must be open to new techniques and to the possibility that change will occur (Argyris, 1962). There must be a concensus, a willingness to try laboratory training. If you are the administrator of an organization which you wish to change, you may only succeed in threatening other members of your organization if you impose laboratory training on them. If you are a member of an organization which you feel could benefit from group methods, you will need the cooperation of your administrator as well as your peers if the innovation is to succeed.

In addition to a concensus that change-producing techniques would be useful, there must be motivation on the part of group members to expend the necessary time and energy. Membership in the group must be on a voluntary basis. This is a real problem because an individual may see group participation as a mandatory condition for survival in the organization. Even when group participation is stated to be strictly voluntary, an individual may perceive group membership as, in fact, a condition of continued organizational acceptance.

It might be difficult to find an organization where all members are willing and eager to take part in group procedures. In many cases, a consultant might be able to recommend a best course of action. Most of us can get a great deal of aid and advice on our own college and university campuses. Trainers and others knowledgeable about group methods are often found in departments of sociology, psychology, education, management, and so on. In my own university, for example, group training experts may be found in the Institute for Extension Personnel Development of our Cooperative Extension Service.

An excellent source of information would be the National Training Laboratory. Their Institute for Applied Behavioral Science can provide extensive information.

It may be desirable to engage an outside consultant who may review the situation with greater detachment and less personal and emotional involvement. This is a technique often used by business and industry in the selection of management consultants. A consultant who is on a contractual basis may be a great deal more open than one who is a permanent employee of the organization undergoing change.

Selection of a consultant or trainer is not an easy task. There is a tendency for anyone who has been involved in a weekend training group to consider himself a competent trainer. As far as I know, there is no code of ethics, no set of guidelines, no professional group specifically for trainers. I would prefer that a trainer be a member in good standing in one of the helping professions mentioned earlier.

What is the future of group activity? Benedict and others (1967) write

> Currently, the induction of organization change shows all the signs of being an 'in' activity. More and more applied behavioral scientists find their energies channeled in this direction. Client systems appear to be satisfied and change-inducers recount their adventures with great satisfaction.

In California, one may hear of some very "far out" group encounters on one hand and, on the other hand, read pamphlets calling for the stamping out of sensitivity training as just another facet of the communist plot to overthrow the country. Nevertheless, group activity seems to be flourishing. Whether it is a current fad or permanent fixture remains to be seen.

Hopefully, we will be better able to judge the effectiveness of group methods. As mentioned before, a great deal of research effort is being concentrated on this area. As evidence accumulates, it is used to modify the theory of group training.

I would like to make note of the fact that the principles of sensitivity training are congruent with the ideal values of our society. Concern for scientific inquiry, concern for democratic process, and concern for supportive relationships sound very American indeed.

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TEACHING MAJORS IN ACADEMIC FIELDS: A FOOTNOTE TO U.S. OFFICE OF EDUCATION STATISTICS

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This paper is an initial progress report of a study which undertakes to estimate the extent to which USOE statistics on bachelor's degrees awarded in academic fields are misleading to anyone who does not read the fine print. Since 1953 it has been the consistent policy of OE to require that degrees of education majors preparing to teach academic subjects in high school be reported as having been awarded in those subjects. Because the OE statistics are being used for professional manpower projections, as well as in connection with program operations both inside and outside the federal government, it is important that the inherent limitations of the data be made explicit.

The origin of the policy explains the limitations of the data. Beginning about 1944, with the passage of the GI Bill, OE was called upon to provide the statistics on college enrollments and degrees which it had discontinued collecting during the war. In addition, it was being asked for data on degree production by subject field, which it had not previously collected. The survey of degrees awarded in 1947-48 was published as a fairly simple listing. Immediately it became apparent to professional associations, as well as to OE itself, that subdivisions of the data would serve a number of special interests. In 1950-51 there were 70 subject fields; by 1955-56 there were 160; at last count there were 188. The major part of the initial increase was in the field of education. At the same time, the breakdown of scientific subjects was made to conform to the pattern of the National Scientific Register, which was funded by the National Security Resources Board and operated by OE (and subsequently made the responsibility of NSF) and which was oriented largely to graduate studies. Against these special interests the statistically minded within OE lost out in their argument that the categorization of majors by subject fields of undergraduate study should be consistent for all subject areas.

The net result is that while education majors in specialized fields such as art, music, business and commerce, and home economics, for instance, are distinguished from other majors in those subjects, no one knows the proportion of bachelor's degree recipients in mathematics, physics, biology, chemistry, languages, history or social sciences who were really majoring in education. It was argued that in these fields of undergraduate study preparation for graduate school was no different than preparation for teaching school in so far as content mastery was concerned. It has been increasingly apparent that this argument is not necessarily valid. Not only the personal ability and motivation of the student but also the intellectual orientation of the college which he attends have their effect on the quality of academic learning. In the making of educational and manpower policy decisions it may therefore be quite valuable to have adequate statistical data on bachelor's degrees awarded to majors in academic subjects apart from those awarded to students oriented towards the school-teaching profession.

The problem of the internal consistency of the current OE data cannot be passed over merely by citing item 9(c) of the survey instructions or the introductory notes to the earlier published data. The users of federal statistics--whether they be congressmen, educators, scientists or employers--assume that the figures are what they appear to be and they should not be forced to interpret the niceties of the fine print in order to come to correct conclusions. When other federal agencies use the OE data uncritically the situation becomes even worse confounded. In December 1968, for instance, the Science Education Group in the National Science Foundation published a study of baccalaureate sources of science and engineering manpower which used as one of its measures "the number of baccalaureates that were awarded in the sciences (including social sciences) and engineering in academic year 1964-65,"--noting neither the limitations of the OE data nor defining what had been included as social sciences. The fact is that bureaucratic custom dictates that data from other agencies are used without question in the form in which they are made available.

However, there is some indication that federal statistics relating to higher education may be improving. At present, stimulated by the exigencies of computer-type operations and backed up by the Executive Order of October 16, 1964 which directed agencies to get together on their education facts and figures, the National Center for Educational Statistics in OE is making a real effort to define the facts before the data are fed into the computer. But the OE decisions regarding these definitions will depend in part on the pressures which professional organizations bring to bear to insure that the statistical output will have clear and unequivocal meaning.

The OE statistics indicate that 40,320 bachelor's degrees were awarded in 1964-65 by 123 (101 private, 22 public) primarily undergraduate colleges in the five states of the East North Central region. This group of colleges, defined originally for another study, are those which grant bachelor's degrees according to the normal pattern of the liberal-arts/general-education curriculum, whatever may be their own preferred designation.[1] For the purpose of this study, colleges for which comparable data on eligibility of graduates for teacher certification are lacking are omitted. An analysis of the data for this group of 123 colleges shows that 8,543 (21 percent of the total) represent bachelor's degrees awarded to education-oriented majors who were reported by OE as having been awarded their baccalaureates in academic fields of study. This is 40 percent of the number of bachelor's degrees awarded in all academic subjects. These percentages are probably not representative of the nation as a whole, but they do indicate the extent to which the OE statistics are misleading. (Detailed tabulations by state and by type of institutional control are given in Table 1.)

The OE listing of earned degrees for 1964-65 was not published until 1967. In 1966, however, the American Association of Colleges for Teacher Education had issued institutional data on the number of bachelor's degree recipients eligible for teacher certification. Hence this study was begun on the basis of those institutions for which both OE and AACTE data were given--and for which other data had been compiled earlier. The project covers colleges in the 12 states of the North Central Region, of which only the East North Central area is reported on here. With both the OE and AACTE data for 1964-65 available, it seems reasonable to assume that since education majors normally become eligible for teacher certification upon graduation, the AACTE data can be used in place of the OE total of bachelor's degrees awarded in education.[2] The extent to which the AACTE figures exceed the number of education degrees reported by OE

thus indicates how many education-oriented students have been included as academic majors. As a first step, the number of degrees awarded by an institution in practical, applied, or vocational subjects which do not involve teacher certification have to be subtracted from the total.[3] Then, by subtracting the AACTE figure from the net amount, the number of nonteaching oriented majors in academic subjects can be estimated. By further subtracting this number from the total number of degrees awarded in academic subjects, an estimate can be made of the number of teaching (or education-oriented) majors reported by OE as academic subject majors.

Referring to Table 1, it may be seen that in 1964-65 the 101 private colleges produced 19.6 percent more prospective teachers than the OE statistics indicate, while the 22 public colleges should have been given credit for an additional 22.8 percent. From a different point of view, it would appear that 46.9 percent of the graduates of the private colleges majored in academic fields but did not expect to teach, whereas only 16.6 percent of those in the public colleges did so. Whether these percentages would hold in other years is not known. The figures are less important in themselves than as evidence that our national statistics are inadequate. It should also be noted that the percentage of nonteaching-oriented graduates in academic fields cannot be applied to the separate fields of study. This makes it all the more important that internally consistent bachelor's degree data be collected, both as a basis for higher education program planning and support and as a basis for professional manpower projections in the sciences and the humanities.

There is every reason for OE to take corrective measures to improve the adequacy and usefulness of its statistics. In 1961, four years before OE experienced the great shakeout of its entrenched bureaucracy, an internal Committee on Mission and Organization stated that

> the Office of Education had, during the period of its development, a clear responsibility to assist educators . . . to do their work as they saw their work. . . . This Committee, having as its charge the assessment of tomorrow's responsibilities, will urge action to insure that the Office of Education is prepared to render vastly increased staff services . . . in the initiation and formulation of broad national policies in the field of education.[4]

In the reorganization of 1965 the National Center for Educational Statistics was created within OE to bring together the facts upon which these national policies will be based. It must be recognized, however, that OE decisions as to definition and method are influenced by the established organizations representing higher education. If they are to exert effective pressure the various interests within higher education will have to agree among themselves what ought to be done.

In this instance the remedy for the continued inadequacy of OE bachelor's degree statistics may be very simple. First of all, establish the principle of reporting degrees according to the academic departments which recommend the granting of the degree. Secondly, for departments or schools of education, add to the present list of specialized teaching fields on Form OE 2300 (using item codes in the 2200 or 2400 series for the purpose) the academic fields in secondary education not now being covered. These might reasonably be biological sciences, physical sciences (possibly divided to show preparation as secondary

school teachers of physics, chemistry, and earth sciences), mathematics, social sciences, English, and foreign languages (again possibly divided to show preparation as teachers of French, Spanish, German, Latin and the like). Whether this recommendation may be a feasible remedy can readily be tested, with the cooperation of the 123 colleges in the East North Central region whose OE and AACTE data have been utilized in making this analysis, by resurveying this portion of the 1964-65 data. Under the aegis of a nonprofit organization, it is possible that the federal government might even pay for such a survey. To quote again the OE committee report of 1961:

> Improvement in the effectiveness of our educational enterprise depends upon the adequacy of the information on which programs are formulated . . . . The development of uniform, consistent, and compatible statistical data in all States and in all institutions of higher education will call for both technical and financial assistance to these sources from the Office of Education.[5]

The evidence indicates that the policy of OE with regard to the reporting of the bachelor's degrees of education majors preparing to teach academic subjects in high school has resulted in the dissemination of statistics which are not only misleading but which until recently could not be easily evaluated. This paper is presented simply as a footnote to the small print in the OE surveys, with the suggestion that--if it has not already begun to do so--the National Center for Educational Statistics be urged to take corrective measures to redress the misdoings of its predecessors.

Footnotes

1. A primarily undergraduate college in considered to be one in which the bulk of students are bachelor's degree candidates although it may also award earned degrees at the master's level. Among the 123 colleges in this study are two public institutions which in 1964-65 were beginning to offer doctorate programs and one private institution which awards the doctorate only in a single specialized field. Excluded from the liberal-arts/general-education category are colleges which award bachelor's degrees only in specialized or professional fields such as business administration, art, music, engineering, theology, religion, or scholastic philosophy. Omitted are colleges for which statistics since 1952 are incomplete.

2. Although the AACTE and OE data are not strictly comparable, they are completely useable for gross comparison. The few instances in which the AACTE data exceed the OE figures are indicated by the footnotes in Table 1.

3. As used in this study, the practical, applied, or vocational subjects (outside the general field of education) are agriculture, business and commerce, engineering, journalism, health professions, home economics, library science, agricultural economics, industrial relations, social work, other applied social sciences, and trade and industrial training.

4. "A Federal Education Agency for the Future," Report of the Committee on Mission and Organization of the U. S. Office of Education, U. S. Office of Education, 1961 (OE-10010), pp. 1-7.

5. Ibid. pp. 44-45.

Table 1

ANALYSIS OF BACHELOR'S DEGREES IN 123 COLLEGES, 1964-65
EAST NORTH CENTRAL REGION

Private Colleges

	TOTAL	N=101	Illinois	N=23	Indiana	N=19	Michigan	N=15	Ohio	N=28	Wisconsin	N=16
(a) Total bachelor's degrees (1964-65)	20,003	100.0%	4173	100.0%	4360	100.0%	2562	100.0%	6577	100.0%	2331	100.0%
(b) Degrees awarded in practical, applied and vocational fields	2,313	11.6	608	14.6	656	15.0	214	8.4	585	8.9	250	10.7
(c) Degrees awarded in Education (OE)	4,402	22.0	682	16.3	1244	28.5	399	15.6	1397	21.2	680	29.2
(d) Graduates eligible for teacher certification (AACTE)	8,314	41.5	1483	35.5	1962	45.0	1268	49.5	2458	37.4	1143**	49.0
(e) Degrees awarded in academic subjects (OE)	13,288	66.4	2883	69.1	2460	56.4	1949	76.1	4595	69.9	1401	60.1
(f) Nonteaching-oriented academic majors (a)-(b)-(d)	9,376	46.9	2082	49.9	1742	40.0	1080	42.2	3534	53.7	938	40.2
(g) Education majors reported as academic majors (e)-(f)	3,912	19.6	801	19.2	718	16.5	869	33.9	1061	16.1	463	19.9
(h) . . . as percent of academic subject degrees (g) ÷ (e)	(3,912)	(29.4)	(801)	(27.8)	(718)	(29.2)	(869)	(44.6)	(1061)	(23.1)	(463)	(33.0)

Public Colleges

	TOTAL	N=22	Illinois	N=4	Indiana	N=2	Michigan	N=4	Ohio	N=4	Wisconsin	N=8
(a) Total bachelor's degrees (1964-65)	20,317	100.0%	3695	100.0%	2293	100.0%	5150	100.0%	5331	100.0%	3848	100.0%
(b) Degrees awarded in practical, applied and vocational fields	2,816	13.9	436	11.8	208	9.1	831	16.1	940	17.6	401	10.4
(c) Degrees awarded in Education (OE)	9,485	46.7	1992	53.9	1260	54.9	2136	41.5	2184	41.0	1913	49.7
(d) Graduates eligible for teacher certification (AACTE)	14,116	69.5	2995*	81.1	1849	80.6	3665	71.2	3051	57.2	2556	66.4
(e) Degrees awarded in academic subjects (OE)	8,016	39.4	1267	34.3	825	36.0	2183	42.4	2207	41.4	1534	39.9
(f) Nonteaching-oriented academic majors (a)-(b)-(d)	3,385	16.6	264	7.1	236	10.3	654	12.7	1340	25.1	891	23.2
(g) Education majors reported as academic majors (e)-(f)	4,631	22.8	1003	27.1	589	25.7	1529	29.7	867	16.3	643	16.7
(h) . . . as percent of academic subject degrees (g) ÷ (e)	(4,631)	(57.8)	(1003)	(79.2)	(589)	(71.4)	(1529)	(70.0)	(867)	(39.3)	(643)	(41.9)

* excludes 26 in excess of the number of institutional bachelor's degrees
** excludes 23 in excess of the number of institutional bachelor's degrees

COMMUNITY COLLEGE INSTITUTIONAL RESEARCH

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Community college institutional research combines two developing sectors of higher education. Community colleges are, of course, a very fast developing institutional level of higher education. The fact that this institutional level of higher education is past the very early developing stages and still expanding at a high growth rate greatly adds to the magnitude and importance of this sector of higher education. Along with the growth of this institutional segment of higher education is development in the field of institutional research. The comparative newness of institutional research as a more formalized process in higher education is reflected, in part, by the relatively recent development of its own professional association--during this decade. Thus, community college institutional research certainly combines two factors having rather recent, accelerated development.

This paper is based on a nationwide study of institutional research activity within randomly selected community colleges of the United States.

Related Studies

Two other studies on junior college institutional research are particularly relevant to this one. Swanson invited all two-year institutions, public and private, listed in the 1962 Directory of the American Association of Junior Colleges to participate in an investigation of institutional research practices in junior colleges of the United States.[1] Very recently, Roueche and Boggs made a nationwide telephone interview survey of institutional research in sampled junior colleges, public and private.[2]

Similarities between these two studies include finding that less than one-fourth of the institutions had formal institutional research organization, in the case of the Swanson study, or a separate, full-time coordinator for institutional research in the case of the Roueche and Boggs study. Institutional age seemed to have little relation to the level of research activity. Institutional size was related to research activity--with larger institutions having the more active research programs.

Differences between the findings of these two studies included the more recent Roueche and Boggs study finding of no relationship between type of institutional control, public or private, and research activity, whereas the former Swanson study found public junior colleges to have the more active programs. Also, the Roueche and Boggs study found the research category of "students" to receive most emphasis (42 percent of all reported studies) with least emphasis placed on "instruction" (1.3 percent of all reported studies). Curriculum and programs received second most emphasis with 21 percent of all reported studies being in this category. Whereas, the Swanson study found 72 percent of the institutions used research findings for curriculum planning and two-thirds used them to improve instruction.

Roueche summarizes the specific need for junior college institutional research as follows:

> It is now necessary that the junior college assume a research function (at the institutional level) if it is to substantiate its claim of superior teaching. . . .
>
> Effective institutional research programs are the results of a commitment to the need for research as a prerequisite to institutional planning. The junior college president must be willing to translate his research interest into budgetary provisions for the activity.[3]

Study Methodology

A personal interview pilot study of 19 selected Midwest and Southeastern institutions preceded a mail questionnaire survey. Questionnaires were mailed to a stratified random sample of 300 of the remaining 626 public junior colleges of the United States listed in the 1968 Directory of the American Association of Junior Colleges. Stratification was on the basis of region and size, and proportional allocation was used in selecting the sample from these strata. Responses were received from 210 (70 percent) of the sample. Follow-up measures used to encourage maximum response rate included a reminder-thank-you card sent to the entire sample and later a letter to nonrespondents.

Summary of Findings

Institutional age and size were two primary variables used for analysis throughout this study. Institutions were divided on a basis of age with the older institutions being those founded before 1960 and the younger ones 1960 or later. Institutional size was determined by regarding total enrollment size of less than 1,200 as small and 1,200 or more as large. Both size and age categories were determined by inspection of the population age and size distributions and establishing a convenient value which best approximated a median figure. Differences are reported when the chi square tests are significant at the .05 level.

The three major areas into which the findings of this study are divided are 1) Organizational Patterns, 2) Research Categories, and 3) Implementation Problems.

Organizational Patterns

Institutional research organization is significantly more formalized and developed in the larger institutions. These more formally organized and developed programs have more full-time research coordination and other organizational structure as contrasted to those institutions with little or no research organization.

A variety of different categories of officers and committees were reported as having institutional research responsibilities. A total of 72 officers with

35 title categories, ranging from Research Director to President, were reported as having research responsibilities. Similarly, 23 committees with 10 title categories were reported as having research responsibilities. Some of these officers and committees were reported as existing concurrently.

However, only about one-third of the institutions have a program which approaches being formally organized when considered on the basis of such criteria as type of organization, titles of individuals and committees having institutional research responsibility, research staff size, and budgetary provisions.

Officers to whom institutional researchers report are somewhat varied, but smaller institutions tended to have more of their researchers reporting to higher level administrators, such as the president.

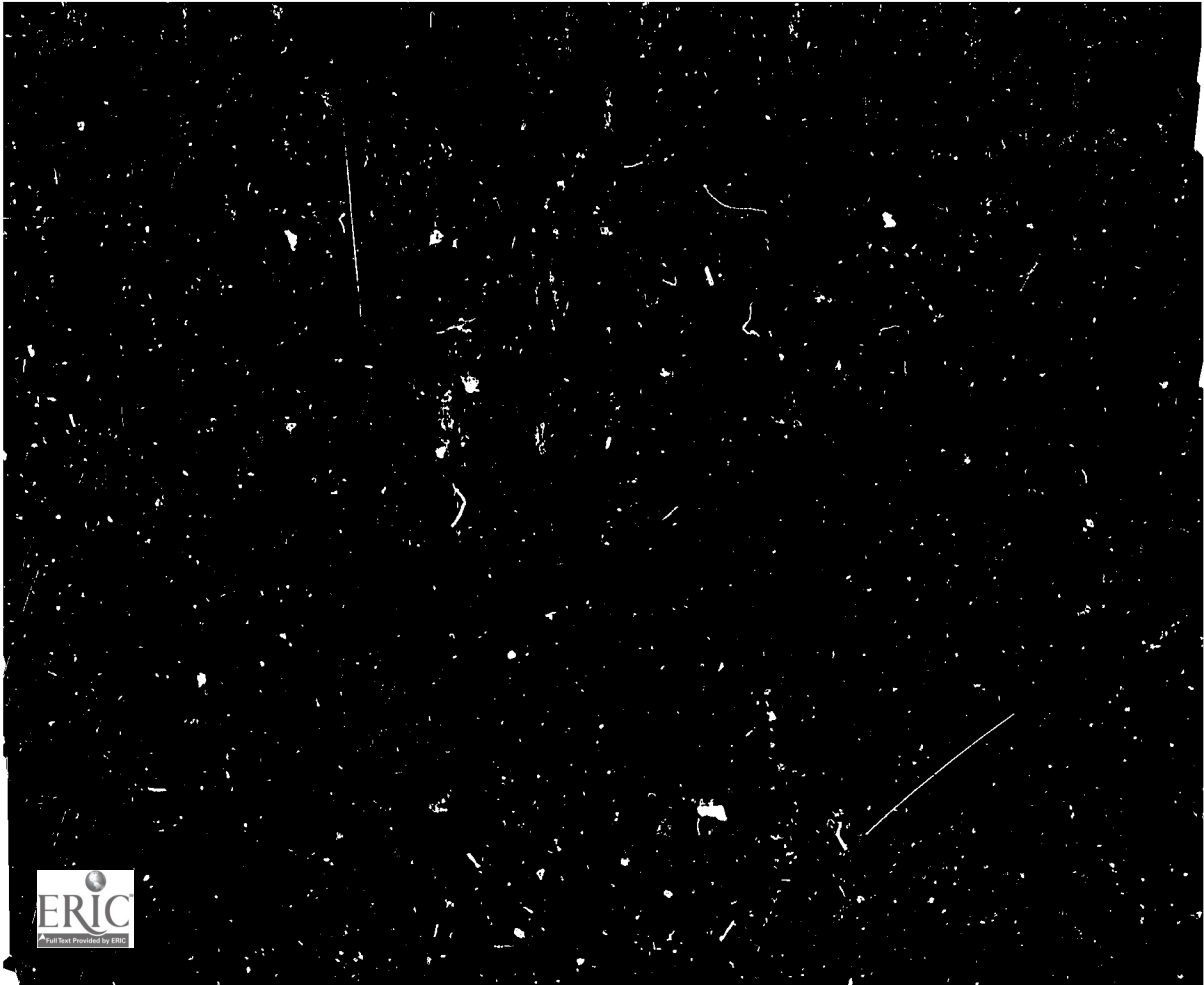
Staffing patterns tend to reflect somewhat larger research staffs in the larger and older institutions. Larger institutions reported having a total of 34 full-time researchers and 22 full-time support staff compared to no full-time staff reported by smaller institutions. The Mann-Whitnery "U" Tests for two samples, with differences reported when these tests were significant at the .05 level, were used to analyze research full-time equivalent staff sizes by institution size and age. By these tests, the larger and older group had significantly more institutions who reported having professional research staffs, and these staffs tended to be larger than those of the smaller and younger institutions. Similarly, larger institutions reported having significantly more and larger nonprofessional (support) staffs. Institutional age was not a significant factor in nonprofessional staff size. Thus, the significantly larger and more numerous professional research staffs of the older institutions are not supported by nonprofessional staffs significantly larger and more numerous than those of the younger institutions.

A tabulation of academic majors for all degrees held by research coordinators reflects a breadth of background with emphases on the following majors: education, social science, mathematics, and physical (and biological) science. Also, the teaching and administrative backgrounds, for both past and present educational assignments, were most varied. A stereotype of institutional research directors' background and experience is not evident.

The age of institutional research organization was requested for both present organization and any organization which may have existed prior to the present research organization. Very few institutions reported having research organizations prior to their present one. Of those reporting presently having organizations, 91 (83 percent) were not more than 3 years old.

Advisory committees for institutional research were reported by 68 (34 percent) of the responding institutions. Larger institutions reported having significantly more advisory committees (47, 44 percent) than did smaller institutions (21, 23 percent).

Sources initiating institutional research studies were varied. However, a predominant tendency was toward initiation by general administration sources (including department chairmen) and meeting requirements made by external sources such as government agencies. Smaller institutions have significantly more of their research initiated by general administration sources.



Budget provisions were reported for the present and past fiscal years. Of the 45 institutions reporting a budget amount for last fiscal year, 23 larger schools had a research budget of $10,000 or more while only 1 smaller institution reported a budget of this amount. Similarly, of the 63 institutions reporting a budget amount for the present fiscal year, 32 larger schools reported a budget of $10,000 or more while only 4 smaller schools reported budget provisions in this amount. Larger schools reported significantly higher budget provisions than did smaller institutions for these 2 years.

Research Categories

About 200 of the 210 study respondents completed a checklist to reflect their institutions' research activity in the six major categories of research topics and their subcategories listed below.

Area Surveys
1. Initial Planning Survey

Community Service
1. Community Services and Continuing Education

Students
1. Admissions Policies
2. Alumni and Former Students
3. Enrollment
4. Student Personnel Services
5. Demographic and Attitude Studies

Instruction and Faculty
1. Curriculum
2. Instructional Program, Methods, and Materials
3. Library
4. Faculty

Fiscal and Administrative
1. Finance
2. Physical Plant and Facilities
3. Administration and Organization of the Institution

Inter-Institutional Research
1. Statewide and/or Regional and National Coordination and Planning.

Three-fourths or more of the respondents reported doing research in almost all of the categories listed. Area Surveys, Enrollment, and Physical Plant and Facilities studies had especially high reported research activity with about 90 percent of the respondents reporting activity in these categories. There was a significant difference in the Area Survey category on the basis of institutional age. The younger institutions reported using considerably more outside sources, such as consultants, in making Area Surveys than did the older institutions.

Alumni and Former Students studies were reported by little more than half of those responding. Larger institutions report significantly more activity in this student research category. Demographic and Attitude Studies were made significantly more often by the larger institutions. Inter-Institutional Research studies were participated in significantly more often by larger institutions and younger institutions made significantly more use of sources outside their own institution for making these studies.

Implementation Problems

Needs and problems of implementing research were reported by 191 of the 210 study respondents in five basic problem categories. Fiscal resources and/or personnel were the most commonly reported needs, receiving almost twice as many responses as any of the other categories. Improved coordination and increased use of findings were the next two needs commonly reported. These two were mentioned with almost equal frequency. Need for a program of action is a category of responses which summarizes such problems as the need for planning, organizing, and establishing procedures for a research program. Need for motivation includes desire on the part of the institution to have and provide for a research program.

Comparison of Findings with Other Studies

As in the case of the previous studies, research organization is very limited. Only about one-third of the institutions exhibit minimal formal organization criteria as contrasted to about one-fourth of the institutions in the previous studies. As Roueche and Boggs found, studies on students are quite popular. As with the Swanson study, the present findings reflect about a two-thirds to three-fourths support for curriculum and instructional research. As contrasted to only one-third of the institutions participating in inter-institutional research in the Swanson study, about three-fourths reported such participation in the present findings. As in the case of the two previous studies, institutional age had limited relation to research programs; however, it was more evident than in the Roueche and Boggs findings. Also, as found in the previous studies, institutional size is a recurring factor with larger institutions exhibiting the more research activity. Of course, institutional control was not a variable in this study since only public institutions were studied, but, as Swanson found, the larger of these public institutions do have the more organized and developed research programs.

Conclusions

The findings of this study either directly or indirectly seem to support making the following conclusions.

1. Based on the questionnaire response rate, pilot study interviews, and various comments and information volunteered by respondents, there is considerable interest on the part of community college leaders in the subject of institutional research. This is not to say that this interest has in all cases, or even most, been translated into substantial, con-

crete research program activity. On the contrary, numerous comments were volunteered recognizing the discrepancy between present and past research programs and desired accomplishments.

2. Organization, especially in the smaller institutions, is largely inadequate for conducting institutional research in probably two-thirds, if not more, of the community colleges.

3. A wide variety of officers from different specialties and disciplines have responsibility for institutional research in community colleges, although the number involved in any single institution is very limited. Very little support staff, such as clerical assistance, is provided researchers.

4. The educational backgrounds of institutional research directors are quite varied. A variety of academic degree majors and teaching and administrative assignments (past and present) are represented.

5. The rather young age of community college institutional research organizations probably contributes to a number of problems which beset them. Institutional expansion problems, particularly in the research function, are reflected in the need for refinement and structure of the research process.

6. Advisory committees are sufficiently few and young that they have had a less than major impact on community college institutional research--in either its development or continuance.

7. Demands made on institutional research are such that having a program organized is hardly optional. Increasing external demands, such as for government reporting, require adequate information retrieval. Also, higher levels of sophistication of the staff within the institution require additional institutional information.

8. Budget provisions are not adequate for even a marginal research operation in most institutions. The few institutions reporting a research budget of $10,000 or more, hardly indicate adequate budgetary provision.

9. A rather broad range of categories seems to have received research attention from community colleges in spite of the limited provisions that may be made for doing this research. Thus, the rather broad range is probably not typically researched in considerable depth or with regularity. Also, since inquiry into these research categories did not specify recency or time of research completion, some of the reported categories were possibly studied years ago. Some may have been dependent upon considerable external support and assistance beyond the scope of this study.

10. Needs and problems of implementing institutional research are quite varied. The recognition of these needs may be a major

step in their solution. Need for fiscal resources and personnel, improved coordination, and increased use of institutional research findings are major problem areas needing attention.

11. The community college may be reaping the results of a non-research orientation of its earlier development. A nonresearch orientation in academic affairs, such as the development of basic knowledge, may have carried over into affairs of the institution and its analysis of its operations.

Recommendations

The following recommendations are made on the bases of the total study including the questionnaire survey, pilot study, and review of literature. An emphasis is placed on basic steps for improving institutional research in the community colleges. These recommendations are not intended to be entirely novel--some may be a restatement and re-emphasis of previously made recommendations.

1. Philosophy, policy, and direction for institutional research should be developed, early in the life of the institution, and implemented with adequate organizational structure, staffing, and budgeting. This is not to say all institutions should necessarily provide a full-time research director, at least not initially, but such direction should be provided as is needed by an institution. This may very well mean part-time coordination, particularly for some of the smaller institutions. Adequate staffing should also include both professional and support staff, such as clerical and secretarial, as needed. Budgetary provision should be adequate and specifically included as a separate item in the institutional budget.

2. An advisory committee for institutional research should be formed with the establishment of the research organization--if not before. This is to encourage faculty and staff involvement in the planning and implementation process of the research program. Emphasis should be placed on establishing an advisory committee early in the life of a research program and not as an appendage after the fact. The advisory committee might also provide an evaluative function for the institutional research program.

3. Broad participation by faculty and staff in actually doing institutional research should be encouraged. It is probably neither desirable nor practical that the research office itself attempt to exclusively make all institutional studies, but rather, it is probably more appropriate that the office provide supportive, facilitating assistance.

4. Proper use of institutional research findings should be assured. Research findings should be widely disseminated, particularly to those directly concerned. Provisions should be made to implement findings where appropriate.

5. Institutional officers, especially top-level administrators, should make every effort to ensure having a viable institutional research program. This includes developing support for such a program by faculty, boards of directors, and all individuals directly concerned with the governance of the institution. This may be implemented by in-service training (in board or faculty meetings) concerning the nature of institutional research and its institutional importance for the decision-making process. Also, active participation by institutional officers in organizations such as the Association for Institutional Research should contribute toward strengthening their institutions' research programs. Conversely, organizations with institutional research interest and expertise should seek out the opportunity to be of service to community colleges, as the Association for Institutional Research is doing.

6. Community colleges should actively seek to redirect what appears to be a nonresearch emphasis of this particular level of higher education. It seems that what may be an appropriate nonresearch orientation, such as in areas of discovering basic knowledge is concerned, may have carried over into areas of institutional concerns where adequate information is most needed for responsible decision making. Some of the pronouncements made by community colleges, such as superior instruction, certainly need continued research support.

In conclusion, it seems appropriate to observe that although community college institutional research does encompass two developing aspects of higher education, the latter, institutional research, seems to be lagging considerably behind development and progress of the community college itself. Just as there has been previous emphasis on junior college institutional research through studies, conferences, and other means, continued attention and emphasis may lead to fruitful fulfillment of the promises of community college institutional research.

ITEM SAMPLING OF INSTITUTIONAL ENVIRONMENTS

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how often have we looked at one of our studies and said, "I wonder what a return from the other 40 percent would have done to these results?" Even if we could get a 99 percent return, the question might be about that other 1 percent. One of the reasons why we can get only a 60 percent return of the typical survey has to be the length of the instrument. Most run to 150 items and take a minimum of 20 minutes to complete. If the instrument could be shortened without greatly sacrificing reliability or validity, the increased return might compensate for that loss. If we can get a 99 percent return from individuals responding to a sample of items, it may be better than a 60 percent return from individuals responding to all items.

Purpose

It is the purpose of this paper to trace the development of the item sampling technique to present factor analytical data on the instrument used, and to compare the results of student sampling and item sampling. To achieve these purposes, illustrative data from a "Campus Environment Attitudes" studies which were from item sampling will be presented. These studies will be analyzed from the standpoint of the following questions. (1) Are there differences in item means that can be attributed to student sampling and item sampling? (2) Are there differences in item standard deviations that can be attributed to student sampling and item sampling? (3) Is demographic information collected from all students along with the item samples accurate?

Development of the Item Sampling Technique

In a 1955 Psychometrika article, Frederic M. Lord commenced publication of his work which has led to the item sampling technique as an alternative to the traditional individual sampling approach. In another article, Lord (1960) derived the formulae demonstrating the practicability of item sampling. He also pointed out the need for large numbers. "It is probably not useful in most cases to try to estimate any true-score or observed score moments . . . unless the number of examinees is at least 500 or 1,000."

Lord (1962) conducted a simulation study in which item samples were drawn after all examinees had responded to all items. Thus, they were subject to the assumption that context has little effect on item responses. Lord found that it was better to randomly select items without replacement. Furthermore, he suggested drawing more item samples so that each item would appear in several different short tests. He also encouraged evaluating the possibilities of trading items for people in a wide variety of situations.

Since 1962, Plumlee and Cook and Stufflebeam have also conducted simulation studies. Plumlee found in an industrial personnel testing setting that item sampling is likely to produce more representative norms than those based on persons available for longer testing times. (Plumlee, 1964) Cook and

Stufflebeam (1967) extended the research on item sampling by using various size item samples and examinee samples. They found that item sampling is equally effective, if not superior to examinee sampling, in test norming of a college hygiene test.

Owens and Stufflebeam (1967) empirically compared the validity of item sampling with that of examinee sampling for estimating test norms of an elementary achievement test. "Item sampling was defined . . . as the case where a single set of test norm statistics was derived from a test administration in which no examinee attempted more than a fraction of the total items in a test." Examinee sampling was defined as the case where norm statistics were derived from administering a population of items to a sample of examinees. Item and examinee samples were drawn prior to test administration which tested the assumption that students' responses in the item sample context are comparable to their responses on full length instruments. Findings supported item sampling as an acceptable alternative to examinee sampling for estimating test norms. Furthermore, the context in which the items occurred tended to favor item sampling as evidenced by the following specific finding. "Given a fixed total number of item responses, a large number of examinees taking only a few items each provided a better estimate of the population norm than a small number of examinees answering many items each." (Owens and Stufflebeam, 1967) Sax and Cromack (1966), in a study related to the context question, found that little is gained in arranging items if the time limit is generous or the test is short. This evidence was gained from an experimental study with college students. French and Greer (1964) found the order of item arrangement insignificant. Galvanic skin response measures with primary school children were used in this study.

Item sampling holds the promise of being a technique which can be used to approach some of the problems of assessing institutional environments. By randomly sampling the population of items, the instrument can be drastically reduced in length. Because it is possible to administer the item sample to a population of individuals, a greater return may be expected than if the entire instrument is utilized. At least two other advantages have been recognized with item sampling. When an item is randomly selected, it is used; whereas when an individual is randomly selected, his cooperation still has to be gained. Item sampling is much quicker because responses to a few items can be expected almost immediately while responses to a large number of items are frequently delayed until more time is available.

The development of item sampling has been limited to use with achievement tests and binary items. It has been used successfully in the National Longitudinal Study of Mathematical Abilities. To the writer's knowledge, item sampling has not been used for attitudinal measures where the degree of agreement or disagreement was elicited. Yet Lord, in addition to his encouragement in 1962 to explore possibilities of trading items for people, recommended item sampling for situations such as when (1) it is impossible or impractical to administer all items to every examinee; (2) the attempt to test all examinees fully would itself introduce some bias into the results because of poor cooperation from examinees or because of selective loss of examinees; and (3) there is no pre-existing test on which performance must be estimated . . . ." (Lord and Novick, 1968) These situations were so similar to those existing in the assessment of institutional environments that item sampling seemed a reasonable solution to the problems encountered.

The Campus Environment Study

The data presented in this paper are relevant to one institution but the Campus Environment Study (CES) has been utilized in 25 institutions in the upper Midwest. It was developed by the Central States College and University (CSCU) Cooperative Research Program.[1] CES consists of 150 attitudinal items designed to describe six college environments: academic, physical, cultural, communications, community relationships, and moral-ethical environments. There are 25 items relating to each environment developed on a priori basis. It is scored: strongly agree = 5, agree = 4, uncertain = 3, disagree = 2, strongly disagree = 1. CES was administered to 13,500 students among 25 institutions in May, 1968. A student sample of 1,300 Mankato State College students was randomly selected and they contributed 791 of these returns. During the fall quarter of 1968, 6,500 six-item random samples were drawn from the 150 item pool stratified by environment which results in selection without replacement and an almost infinite number of different short tests. Each item sample was generated on a computer and included one randomly selected item from each of the six environments. These item samples were administered to students at preregistration for winter quarter during November, 1968. There were 5,958 item samples collected during this period. The process was repeated during February, 1969 and 5,421 item samples were collected at preregistration for spring quarter. The combined item samples for fall and winter produced an average of 455 responses for each item.

To explore the structure of the CES, two factor analyses were performed on the results of the Mankato State College student sample (N = 791) of spring, 1968.[2] A principal factor analysis with a varimax rotation was performed separately on the six environmental scales and all 150 items. As the CES evolves, it may be necessary to replace items and develop empirically based scales. These factor analyses, as well as others completed later, will provide clues as to how the scales may be restructured and which items may be replaced. With the item sampling technique, it is a simple matter to replace an item in the computer and print it out immediately on the item samples.

Results

The factor analysis of the six environmental scales demonstrated that there was a relatively low correlation between scales. As can be seen in Table 1, the intercorrelations ranged from .46 to .66 with an average of .56.

Table 1

CORRELATION MATRIX OF THE ENVIRONMENTS OF THE CAMPUS ENVIRONMENT SCALE (CES) AT MANKATO STATE COLLEGE, SPRING, 1968

Environments	Acad.	Phys.	Cult.	Comm.	Comm. Rel.	Moral
Academic	—					
Physical	.57	—				
Cultural	.57	.52	—			
Communications	.59	.62	.55	—		
Community Relations	.59	.60	.58	.66	—	
Moral-Ethical	.52	.47	.46	.51	.64	—

In the varimax rotation of the principal factor analysis it was demonstrated that academic, communications, cultural, and physical environments are closely related. In Table 2 this factor is presented which seems to comprise the campus academic environment. The other factor loads very highly on the moral-ethical environment which in turn is related to the community relations scale. The community relations scale also loads on the campus academic environment but at opposite poles. The loadings in parentheses are not considered significant although community relations may be in factor I.

Table 2

VARIMAX ROTATION LOADINGS OF PRINCIPAL FACTOR ANALYSIS OF THE SIX ENVIRONMENTS OF CES AT MANKATO STATE COLLEGE, SPRING, 1968

Environment	I Factor Loadings	II Factor Loadings
Academic	-.734	(.349)
Physical	-.805	(.220)
Cultural	-.767	(.233)
Communications	-.764	(.341)
Community Relations	(-.605)	.628
Moral-Ethical	(-.275)	.928

Factor II might be called an ethical community environment which is differentiated from the campus academic environment.

The other factor analysis was performed on all 150 items. The average correlation between items was only .11. A varimax rotation of the principal factor matrix was also accomplished. Ten meaningful factors were extracted representing all six of the environmental scales.

Factor I in Table 3 represents personal communication differentiated from official communications found in factor IV. Eight of the items are from the communications environment (items 76-100). Three are from the community relations environment (items 101-125) and one (item 23) is from the academic environment scale. All of the items involve friendly, warm, informal communication.

Table 3

FACTOR I FROM VARIMAX ROTATION LOADINGS OF PRINCIPAL FACTOR ANALYSIS OF THE 150 ITEMS OF CES AT MANKATO STATE COLLEGE, SPRING, 1968

Item No.	Item	Factor Loading
79	Generally, students feel quite comfortable in approaching instructors regarding a problem.	.712
78	Instructors are easy to approach with questions concerning classwork.	-.668
94	There is a friendly relationship between faculty and students.	-.645
107	The faculty on this campus is considerate and concerned with student problems.	-.592
122	The faculty as a general rule welcome student appeal for advice and counsel.	-.579
110	There is a feeling of mutual respect between students and faculty.	-.548
23	Most instructors provide ample time for individual consultation.	-.519
96	It is not hard to get to know instructors outside of class.	-.451
76	It is easy for students to communicate with the administration.	-.421
77	The expression of student opinions is encouraged.	-.401
80	Generally there is a friendly and cooperative relationship between departments.	-.391
82	Faculty members invite informal out-of-class discussions.	-.353

Factor II is almost completely made up of items from the moral-ethical scale (items 126-150). Two of the items (58 and 74) are from the cultural environment scale but are closely related to ethical issues. As can be seen in Table 4, the moral-ethical classification is quite accurate for this factor.

Table 4

FACTOR II FROM VARIMAX ROTATION LOADINGS OF PRINCIPAL FACTOR ANALYSIS OF THE 150 ITEMS OF CES AT MANKATO STATE COLLEGE, SPRING 1968

Item No.	Item	Factor Loading
129	In general the student body maintains a high standard of conduct.	.735
58	Patterns of social behavior on this campus conform favorably to accepted good taste.	.684
128	Proper social decorum and good manners are above average on the campus.	.663
74	In general the speech and habits of students reflect refinement and good taste.	.658
134	The moral code of the majority of students is generally above reproach.	.588
133	Attitudes regarding sex held by majority of students don't violate generally accepted rules of good conduct.	.557
127	Excessive drinking by students does not create a real problem on this campus.	.507
126	Students respect institutional rules and regulations.	.454
139	There is a pronounced atmosphere of honesty and sincerity on this campus.	.441

Factor III is entirely made up of items from the community relationship scale (items 101-125). However it seems to have an intra-campus friendliness dimension as can be seen by the items in Table 5. Nearly all of the significant items stress a friendly, homey atmosphere where concern for each other is important.

Table 5

FACTOR III FROM VARIMAX ROTATION LOADINGS OF PRINCIPAL FACTOR ANALYSIS OF THE 150 ITEMS OF CES AT MANKATO STATE COLLEGE, SPRING, 1968

Item No.	Item	Factor Loading
104	Close friendships are easy to cultivate with fellow students.	.693
105	The general atmosphere on campus is friendly.	.691
102	The campus atmosphere here makes one feel at home.	.557
112	Students show a concern for each other at this institution.	.517
124	Life on campus is generally regarded as a pleasant and rewarding experience.	.470
114	There is a relaxed atmosphere on this campus.	.398
106	There is strong student loyalty to this institution.	.375

Factor IV in Table 6 is related to factor I. All of the items are from the communications scale (items 76-100) but reflect more of an official, administrative type of communications. This factor is further differentiated from factor VI which has to do with the student communications media.

Table 6

FACTOR IV FROM VARIMAX ROTATION LOADINGS OF PRINCIPAL FACTOR ANALYSIS OF THE 150 ITEMS OF CES AT MANKATO STATE COLLEGE, SPRING, 1968

Item No.	Item	Factor Loading
99	The administration informs faculty and students promptly of policy changes.	.716
93	The administration attempts to keep students informed on matters of policy.	.714
86	It is not difficult to find out what is going on around campus.	.409
95	Rumors are quickly dispelled on this campus by ready access to factors.	.387
81	The administration and teaching faculty appear to cooperate well.	.366

Factor V in Table 7 is made up of items from the physical environment scale (items 26-50) except for item 136 from the moral-ethical environment. All of the items have to do with satisfaction with facilities, services, and regulations.

Table 7

FACTOR V FROM VARIMAX ROTATION LOADINGS OF PRINCIPAL FACTOR ANALYSIS OF THE 150 ITEMS OF CES AT MANKATO STATE COLLEGE, SPRING, 1968

Item No.	Item	Factor Loading
47	Housing costs are reasonable for the facilities and services provided.	.608
43	Campus food services are satisfactory.	.596
136	Institutional regulations do not place undue restraints on social conduct.	.544
39	Institution-owned housing facilities are satisfactory.	.512
35	Rules regulating student conduct in all housing areas are reasonable and fair.	.485

Factor VI in Table 8 is yet another aspect of communications which might be considered student communications. All of the items deal with the student newspaper and are from the communications scale. The items have a common thread of the newspaper as a tool of communication.

Table 8

FACTOR VI FROM VARIMAX ROTATION LOADINGS OF PRINCIPAL FACTOR ANALYSIS OF THE 150 ITEMS OF CES AT MANKATO STATE COLLEGE, SPRING, 1968

Item No.	Item	Factor Loading
84	The student newspaper is a vital communication tool on campus.	.788
85	The student newspaper serves as a sounding board to discuss administrative policies.	.747
89	The student newspaper provides a medium for exchange of intellectual ideas by faculty and students.	.705
92	The editors of the campus newspaper have a great deal of freedom and latitude.	.353

Factor VII is clearly a student cultural factor. All of the items are from the cultural scale (items 51-75) and are concerned with student attendance and popularity of cultural events. Table 9 includes the items associated with this factor. Factor IX is also a cultural factor but appears to be more of an institutional cultural factor.

Table 9

FACTOR VII FROM VARIMAX ROTATION LOADINGS OF PRINCIPAL FACTOR ANALYSIS OF THE 150 ITEMS OF CES AT MANKATO STATE COLLEGE, SPRING, 1968

Item No.	Item	Factor Loading
56	Live performances of symphonies, ballet, and operas are well patronized by the students.	.733
52	The Artist/Lecture-Concert series are well attended by students.	.708
54	Classical music is popular with the majority of students.	.559

Factor VIII in Table 10 seems to be an organizational communications factor. All of the items are from the communications scale except item 115 which is concerned with student organization. All of the items have the common thread of organizational committees.

Table 10

FACTOR VIII FROM VARIMAX ROTATION LOADINGS OF PRINCIPAL FACTOR ANALYSIS OF THE 150 ITEMS OF CES AT MANKATO STATE COLLEGE, SPRING, 1968

Item No.	Item	Factor Loading
88	The student government is functioning satisfactorily.	-.589
98	Student government is a strong link between faculty and students.	-.559
83	There is close cooperation between campus student organizations.	-.462
87	The student-faculty committees on this campus serve as an effective means of communication.	-.449
115	Student organizations play an effective role in implementing institutional policies.	-.401

Factor IX in Table 11 is another cultural factor. It differs from factor VII in that it does not necessarily relate to students, dealing with emphasis, influence, and interest in cultural concerns.

Table 11

FACTOR IX FROM VARIMAX ROTATION LOADINGS OF PRINCIPAL FACTOR ANALYSIS OF THE 150 ITEMS OF CES AT MANKATO STATE COLLEGE, SPRING, 1968

Item No.	Item	Factor Loading
68	There are available to students opportunities for creative expression in the fine arts.	.594
73	Poetry and literature receive much emphasis on this campus.	.577
69	The music department has a strong cultural influence.	.480
61	The faculty appears to have a keen interest in the fine arts.	.407
67	Speech and forensics have strong emphasis on this campus.	.395

Factor X in table 12 is an academic factor that focuses on the labors involved in the academic life. All of the items are from the academic environment (items 1-25). It is probably a negative dimension of the academic environment.

Table 12

FACTOR X FROM VARIMAX ROTATION LOADINGS OF PRINCIPAL FACTOR ANALYSIS OF THE 150 ITEMS OF CES AT MANKATO STATE COLLEGE, SPRING, 1968

Item No.	Item	Factor Loading
14	Instructors generally expect more work than most students are able to accomplish.	-.757
16	Course work requires so much time that little is left for other activities.	-.739
5	Most instructors establish course standards that are particularly difficult to attain.	-.651
9	Considerable out-of-class preparation by students is necessary for most courses.	-.489

To investigate any differences in means that might be attributable to student sampling and item sampling, coefficients of correlation were calculated. The mean scores were scatterplotted and found to be linear. Pearson product moment coefficients of correlation were selected due to the large N and the linear relationship. The r's were between the means of the items of the student sample (N = 791) of spring, 1968 and the item samples of fall, 1968 and winter, 1969 combined (XN = 455). Separate r's were produced for each environment (25 items each) and for the total 150 items. The r's along with t-ratios to test the significance of the coefficients of correlation are presented in Table 13.

Table 13

CORRELATIONS BETWEEN STUDENT SAMPLE AND ITEM SAMPLE MEANS OF THE CES AT MANKATO STATE COLLEGE, SPRING, 1968 AND FALL, 1968 AND WINTER, 1969

Environment	r	t-ratio
Academic	.91	10.49*
Physical	.93	12.29*
Cultural	.95	14.23*
Communications	.83	7.21*
Community Relations	.89	9.62*
Moral-Ethical	.81	6.58*
Total	.88	22.23*

*Significant at the .01 level.

To investigate any differences in standard deviations that might be attributable to student sampling and item sampling, coefficients of correlation of the standard deviations of the items were calculated in a similar manner. The r's of the standard deviations along with t-ratios are presented in Table 14. Standard deviations were generally smaller when item sampling was used. The mean standard deviation for student sampling was 1.1, whereas the mean standard deviation for item sampling was 1.0.

Table 14

CORRELATIONS BETWEEN STUDENT SAMPLE AND ITEM SAMPLE STANDARD DEVIATIONS OF THE CES AT MANKATO STATE COLLEGE, SPRING, 1968 AND FALL, 1968 AND WINTER, 1969

Environment	r	t-ratio
Academic	.62	3.78*
Physical	.85	7.77*
Cultural	.77	5.81*
Communications	.88	9.07*
Community Relations	.61	3.72*
Moral-Ethical	.75	5.40*
Total	.72	12.57*

*Significant at the .01 level.

To investigate the question about whether the demographic information collected from all students along with item sampling is accurate, summary data is presented in Table 15.

The undergraduate student body was made up of 54 percent male and 46 percent female students in fall, 1968 which is precisely the proportion of responses gained in the winter item sampling. The item sampling technique gained returns from 53 percent male and 47 percent female students during fall, 1968. The winter student body was 57 percent male and 43 percent female. The class standing subgroups were as accurate only for sophomores and juniors during fall, 1968. Sophomores represented 21 percent and juniors 23 percent of the undergraduate student body, while the item sampling returns represented 24 percent of the total for each of these groups. Freshmen comprised 43 percent of student body during fall, 1968 while only 31 percent of the item samples came from freshmen. Seniors comprised 13 percent of the student body while those responding to the item sampling technique represented 21 percent of the student body. Thus, the attitudes expressed during fall, 1968 are from a greater percentage of sophomores, juniors, and seniors than existed in the student body. The fall item sampling and the winter student body proportions of classification were identical (freshmen 21 percent, sophomores 24 percent, juniors 24 percent, and seniors 21 percent). This could be explained by the fact that only those continuing at Mankato State College would preregister and have the opportunity to complete the item sample. Following this reasoning the spring student body is likely to be 29 percent freshmen, 25 percent sophomores, 24 percent juniors, and 22 percent seniors which is the classification of the winter item sample. As for program, 18 percent of the student body were officially uncertain whether they were pursuing teacher or non-teacher education curriculums. On the item sample, students were asked if they are taking or expect to take a teacher or non-teacher education program and provision was not made for an uncertain category. The balance that existed between teacher and non-teacher education (both 41 percent) was reflected by the item sampling return being 50 percent and 47 percent respectively during fall, 1968. During winter, 1969, this balance (both 43 percent in the student body) was improved to a 49 percent-48 percent split on the item sampling return between teacher and non-teacher education programs.

Table 15

REPRESENTATION OF UNDERGRADUATE STUDENT BODY BY RETURNS FROM THE ITEM SAMPLING TECHNIQUE, MANKATO STATE COLLEGE, FALL AND WINTER, 1968-1969

Percent of:	Male	Female	Fresh.	Soph.	Jr.	Sr.	Teacher Educ.	Non-Teacher Educ.	Un-Certain
Fall Student Body	54	46	43	21	23	13	41	41	18
Fall Item Sampling	53	47	31	24	24	21	50	47	3
Winter Student Body	57	43	31	24	24	21	43	43	14
Winter Item Sampling	54	46	29	25	24	22	49	48	3

Discussion

The correlation matrix indicated that the six environmental scales are interrelated but to a relatively low degree. This resulted from scales that measured different environments on the campus. The factor analysis of these six environments indicated that they may be subsumed into two larger environments: the formal academic environment and the ethical community environment. However, due to the low intercorrelations among the scales, it is unlikely that two larger environments would be adequate to represent the many facets of student attitude.

The factor analysis of the 150 items indicated that all six original environments of the CES are identifiable in the structure of student attitude toward the campus environment. However, there were four distinct types of communications and two cultural factors. The dimensions of the communications factors were (1) personal, (2) official, (3) student, and (4) organizational. The two cultural factors were a student concern with popularity of culture and another factor related to the influence of culture. The other factors loaded on the moral-ethical, community relationship, and physical environments in a predictable manner. The academic factor focused negatively on the labors of the academic life indicating that classroom discussion, up-to-date lectures, and research accomplished by the faculty may not be as clearly perceived as the work that must be done by students.

Correlations between student sampling and item sampling means indicated that there is high consistency from one quarter to the next in the ratings of items on the CES. There was no discernible evidence that changes which did occur could be attributed to the type of sampling used. There were at least four other possible sources of variation in item means. These were (1) actual change in student attitude from spring, 1968 through winter, 1969, (2) the fact that 1,300 inventories were distributed in spring, 1968 and 791 were returned representing a 60 percent return, (3) sampling error from either the student sample or the item sampling technique, and (4) the freshmen from the item sampling studies and the seniors from the student sampling study were not polled both times.

Correlations between student sampling and item sampling standard deviations were also quite high. The fact that the average standard deviation per item was lower with item sampling may mean that students are more careful in responding to six items than when they respond to 150 items. In any case it indicates that there is less variability in student responses with item sampling than student sampling.

The demographic information collected by the item sampling technique was highly accurate. All students who preregistered were surveyed and this population of students accurately represented the student body. This was especially true from preregistration to the term registered for. Valuable information was also gained by asking which program a student expected to take.

Conclusions

More research is needed on the application of item sampling to the measurement of campus environments. Another factor analysis is planned to investigate the structure of item sampling responses. A technical problem of how to combine the six-item samples into composite individuals was encountered or a factor analysis of item sampling would have been included in this paper. Student sampling and item sampling needs to be utilized during the same term to remove that source of variation. If the structure of item sampling responses coincides with the structure of student sampling responses, strong evidence for the equivalency of the two approaches will have been gained. Enough clues exist as a result of this study to replace several of the items on the CES. The four types of communication demonstrated in the factor analysis of the 150 items deserve careful consideration as do the two types of cultural environments.

Until this research can be accomplished, it appears that item sampling can be used with some confidence. The relationships demonstrated between means and standard deviations indicate that item sampling is at least as reliable as student sampling.

The major advantages of item sampling as demonstrated by this study are timeliness, efficiency, adaptability, consistency, unobtrusiveness, and accuracy at least of the demographic information collected along with the attitudes. Item sampling is much more rapid and efficient than student sampling because respondents only have to respond to a fraction of the items otherwise necessary. Since the items are printed on each sample by computer, the instrument can be revised and the items readily changed to adapt to new situations and information. Since individuals have only a few items to respond to, less variability and more consistency was noted in the responses. The item sampling technique is unobtrusive in that it is unlikely that the same student will get many of the same items even if he responds to a six-item sample during each quarter of his college career. Accuracy as compared to student sampling was demonstrated on the attitudinal items and high accuracy was shown on demographic information collected along with the item samples.

The limitations of item sampling include difficulty in validating the instrument, possible invasion of privacy charges, and convincing producers and consumers of the data that item sampling is effective. The present anonymous utilization of the instrument does not provide for setting up validation groups. If students were asked to identify themselves it could be construed as invasion of privacy although with only six attitudinal items involved this would not be as likely as with 150 items. To convince producers and consumers of the effectiveness of item sampling, it needs to be used, researched, and improved upon whenever possible.

Footnotes

1. The writer wishes to express appreciation to Dr. Herb Silvey and CSCU for permission to utilize the pool of items from the Campus Environment Study.

2. The writer wishes to express appreciation to Dr. Douglas H. Anderson and the University of Minnesota for running the factor analyses.

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QUANTITATIVE METHODS: MODELS AND SIMULATION
A SUMMARY OF TECHNIQUES

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The task here is to list various quantitative methods and model-building techniques which can be applied to management planning at institutions of higher education for analysis of "hard" data. I will outline the advantages and disadvantages of the various techniques as well as examples of their use. I will not attempt to be exhaustive of all techniques which can be used.

To best summarize the kinds of techniques that might be useful to university planners, I will classify these techniques in a number of ways. There is no one taxonomy that I felt could be used in today's discussion. Rather, I will talk about various characteristics of quantitative and model-building techniques.

Eight distinctions that I will make in my remarks involve: (1) Techniques for Analyzing Hard Data versus Soft Data; (2) Model Building versus Testing; (3) Identities versus Behavioral Models; (4) Stochastic versus Non-Stochastic Models; (5) Analytic versus Simulation Solutions; (6) Macro versus Micro Models; (7) Static versus Dynamic Models; and (8) Predictive versus Descriptive Models. I will then give examples of the application of some specific techniques to educational planning and modeling.

Obviously in the time available all I can hope to do is to make a few remarks about a few techniques and suggest an application of the techniques to university planning.

Some Attributes of Model Building Techniques

Hard and Soft Data

The first distinction I wish to make is between techniques dealing with hard and soft data. It is easy to give examples of hard and soft data. Faculty salaries last year, tuition last fall, or student counts last year are examples of hard data. However, some of us may have our doubts at times about how hard these data are. Soft data include attitudes, opinions or expectations of student, faculty, administrators or others about our college.

Some data lie between these two extremes, such as data on indicated majors of incoming freshmen. Since students do not formally choose a major until the end of their sophomore year or the beginning of their junior year, the data are predictions by the students. I recall one student whose expected major was nuclear physics. However, to the surprise of his freshman counselor, his proposed two-year program called for history, humanities, and English, and no math or science. On the whole, however, these soft data may be useful input to a probability model that predicts expected demands on different major departments in two years. These data might, for instance, pick up changing interests and

signal changes in future course enrollments.

Model Building versus Testing

The second distinction I would like to draw is between the process of building a model and the process of testing a model. Often the two occur simultaneously. By building a model of a university, I mean describing the university in terms of equations or statements. Some of these descriptors will be over-simplified, others may even be untrue. However, they will be approximations of reality. How do we know if we have a good model? We have a good model if it describes the university sufficiently well so that we can use the model to study activities and patterns within the university. The model is a good one if it includes or makes visible those factors we wish to study.

The model can be very useful even without data because it permits us to understand relationships among variables. When data are available, we can test the model using a number of techniques. The techniques for testing the model should not be confused with the process of building a model.

Identities versus Behavioral Models

The statements of models are typically in equation form. These equations can be of one or two types--either identities or behavioral relations.

An identity is an equation true by definition. For example, if we said that total instructional costs in a department were equal to the average salary paid in the department times the number of persons in that department, we have an identity equation. Just because an equation is an identity, does not mean it is not useful. For example, it may be possible to break up costs into a number of components which, when multiplied or added together, form total costs. However, by separating these components we can get a better understanding of how costs can be influenced. If any one of the components of costs were altered, total costs might be reduced.

A behavioral equation, on the other hand, is not true by definition. It implies some behavioral assumptions about how a university operates which the model builder believes to be useful. For example, we may assert that the increase in the number of freshmen applicants at College X will depend upon the increase in the population of 18 year olds in the state. This assertion is probably true, but it is possible for the population of 18 year olds in the state to increase when freshmen applications actually fall. Thus, the relationship is behavioral and not an identity.

Stochastic or Non-Stochastic Models

In the previous section we have been discussing two types of relations that can occur in a model. However, in order to statistically test the model, some assumptions must be made about the distribution of random or stochastic elements that influence the model. For example, we might hypothesize that the number of hours required to prepare for a particular course was a function of the number of years of experience that the teacher of the course had. There

are other factors that also affect preparation time, such as the number of committee assignments the professor teaching the course has, how many times the professor has taught the course before, or how many other courses he is also teaching.

There is not an exact correspondence between the number of years of experience a teacher has had and the number of hours of preparation time--we might write: $H = a + bE + U$, where H is the number of hours of preparation for a course, E is the number of years of experience of the teacher, a and b are parameters to be estimated, and U is what is left over.

Since there is not an exact correspondence between H and E for every teacher, U is not always zero. If we can make some reasonable assumptions about the distribution of U, we are in a position to make some estimates of a and b.

Analytic versus Simulation Solutions

A fifth distinction to be drawn before discussion of specific techniques is the difference between analytic and simulation solutions. Once a model has been built, it is necessary to solve the model to provide predictions. Using analytic techniques, one tries to obtain an algebraic or statistical solution for the system of equations in the model. The simulation approach provides a specific numerical solution for the model. To obtain this solution, however, one must specify the values of the parameters which would be solved in the analytic approach. Typically one solves a subset of the equations in the model using the analytical approach, and the entire system is solved using simulation.

Micro versus Macro Models

A sixth distinction concerns the unit being modeled. We might model the entire university or we may model individual students, faculty and staff. The former is called a macro model, the latter a micro model. When we model individual departments, we may still have a micro model. If we model colleges within a university, the distinction is harder to draw.

Static versus Dynamic Models

A model can either be static or dynamic, depending upon the assumptions made about the time dependency of the model. An economist would classify a model as static if the model studied only equilibrium situations. A dynamic model, on the other hand, studies the behavior of a system in attaining equilibrium. In systems theory, a static model is one that contains only algebraic equations. A dynamic model contains at least one difference or differential equation. A model that describes how the university adapts to changes in its environment is dynamic. A model which allocates costs to different factors that are algebraically related to one another is static.

Predictive versus Descriptive Models

Finally we can classify models by their primary purpose. Some models are constructed to describe reality in order to improve our understanding of some process. These models are called descriptive. Other models have as their primary purpose to predict some future event, such as enrollment, and are called predictive.

Some Examples of Specific Techniques

In this section examples will be given of the use of five specific techniques useful to educational model builders. The five techniques that I will discuss are regression analysis, discriminant analysis, stochastic process modeling, linear programming, and input-output modeling.

A regression can be used to predict or explain a behavioral relationship between a dependent variable and a set of independent variables. For example, we may use regression analysis to explain the differences between cost per credit hour among different colleges in a state. We might hypothesize that the cost is a function of the size of the college and the quality of the institution. If we had a measure of quality, we could regress cost/credit hour against the size and quality variables and test our hypothesis.

Discriminant analysis is useful in statistically separating various groups of students that have different characteristics. For example, discriminant analysis could be employed to separate undergraduate applicants who are likely to complete their bachelors degree before other students. In applications involving a separation between two groups, regression analysis may be employed where the dependent variable has two values: success = 1 and failure = 0.

Several applications of stochastic process techniques have been used primarily to predict enrollment. A specific stochastic process model in use at California is described by Oliver as the grade progression ratio (GPR) model.

In the GPR model we attempt to calculate probability that a student in the ith year of school will return in the itjth year. For example, if i and j are both one, the probability to be calculated is the probability of freshmen becoming sophomores in one year. The data for such a model are usually obtained from previous enrollment data, typically at a macro level.

Linear programming is used to determine an optimal solution to a problem, subject to some side conditions or constraint. Keith Trowbridge discussed an application of linear programming to a university planning problem. (See References). The problem was to minimize the distance faculty and staff members have to walk from their parking structure to their office, subject to the constraint that no faculty or staff members walk more than a specified distance. Trowbridge experimented with alternative constraints and chose as an acceptable solution a minimum average distance and a constraint.

Let us assume a college has three departments and gives bachelors degrees in these three departments: literature, economics, and zoology. If we wanted to calculate the average number of credit-hours of one subject to produce a degree in another, we could use the following input-output matrix:

Output Degrees

Input Credit Hours	Literature	Economics	Zoology
Literature	.6	.4	.2
Economics	.3	.5	.3
Zoology	.1	.1	.5
	1.	1.	1.

Assume 120 credit hours are required for a bachelors degree. The .6 in row one and column one of the table means literature majors take on the average .6 of their credits, or 72 credits in literature. If 50 new literature majors were admitted to the college, this would mean 72 times 50 (3,600) more credits in literature, but also .3 x 120 x 50 or 1,800 more credit hours in economics, and .1 x 120 x 50 or 600 more credit hours in zoology.

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INSTITUTIONAL RESEARCH:
SOME COMMENTS FOR USERS AND RESEARCHERS

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Having been in administration for twelve years, the past six as dean, I speak to you from a management point of view. I should also state that I am a rank amateur and a layman in the sophisticated world of computer-simulated models, program planning and budgeting systems, and the whole world of institutional research tools now coming into use for the decision-making process. I might say that I am personally strongly convinced that planning should be and must become one of the major functions of every line administrator and this at a progressively more sophisticated level. Moreover, I regard institutional research as one of the main sources for planning. I speak of this in the most comprehensive sense of gathering information, bringing appropriate tools to bear on the decision-making process, feedback, and continual modification and revision.

The purpose of this paper is to consider what the decision maker's needs are; how the institutional research effort is, or is not meeting them: and the nature of the changes, if any, that I would like to suggest to make institutional research more useful to a person in my position. The panel has been asked to describe the kinds of information and analyses of institutional programs and operations which we need to effectively carry out our role. We are asked to identify and discuss the critical kinds of information which we seem to use most frequently and the kinds that we would like to have, but do not seem to be able to get. I am further told that the profession of institutional research is in a somewhat self-critical mood at this time. This is a clear sign that the profession is now mature, well-established, and secure; on this I compliment you.

Very briefly, I want institutional research data which is usable for decision-making purposes: data on enrollment, broken down by departments, male and female, part-time and full-time, consistent from semester to semester, and summer session to summer session, undergraduate, graduate, professional; and I want to be consulted on the design to be sure that what I get is usable, and I want this material consistent historically and consistent from year to year. I want detailed information of the faculty from someone who understands the many subdivisions and subcategories, from someone in whom I have confidence and who can feed me the significant kinds of information needed for the kinds of decisions I have to make about faculty salaries, faculty-student ratios, etc. Our budgeting and financial reporting procedures are now established and canonized in the new edition of College and University Business Administration published by the American Council on Education. I want to move very strongly in the direction of making these budgeting and financial reporting standards and procedures more usable for management decision-making purposes by supplementing and adding to them the kinds of management accounting which will be most useful to me as an academic administrator. I also want to adapt this to a form of budgeting and reporting that will be more intelligible to businessmen. In saying all this, I am not criticizing in the least the tremendous amount of work which has been carried out by the National Association of College and University Business Officers. I commend and support what they have done. I do, however, wish to see a new level added to this which will take this same

information and cast it into a form more immediately usable for management decision making by academic administrators. Admittedly, finance is only one aspect of a very important, complex decision-making process, but it is frequently the most decisive single element, after that of quality of personnel. I believe I would want to move in the direction of Wesleyan University as described in the March, 1969 issue of College and University Business. At Wesleyan, the budgeting system format will be recast at the summarization level so that it is stated in terms of major programs and activities even though these may cut across existing organizational lines. This is being done so that the operating budget will be consistent with the data used for program planning, thus permitting the administration to be sure that the budget is, in fact, the implementation of planning decisions. This is essentially an addition to something that has worked well over the years, but it is a management type of addition, not a custodial type of addition. I also feel that an important aspect of the relationship of institutional research to effective management of colleges and universities is predicated upon a clear and proper understanding of the very nature of the college or university itself. Along these lines, I very strongly recommend careful reading and consideration of what has frequently been referred to as the Henle report, Systems for Measuring and Reporting the Resources and Activities of Colleges and Universities (National Science Foundation, NSF 67-15, 444 pages). This study was sponsored by the National Science Foundation and the National Institutes of Health. A number of those in this room were involved in its preparation. I refer especially to the diagram on organization on page 203 of this report and the philosophy related to it.

While I vigorously support the development of tools to aid decision makers, and continuing experimentation with these tools, I believe it only appropriate to make it clear that here and now, in most institutions of higher learning in the United States, the principal problems regarding the uses of institutional research concern the users of institutional research and the researchers themselves rather than the tools which they use. It is true to say that in most institutions of higher learning at the present time the quality of the tools has far outstripped the inclination or the ability of most academic decision makers to utilize these tools. My remarks will be addressed to the tremendously important role you have to play in moving the product of good institutional research into the decision-making process.

Your effectiveness as a director of institutional research will be judged mainly by the results; that is, just how importantly does institutional research affect the decisions made at your institution?

The degree of this effectiveness is measured by the degree in which institutional research affects academic decisions. Other nonacademic decisions, indeed, are important, but they are less central to the enterprise of an educational institution precisely as an educational institution. What I am saying here is essentially a reinforcement of the concept enunciated by Henle and others in the report I mentioned earlier. It is precisely as an educational institution, as an academic enterprise, that the college or university moves forward and all of the other services which have to do with finances, physical facilities, etc., are used to support the academic operation.

It becomes, then, immensely important for you to correctly evaluate the relative importance of methods and tools of your profession, the products they produce, and the use of those products in academic decision making. If no one

uses the studies here and now, your work is relatively useless. I think this says a great deal to you, about the relative importance of sales and human relations. A lathe may be a beautiful lathe, but its purpose is not to be beautiful but rather to make something. You may have a beautiful technique, but it is no good unless it is used. In institutional research, there is no such thing as "art for art's sake."

I would now like to pull together a few brief suggestions for institutional researchers in dealing with academic administrators. These are really suggestions on how to get academic administrators interested in institutional research and in the value and importance of it for academic decision making.

First of all, begin from their point of view. Academic administrators are qualified as generalists, but they probably know relatively little about newly developed tools of institutional research. Do not begin with these. No one wants to be sold a beautiful airplane if he does not see how he can ever learn to fly it. Academic administrators, in my opinion, have a very broad knowledge of the institution and of almost all facets of the institution--a knowledge far broader than students or faculty or other administrators whose work may be confined to a given area such as that of the financial officer, the registrar, etc. Begin with academic administrators where they are; recognize their point of view.

Make it clear that you are only attempting to help them exercise their responsibility for academic decisions. Let them know that you realize that the full responsibility for academic decision making is a line responsibility, and that in this aspect of the matter, institutional research and the institutional researcher are offering staff assistance to the line officers.

Be prepared for a long, slow process of initiation and of education of the academic administrator into the potential of institutional research. But once you win his confidence, be prepared for a deluge of requests for all kinds of information and research. Basically, he is trying to decide whether you can really help him or whether you are just another salesman with a new bag of tools. Here it is vitally important to build up a relationship of mutual trust and mutual confidence.

In building this relationship with the academic administrator, do not attack other sources of information used in academic decision making. Institutional research can supply vitally important kinds of information, but it will never be able to supply the kind of prudential judgment which is one of the vital components for the academic decision. For this reason, do not attack other sources of information. Academic administrators already know the advantages and the limitations of these sources of information, and they have become through experience highly trained past masters at sifting the wheat from the chaff, of sorting out the opportunist from the solid contributor of ideas. Quietly indicate to them how you think you can provide hitherto untapped sources of information through institutional research.

It is vitally important that institutional researchers learn all they possibly can about college and university budgeting. This is a principal tool of the academic administrator, and as you are well aware, a great deal of your research will be useful precisely as it is relatable to the budget.

In building your relationship with the academic administrator, I would like to urge that you place a tremendous amount of reliance upon oral communication. Reports are useful as backup data after an oral presentation, but the academic administrator is overwhelmed with written reports. He does not have the time to read much as he would wish to, and he will be eternally grateful for a ten or fifteen minute summary presentation accompanied by a written report. It seems to me that this kind of personal contact is vitally important to him, and this will enable you to get direct feedback from the academic administrator, to inquire of him what his needs are, and to educate him in the potential contribution which you can make to the decision-making process.

I think it is vitally important for an organization such as the Association for Institutional Research to work with allied educational organizations at the very highest level, and attempt to reach the presidents of institutions to educate them and the members of their academic staffs to the contribution which institutional research can make right now to the present and future planning of the institution. Certainly, institutional research will not develop adequately as a profession nor will you as individuals be able to make your maximum contribution to the future of American higher education unless and until those chiefly responsible for academic decisions are convinced of the importance of institutional research. And they will not be convinced until they have been educated to its potential and possibilities.

I strongly urge you, therefore, to work very closely with organizations such as the American Council on Education, The Association of American Colleges, The Association of Urban Universities, The National Association of State Universities and Land Grant Colleges, The American Conference of Academic Deans, and The Council of Colleges of Arts and Sciences. Attempt to get institutional research and its potential featured in annual meetings of these organizations. I would very strongly urge that you cooperate with existing organizations such as WICHE, and Higher Education Executive Associates in working toward the sponsorship of conferences which will bring together in the same room academic administrators and institutional researchers for mutual education.

I am well aware that at this point many of you may be commenting that I am talking about a situation which does not exist in your institution. This may very well be the case. Probably most of you are from institutions which have already made a rather substantial commitment to ongoing institutional research as an aid to the decision-making process. But you represent only a favored cross-section of American higher education and a limited one at that. I am referring to the literally hundreds of institutions which are currently not doing any institutional research or not doing it effectively. The need is apparent; the need is tremendous. I urge you to address yourselves to it. The situation is not unlike the one that occurs in thousands of churches every Sunday morning. The message is needed, but not necessarily by those present. Those in the church have already been converted. I urge you to address your concern not only to yourselves, but to the unconverted thousands of academic administrators who really need institutional research, and would be receptive to it, but who have never heard the message because no one has ever preached it to them.

INFORMATION REVOLUTION: CLARITY OR CONFUSION

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My charge is to try to show how the information explosion has had impact on administering colleges and universities. To do this I first need to tell you what I believe the nature of the information explosion is. I then want to discuss how administration has or has not been affected by this explosion. In particular, I want to talk about the problem of sorting from the vast amount of information now available that which is needed by key persons in higher education so that they can more effectively administer their institutions. Finally, I must deal with the problem of whether administrators really do make better decisions as a result of information which is now available to them.

Nature of the Information Explosion

Perhaps it is really not necessary to dwell at length on this first item --the nature of the information explosion. The abundance of data and other kinds of information is painfully obvious to all of us. Few there are who can adequately cover the many volumes, books, newspapers, media presentations, and the like, which are related to fields of general or special interest today. We are in a state of confusion, and present systems for sifting and sorting from among the various kinds of information are just not adequate. In short, the problem of "keeping up" is just insurmountable, and simply increasing the frequency of committee meetings is not going to solve the problem. Suffice it to say that we are being inundated with information, and somehow we have got to dig through the morass of facts and figures to find those bits of information which are right for our purposes.

Identifying Information on a Selective Basis for Management Purposes

How then does one decide what kinds of information he needs to have, and how then does he take steps to acquire that information to help perform his role as an administrator in an institution of higher learning. Clearly, one can rely on the traditional techniques of reading all appropriate literature. But if he does try this, he obviously will never get his job done. It is painfully clear that he could not possibly read within our twenty-four hour day all of the information that he really might find useful for making effective decisions.

He could, on the other hand, rely on others to determine which of the many kinds of information he ought to have available for management purposes. This would shift the responsibility for sifting through the masses of information to other people who hopefully could then cull only that which would be appropriate for the decision-making role. He might even entrust this task to the library, or to key people in the library, if he happened to be in a sufficiently powerful position to command utilization of such resources. This, however, is hardly an effective way to utilize people, and it simply does not produce the really complete coverage one ought to have of the

information needed for management purposes.

Then there is the computer. Since this mechanical genius is capable of storing vast amounts of information, he might trust to it, through appropriate human intervention, the responsibility of sifting through the information to provide what is needed for decision-making purposes. Perhaps most will scoff at attempts to do this because you are painfully aware of the nearly insurmountable task of getting the computer to produce in a timely way the information we need to have. Turn-around time, if you will, is too great. But we at Wayne State have experimented with and found successful a technique with which some of you are familiar. It is known as SDI (Selective Dissemination of Information), and it capitalizes on the potential of the computer by matching information which is stored in the computer with interest profiles of university administrators. The following is a brief summary of this technique which has been helpful in meeting the problem of selective communication of information, indicating as well how it has proved effective at Wayne.

SDI System at Wayne State University

Wayne began use of a current awareness technique known as SDI (Selective Dissemination of Information) in July 1964. It was at that time that a member of the Wayne State University staff, Dr. Robert E. Booth, now Chairman of the Department of Library Science, attended an IBM seminar in Chicago and became aware of this technique. He suggested to the present writer that this appeared to have potential for the operation of a small reference library just established on the campus, and as a result, some preliminary explorations were made of the potential of that system.

It was determined that the IBM programs supportive of this system had been written for the IBM 1401 computer, which was fortunately in the computer repertoire of Wayne State University. It was also determined that the program could be made available from IBM and that only a minimum amount of reprogramming was necessary to make it operative on Wayne's 1401 computer.

The Administrative Reference Center was originally established as a vehicle to alert University administration of the current literature of higher education, particularly with relevance to state and national legislation. Because a fairly large number of University administrators were represented in the services of the Center, the Administrative Reference Librarian faced the problem of providing specialized services to a number of quite different users with varying interest profiles.

The SDI System is particularly well suited for this program because it provides for the establishment and maintenance of separate interest profiles for each of the users in the System. The System works as follows:

1. Persons who receive the library service are interviewed to determine their interest profiles. The SDI program permits profiles of approximately 60 words in length, and users may have as many as 36 profiles. Two types of words are maintained: a root term, which is a truncated form for several longer terms, and an exact term.

2. Each profile has a "hit" level associated with it. This provides a measure of control of document notices which the user receives. Thus, a combination of terms must be recognized to produce a required "hit" level and thus alert the user of a document which is current in the SDI System.

3. The second step in the SDI program is to review the literature of the library and prepare abstracts, on a periodic basis, of all the articles, books and journals relevant in the SDI System. These abstracts are 100 words in length. The abstracts are automatically indexed by the computer and stored on magnetic tape.

4. Words from the abstracts are compared with key words in the interest profiles, and in the cases where the key words match (required "hit" level achieved), document notices are printed along with the abstracts on IBM cards. Cards also provide responses. For example, the user can indicate that he wishes to see the entire publication.

5. These notices of abstracts are mailed periodically to users. In addition a KWOC indexing service is provided whereby all key words in the publications included in the abstract system are indexed and stored on magnetic tape. Printouts of these periodic indexes are prepared on a biennial basis.

6. The system has been in operation for some five years, during which time users from other Michigan universities have been added as a result of a small grant received from the U.S. Office of Education in June 1965. Consideration is now being given for expanding the System further.

Ensuring that Decisions are Based on Available Information

Of course the acid test is whether decisions in colleges and universities are actually based on this information which we are now able to make available, either on a selective basis such as SDI or through any of the other techniques which have been referred to above. But before noting what evidence we may have in this regard, let me suggest some cautions which we must, I believe, exercise in using information for management purposes.

1. First, one principal concern is that the more immediate availability of information presents us with some problems which in fact might be solved in an orderly way over the passage of time if someone were not aware of their existence too quickly. The very fact that they are immediately known sometimes commands our attention and causes us to take steps to solve them, while our ignorance of them could well mean that the solution would have been natural and would have occurred within the normal operation of the university. My point is that just because information is available more quickly, it does not need to be considered or acted on immediately.

2. This suggests some additional prescriptions: policy determination should be entered into cautiously when it is based on information which now becomes more immediately available. Perhaps trends can be apparent which were not apparent when the isolated bits of information came to our attention and caused us to make decisions or to establish policies which upon more careful reflection would not have been made. Also, the nearly immediate generation of information permits us to analyze data in a systematic way (elements of program planning and budgeting, if you will) and to take actions which are based upon a careful synthesis of such data from many sources. But frequently we are not systems-oriented, and we prefer to act with the bits of information which we might formerly have been able to assimilate without difficulty. Now, however, we have much more data to absorb, complicated by the much more difficult task of coordinating and extrapolating and deciding on facts which are put together in a total environment which is much greater than we previously could conceive of.

3. The need for synthetic and analytic abilities has great implications for the training and background of administrators. University managers are simply not ready for the challenge of the new information-oriented society.

Even if we recognize and deal successfully with these cautions, we still must face the problem of determining whether universities are indeed run better because of the information explosion. My thesis is that the availability of vast amounts of information and data and the bringing of these in various selective ways to the attention of administrators has not made for better administrative decisions. We are still "political" in our decision making. We are aware of the consequences; yet, we choose to consider the action which is of political expediency rather than the one which is objectively validated, and no amount of educational information is going to change this. The information producer has to realistically understand that the administrator cannot forgo his political role. He can be aware of more information than ever before; indeed, he must, but his judgment will always be tempered by conditions which are frequently beyond the grasp of the information producer to understand or control.

Can this ever be changed? Within limits, I think so. But one of the best ways to ensure that it not change is to continue to thrust upon the harried and sometimes overworked administrator information which he simply cannot take time to absorb and indeed will not take time simply because he faces the necessity of acting expediently in any case anyway. Perhaps this is the challenge of not only institutional researchers but those concerned with techniques for communicating information. There are few who deny that we have at our disposal today the means of producing all the information the human mind is capable of absorbing and, in fact, of selectively distributing that information to individuals. The problem is not there; it is rather ensuring that the wisest possible decisions are reached by people who are in a position to digest and to utilize this information for the total betterment of the institution.

THE INFORMATION REVOLUTION: CLARITY OR CONFUSION

Toward a Measure of Clarity

Ben Lawrence
WICHE Management Information Systems Programs

Computers have brought about an information revolution which, on occasion, seems to create more confusion than clarity. I am reminded of the teenage boy who, on arrival home from school, asked his mother to explain the principle of jet propulsion. Not fully understanding jet propulsion, she advised her son to ask his father. His quick response was, "Aw gee, Mom, I don't want that much information." The computer often provides us with far more information than we need for the problems we are trying to solve. Not too long ago, a serious, analytical type hurried into his chief executive's office carrying two armloads of computer printouts. He dropped them on the desk and said, "Boss, there are the answers to all your questions. Now, if we only had a method of extracting the answers from those piles of information."

The computer's capacity to rapidly analyze data is occasionally used without serious thought of the consequences of the use to which such information might be put. Many times such information is misused and causes more damage than good. It is like the bear hunter from Tennessee who decided to try his prowess in Alaska. He was a busy man but wealthy enough to arrange for a quick three-day trip. He arrived in Alaska on the afternoon before the big hunt. A group of men had previously been selected by a travel agency to take him on this hunt. All preparations had been made, and on his arrival he changed his clothes and they began immediately their hike to a cabin in the hunting area where they intended to spend the night. While on the trail, one of the men noticed that our friend from Tennessee was not carrying a gun. In view of the fact that he was a renowned hunter, they had assumed that he would bring his own rifle and, accordingly, had not arranged to get one for him. Panic prevailed for a moment, and finally one of the guides asked, "Where's your gun?" The Tennesseean responded by saying, "What do I need a gun for? In Tennessee, we hunt bears with our bare hands." The guide shrugged his shoulders and proceeded on the way, too much in awe to challenge his response. On arrival at the cabin, they ate supper and immediately went to bed. The next morning about 5:30, the man from Tennessee awoke and began scurrying around the cabin while the men still slept. A short time later he announced to the men that they should get up and get breakfast and that he was going out to get a bear. All of them immediately came to life, but he was out the door before they could raise any objections. They again shrugged their shoulders and began to prepare breakfast. About a half hour later, as breakfast was just about ready, they heard a terrible shouting outside the cabin. They rushed to the windows and looked. There was our friend from Tennessee running toward the cabin as fast as he could come shouting at the top of his lungs, "Open that door! Open that door!" Immediately behind him was a very large and irate grizzly bear. Of course the men in the cabin quickly recognized his problem and readily opened the door. The man from Tennessee dashed straight for the door, with the grizzly bear close behind. At the last moment, rather than entering the cabin, the man from Tennessee stepped aside. The grizzly bear ran so rapidly he could not make the switch and he charged through the door. The man from Tennessee quickly

grabbed the door and closed it and shouted, "All right, boys, you skin that one out; I'll go after another."

Computers have unleased the capacity to produce large quantities of information never before available. As with the bear in our story, this unleashed information has the potential of being very damaging. On the other hand, computer-generated information can be used to clarify our understanding of higher education and develop improved decision-making capabilities equally as well as it can confuse.

Before I discuss the possibility of bringing about a measure of clarity, I would like to identify a few factors that make it possible for information to create confusion, and to describe some situations in the coordination of higher education at the state level in which the clarity-confusion issue becomes significant.

Why Does Computer-Generated Information Create Confusion?

At the outset we must acknowledge that much of the time the computer does not create confusion. When appropriately developed and used, it is an extremely useful tool. There are some factors, however--perhaps a combination of factors--that make it possible for computer-generated information to create relatively more confusion than traditional methods of information production.

One of these factors is quantity. The computer has created the capacity to analyze raw data in far greater detail, in many more ways, and in far less time, than traditional procedures. While such analysis was possible prior to the computer, it was of little value because the decision to be made on the basis of the analysis could not wait until the analysis was complete. Now, of course, the computer can provide very quick response in very great detail. There is so much detail that very few decision makers have the time to study it and understand the implications for the decisions they have to make. There is always the danger, when such volumes of information are at hand, that decisions will be based only on a superficial examination of its contents and will be made in light of only the most interesting or obvious indicators. Perhaps we should ask the computer to aggregate the information into manageable form.

Another factor is complexity. The capacity to produce large quantities of information in a short period of time has brought with it a significant increase in our understanding of the complexity of the relationships among pieces of information. While we now understand that the relationships are complex, we have not yet had sufficient time to develop procedures for understanding many of these complex relationships. We are not of one mind in the interpretation of the relationships we now see. We are unclear as to the techniques necessary to modify the relationships. We are even more uncertain as to what modifications in the relationships are desirable.

A third factor is the lack of purpose in our analysis. Most information generated today is produced in response to a specific question or demand by an investigator or decision maker but generated from data collected for other purposes. Unfortunately, information generated for a specific purpose is frequently not applicable to all situations. This fact is compounded because analysis design itself can affect the information results. Unfortunately, many

investigators or decision makers do not know the question they wish to ask until a significant amount of information is already available to them. This fact is compounded because the information already available to them occasionally encourages them to ask the next wrong question. Without identifying the purposes to which we propose to put information at the very outset of analysis, we may be led down the garden path only to find ourselves disillusioned at the end.

Now that we have developed the capacity to rapidly produce large quantities of information about complex situations, it is incumbent upon us to ask the questions, "To what use are we going to put the information we intend to produce, and what are the analytical procedures that we must use in processing the information that will best describe the total situation in which the problem exists to which we are seeking a solution?"

It is dangerous to arbitrarily isolate components in complex situations. We can no longer think of information according to isolated categories. We must consider the relationships among the various components in complex situations. For example, when analyzing student data, we must take into consideration all other components of the university. No longer can we provide one list of academic specialties when we are dealing with students, another list of academic specialties when we are dealing with faculty, still another when we are dealing with facilities, still another when we are concerned with degrees awarded, and still another when we are allocating dollars. The relationships among these components have become extremely important, and it is incumbent upon us to provide analysis procedures that will not only enable us to understand the component, but will enable us to understand the relationships among the components and what happens to all other components when one component is altered.

A fourth factor that contributes to confusion is the lack of comparability. For the most part, evaluation of success or failure, decisions concerning management efficiency, and determinations of what should be provided or done are based on comparisons with what others in the same business have done. Accordingly, we tend to produce information to assist us with these comparisons. This normative type analysis would be fine if it were possible to get information that was comparable. However, for the most part, information produced by our colleges and universities today is unique to each institution. We rightly stress the uniqueness of the respective institutions, and resist any procedures that might do violence to "the unique character of our institution."

If our information is not comparable and we persist in making comparisons, we bring about a great deal of confusion and debate. I hasten to point out, as I will explain in greater detail later, that comparable data is possible while maintaining the unique character of our institutions. We place as much pride in the uniqueness of the individual as we do in our institutions; nevertheless, we have found ways by which medical doctors can make useful and valid comparisons based on normative data concerning many of our physical attributes.

It is my specific task today to look at the clarity-confusion problem of information generation as perceived by a state-wide coordinating agency. While the factors I have previously identified are of great concern at the state coordinating level, I would like now to give attention to some situations which, while far from unique, are particularly significant at the state level.

One situation is the response-to-crisis syndrome. Resource allocation, and by this I mean, for the most part, who gets the dollar, is of vital importance to all. Within the institution it affects the lives of every student, faculty member, and administrator. At the state and federal levels it has become a source of great public concern. Even the private institutions now seek public dollars, and public institutions have invaded the private resource area. In order to perform the functions of higher education that the state sees as imperative, state coordinating agencies have sprung up in response to the tremendous task of trying to determine the appropriate allocation of state resources. This task requires that coordinating agencies have a great deal of information. They react to the crisis of hurried decisions about dollars. These pressures on the coordinating agencies to produce answers rapidly are forcing them to place great demands for information upon the institutions. These demands for information come so rapidly that institutions have little time to give thought to the analytical process but must react to the demands imposed upon them. The coordinating agencies also have little time to work with the institutions in developing analytical procedures that will appropriately represent the systems of higher education with which they work and to which they are trying to allocate resources. This demand for more information in short periods of time perpetuates the types of inappropriate analysis procedures that lead to the production of large quantities of information refined for a particular management situation but not accounting for the relationships among situations. It is, unfortunately, accepted in large part by ill-informed users as being true because it came from a computer. It is time to resist the production of these kinds of information. It is time to develop management information systems that more adequately and accurately describe higher education and to bring an end to crisis-induced "quick-and-dirty surveys."

A second situation in which the clarity-confusion problem becomes significant is in making comparisons among institutions. Coordinating agencies also are faced with making recommendations to legislators and administrators about the allocation of programs and resources to institutions that are heterogeneous. Their functions vary widely within a state. No two institutions are alike, and some institutions are vastly different. Institutions have become very sensitive about responding to the requests of coordinating agencies for information according to a specified analysis format that somehow represents the appropriate analysis format for Mr. Average Institution. All institutions insist that they are not average, and any serious student of higher education will acknowledge that their functions are rarely so precisely the same that a single analysis format will accurately describe them. On the other hand, resources must be allocated, and they must be allocated knowing that they are limited--that no one institution will receive all that it is requesting. Some kind of an analysis procedure must be devised that will enable coordinating agencies to produce the kinds of information that will make it possible for busy legislators and administrators to make wise decisions concerning the allocation of resources among institutions with widely varying functions. It is incumbent upon the coordinating agency, for example, to recognize that when common analytical procedures are used for generating information in a four-year program within the university, and when those same procedures are used for generating information within a two-year academic program in a community college, the outcomes are likely to be different. While the information may be specified in equivalent terms and in comparable formats, the production function of these two institutions is different and the outputs of that analysis are not comparable.

Given a 300-horsepower engine in a Corvette Stingray and a 300-horsepower engine in a Galaxie nine-passenger station wagon, an analysis of these two vehicles on acceleration and speed leads one to conclude that the Corvette Stingray is superior to the Galaxie nine-passenger station wagon. The question is, superior for what? The superiority of a Corvette Stingray, given the task of transporting the seven members of my family across town at either low speed or high speed, might be seriously questioned.

Given two four-passenger vehicles, a Volkswagon and a Cougar XR-7, one may be able to do an analytical analysis of transporting four people in these two vehicles a distance of ten miles. Given the constraints of our highway system today in terms of speed, economy and efficiency, the Volkswagon will be considered superior. But all of us acknowledge there is something to be said for the luxury of the ride in the Cougar XR-7. It does have some value that is very real but less susceptible to analysis. As distances increase and the human frame tires, the comfort values of a Cougar XR-7 become more easily measured. If we are talking about traveling 600 miles in a day, most of us will choose a Cougar XR-7. Only the Spartans would choose a Volkswagon. My point is that we readily understand the differences in functions among various types of vehicles designed to perform different functions, and we compensate for these in whatever analysis we attempt to make. It is time that we become astute enough to make these kinds of distinctions among our various types of institutions. To be sure, we must make analyses; we must make comparisons. But let us not fall into the trap of saying that a Volkswagon is a Cadillac.

Having discussed some of the things about computer-generated information that cause it to add to confusion and some of the situations in which information creates confusion, I now pose the question, "How can we work toward the production of information that will bring about a measure of clarity?"

We respond to this question within the context of four self-imposed, important, and necessary constraints. The first of these necessary constraints is adaptability.

Let me stress that information that brings about clarity is something we will work toward. Changing information needs will not permit us to arrive at that happy circumstance when our information needs are harmoniously and exhaustively met. This situation dictates to us the need for management information systems that are adaptable--not adaptable in the sense that they can handle anything, but adaptable in the sense that they can be modified without rebuilding the entire system. We might design the systems in the same way one designs a submarine. A submarine is a highly integrated operating unit, but it contains many compartments that can be sealed off in an emergency and still maintain the basic seaworthiness of the vessel. We need information systems that are highly integrated but sufficiently compartmentalized so that basic changes can be made to a particular part of the system without jeopardizing the integrity of the entire system. For example, the various operating systems--the student information system, the facilities inventory system, and the accounting system--must be able to stand alone as operating units but should also be capable of being interrelated so as to form a larger total system. Given adequate planning resources, it is now possible to design systems with these characteristics.

The second necessary constraint is that we must develop a clear explication of the goals and objectives of the institution or process which the management information system is being designed to serve. We can no longer run the risk of responding to crisis demands for information with "quick-and-dirty surveys." We must develop systems designed to respond to questions within the context of our overall goals and objectives.

With this more precise definition of our goals, the problems facing us become more apparent. We can begin to build models describing the system, and our information needs move from the infinite to the finite. We can move away from gathering all feasible information to gathering information which is necessary for the understanding of our most pressing problems.

This approach has two very practical advantages: a) it reduces considerably the amount of information theoretically required--a practical consideration in view of the costs of storage and retrieval of information; and b) it assists us in reducing the quantity and complexity of information before its generation rather than after its generation.

I believe we can live with the obvious disadvantage it presents--mainly, that we undoubtedly will from time to time be required to go back and get more information.

The third necessary constraint is that we must develop management information systems that apply as few restrictions as possible--preferably none--on the operation and development of the respective unique institutions of higher education. While some restrictions will and must be placed upon our institutions, they should not be placed there by the information system but as a result of the management decisions that are made on the basis of information that accurately describes the institution.

One of the major strengths of higher education in America is the diversity of the institutions providing the services. This is to be encouraged, and our management information systems should permit this diversity.

The fourth important constraint is that we are looking for management systems that simultaneously provide information for 1) management within the institution, 2) inter-institutional comparison and study, and 3) reporting at the state and national levels.

This requires compatible management information systems.[1] Management information systems are compatible when 1) they are identical in every respect, or 2) they can otherwise produce comparable pieces of information.

Identical management information systems do violence to the third constraint we applied to the development of the systems and therefore are rejected. How can we, then, develop management information systems that can otherwise produce comparable pieces of information in order to meet our definition of compatibility? If we commence with the assumption that institutions of higher education have common problems, it follows that common analytical models can be developed that will assist in the solution of those problems. If we can agree upon the problems that are most pressing among a significant number of institutions, we can pull together the resources necessary to develop such analytical models.

have a ready-made system available for adoption or as a guide for the development of their system. However it does not appear advisable at this time to try to bring about compatibility by developing standardization beyond the concept of a common data base and the development of common analytical models which would be used for management information exchange purposes.

Given a standard data base which might include a set of standard data elements, a set of optional standard data elements (that is, data elements that may not be required for the operation of all analytical models, but for which a standard definition is recommended), and a set of data elements that was unique to the institution's needs, it is then possible for the institution, through its own unique data structure, codes, field formats and file structures, driving its own unique management models, to develop unique information for management within the institution. On the other hand, using that same standard data base kept according to the institution's own unique data structure (that is, codes, field formats and file structures), it is possible by means of interface programs or conversion programs or transformation programs, whichever is the more appropriate term, to restructure the data elements in a form suitable for operating common analytical models or management information exchange models, in order to produce information that is comparable with that produced by other institutions using that same standard data base.

This briefly stated concept of compatible management information systems is the concept underlying the management information systems program of the Western Interstate Commission for Higher Education. This program is now well under way. It includes the major institutions of higher education in the thirteen Western states, New York and Illinois. The central staff of the program is funded by the U. S. Office of Education under a five-year continuing contract. While the program staff is employed by the Western Interstate Commission for Higher Education, the program is guided by a steering committee made up of representatives from the institutions and agencies within the participating states and by a National Advisory Panel made up of representatives from the various regional and national organizations having an interest in the development of management information systems.

While we have outlined a concept by which we can bring clarity out of the mass of information being generated by computers, the success we will have in implementing such a concept will be dependent upon the seriousness of our desire to bring about clarity. There are still some of us who are afraid that good information will be misused and that we ought not, therefore, to release this information or perhaps not even generate it. There are those among us who argue that comparisons ought not to be made because they are misleading. On the other hand, the majority of us, I believe, recognize that the public is no longer in the mood to subsidize higher education without a greater understanding of what it is paying for. Decisions with regard to resource allocation will, in fact, be made. Comparisons among institutions and programs will most certainly be made. The question is, "Will the comparisons, will these decisions be made on the basis of information generated as accurately as possible by our institutions in cooperation with one another so as to provide information that will treat institutions as equitably as possible; or, by our default, will the generation of this information be left to other persons who will, perhaps, do it less accurately but perhaps more swiftly than we, ourselves, would do?" The computer has unleashed the power of an enormous amount of information. It is highly unlikely that any one institution is in a position to lead us toward

Analytical models that concern institutions of higher education range from very simple to very complex. In the strict mathematical sense, some of the following examples will not be considered models but will be looked upon as mere formulas. Using models in the more general sense, however, the following list provides examples of some of the kinds of formulas, or models, that institutions of higher education are concerned with: 1) a formula for full-time equivalent student, 2) a formula for full-time equivalent faculty, 3) models or formulas for the production of cost of instruction by level of course, by level of student, or by field of concentration. In the opinion of mathematicians and operations research people, a resource requirements prediction model will more accurately fit the definition of model as they understand it. A student flow model is even more complex and appropriately falls within the sophisticated notion of modeling.

Each model that we may choose for operation requires a finite list of data elements for its operation. This finite list of data elements may be termed a data base. If we are to develop compatible information systems, we must adopt common, or standard data bases. If a data base is to be common or to be standard among institutions of higher education, each element must be defined in precisely the same way and the respective bases of each institution must contain all of the necessary elements.

The collection of data bases for the respective models may be called the standard data base. Given such a standard data base, an institution may produce information that is unique to the institution and required only for its internal operation. It would do this through the aggregation of specific data elements according to its own prescribed model or its own prescribed formula. It could, for example, develop its own unique student full-time equivalency using a formula such as $(A + B)/C$, where A, B, and C are individual data elements in the standard data base. On the other hand, it could develop information that is standard for comparison purposes with other institutions, such as a standard student full-time equivalency, perhaps being composed from the elements A, D, and C, according to the formula $(A + D)/C$. This assumes that the respective basic data elements--A, B, C, and D, in each of the respective bases--are defined in precisely the same way.

There are, of course, other factors that affect the degree of compatibility among management information systems. At this point, we must ask ourselves the question, "How compatible do we wish to be?" Other factors affecting the degree of compatibility among management information systems are codes, field formats, file structures, software programs, and hardware. These terms all pertain to technical matters of storage, retrieval and analysis of data by computer process.

However, as we move toward more complete compatibility by adopting standard codes, field formats, file structures, software programs and hardware, we find ourselves moving away from the concept of compatible management information systems toward the concept of identical management information systems. As we do this, we tend to apply more constraints upon the institutions than is desirable.

It may be useful to develop suggested codes, field formats and file structures and perhaps even software programs for institutions that have not yet developed their own management information systems to any degree, in order to

clarity. In my estimation, however, if we all work together, we can harness this power so that it works together for the good of our entire education system and treats our institutions with a reasonable amount of equity. With cooperation we will move toward a significant measure of clarity.

Footnote

1. Compatible Management Information Systems, a Technical Report Concerning The Concepts Underlying Compatibility in the WICHE Management Information Systems Program (April 15, 1969).

RESEARCH RESPONSES TO INSTITUTIONAL BEHAVIOR

Irving Cohen
Borough of Manhattan Community College

I'd like to look at institutional research within the framework of education in the American community college. In the community college the dynamics of change are as insistent and as pervasive as in the four-year colleges and universities.

In a very real sense, the mushroom growth of the community college is a direct outgrowth of the dramatic reappraisal of higher education in our society. The utility and desirability of extended formal schooling are part of our national mores. Higher learning has become keeper of the keys. Upward social mobility and political, social, and economic advancement in our technologically conditioned "civilization" all require official sanction--the college degree.

Born in the crucible of meeting urgent educational and social needs, the various community colleges reflect the variety and haste of the circumstances of their local origins. This is both a burden and a challenge to the community college system. On the one hand, we seek freedom from the tyranny of tradition and the opportunity to strike boldly into new directions. We have the advantage of lacking comfortable habitual ruts. We seek to invoke a self-consciousness of novelty and the search for new directions in educational purposes--the opportunity of the many rather than the privilege of an intellectual elite. Research in community colleges shares this burden and this opportunity.

In the complexities of community college experiences will be found all varieties of students, faculties, educational plants, educational offerings and community relationships. It would be mechanical and retrogressive to borrow the practices and procedures of older, established institutions as though we were undeveloped countries borrowing the techniques and technologies of the "advanced" societies, especially, if we pull them out of context and apply them without reference to the specific needs of our individual institutions.

Once again, higher education finds itself under attack, this time, as much from within our institutions as from without. Much of this questioning comes as a surprise to the custodians of our educational establishments. This lack of insight into change, this failure to recognize basic movements within our environment not only underscores the inadequacy of long-range educational planning but, what may be more important for our immediate purpose, the failure of institutional research.

Wherein have we failed? In our preoccupation with pressing and immediate problems, we have not turned upon ourselves the same critical insight we apply so generously to others. Educational institutions are just as much historically conditioned, shaped, nurtured, and directed as any other social grouping. What may actually distinguish educational responses from other institutional responses is lethargy. But even this may be changing, especially under the pressures of political examination and priorities. When the practices of an institution are indifferent to or fail to respond to or are unaware of the social forces encompassing it, these forces organize to "correct" the unwanted

or nonresponsive behavior.

The failure of the institution reveals the failure of research and, perhaps, indicates the political status of institutional research within the educational establishment. I suspect that the uses of institutional research are functions of the capacity and interests of the users of the generated data.

If research is to contribute insight into educational needs and behavior, it must be free, scientific, and basically concerned with the entire educational process within the institution. It cannot function as a handmaiden.

Student unrest is an effective, uncompromising teacher. Unmistakably, it focuses on crucial deficiencies in our educational processes and the social response of our institutions. The condition is not that students are forcibly intruding extra-institutional issues into academia but that students are reacting to the nonacademic political, governmental, social, and business intrusions which the academic community has found no difficulty in accepting. They seek to transform the nature of the institutional response. In so doing, they also seek to transform the nature of the institution and to establish new value systems.

Value systems are the key to understanding the tendencies and doctrines of change. Our custodians, our academicians, our evaluators (governmental and industry alike) have failed to identify the uneasiness within our institutions because they were locked into their value systems and their systems of rewards and advancement. Institutional research has also failed to provide insight or data because it, too, was locked into the same value systems and was unwilling or unable to range independently far from the administrative preserve. Self-criticism was either stifled or rationalized away by the exigencies of expediency. In a sense, institutional unrest may be, to an appreciable extent, the cost of the dependent character of research.

The thrust for change originated therefore in the criticism of sanctioned value systems. This criticism was itself generated by the social movements in our society and the impact of political and military requirements on the very lives and fortunes of the students. The validity of learning which did not seem to equip students for dealing with value systems under stress was increasingly called into question. Students began to protest the "failure" in the classroom, the loss or absence of quality in teaching, the lack of "relevance" in curriculum Excluded groups began to demand insistently an effective participation in the educational process. At the same time the institution of higher education was being recast. Decisive changes were occurring in every aspect of educational behavior: administration, faculty, student body, educational plant, purpose, governmental, business, and community relationships.

The community college is both a response and a contributing factor in these developments. If permitted, research can play a meaningful role in understanding, assessing, and making a creative response to this changing educational climate.

Research could start with a look at the community college as an institution. What is the community college? If the community college truly serves its community, there may be as many different kinds of community colleges as there are communities. What is a community? Who is the community? Are the businessmen the community? Are the students and their parents the community? Are the organized groups around the school the community? How should education

be served within the college? To increase the supply of labor for local industry? To advance the potentialities of students: their intellectual, social and cultural horizon? Are these two last goals compatible? These are some of the hard questions we have to face. We need hard empirical data on these issues and intensive studies of actual community college behavior. Among the major obvious changes in our educational environment has been the mass influx of students with widely divergent qualities and aims. The response to this demand has been the need to organize a mass of teachers recruited from widely divergent sources, with widely divergent capacities and outlooks. How have they been trained? How qualified are they to teach? How effective are they in the classroom? Have they presented a challenge to quality and standards? How do you evaluate teaching performance? Who should evaluate? Are we recruiting from the proper sources? Again, we need research and hard data.

In the last analysis, the key factor in educational life is what happens in the classroom. Do we really know what happens behind the closed doors? How do you evaluate the teaching process? How may we test the quality of instruction? How do you establish teacher accountability?

Let us look at our students. Can we say that the student today is the same student of ten years ago? Or twenty years ago? Or the pre-World War II student? What are the distinguishing characteristics of the current student body? In the community college which absorbs the marginal, the underachieving, and the disadvantaged student and which offers a wealth of alternative vocational and technical courses, difficult educational decisions are required. How do you meet the demands of a variegated student body? Then, there is the whole series of questions concerning the validity and relevance of admissions criteria. To what extent is articulation with the four-year college necessary? From the point of view of the more advanced institution, what is the effect on the quality and performance of the student body with the influx of the transfer student? What are proper measures of achievement?

In many ways, the quality of an institution can be tested by its graduates. This is a highly significant issue for the community college. What is the feedback from the graduates? How effective are they in their chosen areas? To what extent has the community college contributed to their development? Wherein has it failed?

The problem of dropouts is most crucial for the community college. On the basis of a priori reasoning and accepted dogmas of predictability of academic success, the rate of disaffection should be significantly higher among community college students than among students in other institutions of higher learning. What are the actual facts? To what extent does motivation play a role? In this connection, it is important to note that there is no viable alternative for a student who drops out. If this analysis is valid, do a greater proportion of the nonconforming students now remain in school? Has this had any effect on current student behavior? Have we any real insight of the effect of the draft on student behavior or academic achievement?

The student seeking upward social mobility faces a particularly poignant problem. What programs do we have to aid the student with gaps or deficiencies in his academic background? Do we go through motions or do we have objective, honest evaluations of our efforts? Do we build images or do we educate?

There is a great temptation in view of multiplying enrollments to regard students primarily quantitatively. The individuality of the student tends to get lost in the shuffle of the registration card. How effective is the institution in resisting the depersonalization of its student body? How effective are its counseling and tutorial services? How much interaction really occurs among the various segments of the educational community: its administrators, its faculty, its students? How successful is the integration of the various interests within the educational community? How do you measure the value of extracurricular activities. How effective is the mechanism for participation by students and faculty in decision making? These are a few questions that immediately spring to mind.

While the administration of an institution, obviously, sets the style and influence to a critical extent the nature of the institutional response, this leadership also reflects the pressures upon it and undergoes metamorphosis. Under today's conditions, the multiplicity of demands upon the educational leader's time and effort has moved education away from the center of his activity. He is so concerned with budgets, building plans, fund raising, public relations and organizational problems that we have now moved to the point where "serious" students of the subject are suggesting that emphasis on scholarship is necessarily limiting the pool of available college presidential timber.

These conditions must be kept in mind in assessing institutional priorities. For obvious reasons, money moves to the center of administrative attention. This leads to the easy inference that a sufficiency of funds guarantees the effectiveness of the educational process. Proper fund raising necessitates the creation and maintenance of the proper public image.

What would be revealed by analysis of the effective utilization of available funds is what is actually accomplished educationally? What is the value of established programs, of the usefulness and purposes of different aspects of institutional activity, of the overlapping of functions within the institution? If there were an objective management survey of educational institutions, would we find money to be the center of educational necessity? In short, how is administrative accountability measured? To whom and to what is administration finally accountable?

This is not to deny the vital need for adequate financial support for educational activities. It suggests that fund raising be translated in the most productive manner into educational contribution. This contribution also lends itself to research evaluation.

A few words may be in order on institutional research. As a subclass of social science research, it may fall into the same two categories Milton Friedman, building on John Neville Keynes, used in describing economic theorizing: positive and normative.

Positive research deals with "what is" and normative with "what ought to be." Friedman further cautions that the investigator in social science is part of the subject matter being investigated and, therefore, needs to be self-conscious in the use of his methodology. The problems are not presented by methodology. The function of research is to ask the right questions about the real world.

These observations are pertinent for institutional research. The great bulk of our research has been positive. It has been mainly concerned with the collection of factual evidence. This, we have been instructed, is the limit of our jurisdiction. It is not within our province to make decisions. Decisions are political acts and cannot be subsumed under the category of information gathering. But information gathering can be a subclass of political decision making; therefore, the tasks assigned to research may be found in the politics of research. All research has to do is sharpen and refine its techniques.

Here we face a dilemma. If we stick to our knitting and only amass accurate data, how do we know that our descriptive accuracy has analytical relevance? Are they identical? Do we not create confusion by this identity?

At this point, we must probe deeper. How do we achieve relevance in data (leaving aside, for the moment, the question of the derivation and collection of the data)? Only by vigorous experimental design. Design inherently assumes pattern and purpose. It purports to find answers to questions. If the questions are to be meaningful, they must refer to the real world.

We now find ourselves in the position where, if we are to ask intelligent questions so as to get accurate and relevant information, we must form judgment and theories concerning the actual environment in which we operate. We can also appreciate that technique without analysis is blind. If the design of our experiment is confused or irrelevant to the questions we are concerned with, all the sophistication of our technique will only yield a mass of finely honed non-essentials. We must also remember we are dealing with a real world. Our most sophisticated techniques require model-building abstractions and can only handle a limited number of relationships and variables. If we are not careful, we may find that the limitations of our techniques or our technology impose limits on our research and insight.

This discussion throws light on the taxonomical distinction between educational and institutional research. There is a difference of degree, of emphasis. Both refer to influences on the educational process within the institution. Activity within the classroom inevitably affects the vitality of the institution and vice versa.

Have we, as yet, overstepped the bounds of decision making? The design of the research and the data secured will inevitably influence any decisions arrived at that have some reference to reality. Obviously, research cannot influence decisions uninfluenced by facts that are reached by other considerations. Nor can research be privy, in all instances, to all considerations that may enter into decision forming.

What is inherent in good research is its intrinsic evaluative or normative implications. Evaluation seems to create subliminal hostility among those forces and institutions not interested in bringing meaningful analysis into public view.

Is evaluation necessary in research? It is not only necessary but inevitable. If the right questions are asked and the accurate, relevant data assembled, inferences will be made from the data. The designer of the experiment is in a key position to assess the validity of the data and relevance of the inference.

It is difficult to see how enlightened administration would want it otherwise and deliberately hobble the creative activity of institutional research. The creativity of this research could be a key element in solving the problems of stress within the educational institution.