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ABSTRACT

This study evaluated the extent to which 386 instructors in the North Carolina Community College System (NCCCS) use certain modes of knowledge utilization, and the effectiveness thereof as seen by the NCCCS instructors. It also examined differences in mode use and effectiveness among vocational, technical, and college transfer instructors as well as between six comprehensive community colleges and six technical institutes. A questionnaire containing 23 scale items was developed on the basis of interviews within the NCCCS and of a literature review on communication modes. Of the questionnaires sent, 336 (87%) were returned. Findings led to several conclusions: (1) modes should be stressed (especially textbooks, reference books, and consultations with coworkers) which instructors used most often and considered most effective; (2) use nonwritten rather than written modes, and external rather than internal modes, whenever practical; (3) since college transfer, technical, and vocational instructors use information sources to increasing degrees, respectively, diffusion efforts should be geared accordingly; (4) comprehensive and technical institutions require different approaches only in the case of college transfer instructors. Implications for further research were also noted. (LY)

MODES OF DIFFUSING KNOWLEDGE TO COMMUNITY COLLEGE FACULTY

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Problem Statement

Current literature on information utilization indicates that a wide gap exists between information produced and information utilized. According to Boylan (1968, p. 21), the juxtaposition of the two terms, production and utilization, signifies that the central issue is improvement of the relationship between the two domains. There are several reasons for this gap between production and utilization. First, the research system and the practice system function under language and communication patterns which are unique to themselves (Havelock, 1968, p. 64). Second, the research system often introduces its findings in a form which does not consider the unique organizational needs of the practice system. Third, the research system seldom provides any assistance in developing skills necessary for the utilization of their resources. Fourth, the practice system contributes to this situation by not attempting to initiate efforts to form linkages with research systems. Thus, it is within the general area of linkage between the two systems, research and practice, that efforts to improve knowledge utilization might be directed. The improvement of this relationship in the North Carolina Community College System (NCCCS) is the purpose to which this research is addressed.[1]

Any effort toward improving information utilization within a system must be initiated by a study of that system's present utilization procedures and practices. Specifically, this study was designed to answer the following questions:

1. To what extent are selected modes of knowledge utilization being used and how effective are they for NCCCS instructors?

2. Are there differences in mode use and effectiveness among (1) vocational, technical, and college transfer instructors, and between (2) comprehensive community college versus technical institute instructors?

Conceptual Framework

Information utilization ultimately relies upon the act of transferring knowledge from a sender to some receiver; therefore, the concept of communication assumes central importance in this study. Berlo (1963, p. 11) describes communication as a continuous process, with an intent to become an affecting agent---to affect others, our physical environment, and ourselves. Havelock (et. al. 1969, p. 11-4) have developed a model which illustrates the communication act.

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[1] NCCCS will be used throughout the paper to refer to the North Carolina Community College System.

Figure 1. Communication Act.

Resource System (Knowledge producer)	Message (Knowledge)	Channel (Modes)	User System (Practitioner)

Linkage is a closely related concept and may best be defined as the number, variety, and mutuality of resource system and practitioner contacts to include the degree of inter-relationships. It follows that the greater the linkages and the stronger these are, the more effective will be day-to-day contact and exchange of information, hence, the greater the mutual utilization of knowledge (Havelock et. al. 1969, p. 11-21). After an extensive review of the literature, Havelock and his associates found that linkage has relevance for each of the variables in the communications act (Figure 1) as follows: For resource systems to be effective in the diffusion process, they need to develop linkages with a variety of potential practitioners as well as with other resource systems. In addition, resource systems should have successful internal linkages within themselves and among their members. The practitioner systems need to develop reciprocal and collaborative relationships with a wide scope of resource systems. Similar relationships are required, for optimum utilization, among individual members and subunits of the practitioner system which allow innovators to be linked to followers. Linkage, in terms of the message or knowledge, refers to relevance and relatedness to the user and the user's need.

> A second meaning is internal linkage within the message or relatedness of one part of the message to another. A third meaning is relatedness to other messages that have been directed to the user in the past; the message which the user can mentally connect to past messages will stand a better chance of acceptance. Finally, a fourth meaning of message linkage is "linkage to a basis in scientific knowledge" (Havelock et. al., 1969 pp. 11-21).

For the channel or mode used to diffuse knowledge, linkage takes on relevance in that the mode should be linked to the resource and the practitioner system in the sense that it should be compatible with their experience and style. (Havelock et. al., 1969, pp. 11-23).

There are three models which expand the basic communication act and attempt to elaborate on points not brought out in the basic model. First, is the research, development, and diffusion model which explains the process as a rational sequence of events moving from development of knowledge to final consumption by the practitioner. This perspective involves several assumptions. Planning on a large scale is first such that the activities are coordinated, that there is a relationship between activities, and that they are in a logical sequence over an extended period of time. Second, there is a division of labor and a separation of roles and functions.

Third, it is assumed that there is a more or less clearly defined target audience who will accept the knowledge if it is delivered through the proper mode, in the right way, and at the right time. Fourth, this model accepts the fact of high initial development cost prior to any diffusion activity, for it foresees a high return in terms of efficiency, quality, and capacity to reach a mass audience (Havelock et. al., 1969, p. 11-5).

The social interaction model deals primarily with interpersonal relations as they relate to knowledge flow. Havelock (et. al. 1969) states that work by researchers on the social interaction model have shown that a complex and intricate set of human substructures and processes must be operative before diffusion may succeed. Thus, the social relations network takes on importance which is not always accounted for in the preceding and following models. The practitioner's position in the social relations network has been shown to be important and may well greatly influence a particular actor's inclination to react favorably to diffusion activities. Informal personal contact is also an important consideration in the social interaction model. For instance, opinion leaders, in diffusing their ideas, depend upon friendly personal contacts with other system members. He, in turn, depends largely on word-of-mouth communication with local innovators and outside experts in gaining his own knowledge. It follows, then, that the more associations and reference groups to which one belongs, the more innovative one should be. According to Havelock (et. al., 1969, pp. 11-9) "A society which allows large numbers of individuals to maintain large numbers of diverse and overlapping reference group identifications will be a very innovative society."

The third model is the problem solver model, and it assumes [illegible]

> .... process as stages of a cycle typically including the steps of (1) need sensing and articulation, (2) diagnosis and formulation of the need as a problem to be solved, (3) identification and search for resources relevant to the problem, (4) retrieval of potentially feasible solutions and solution-pertinent ideas, (5) translation of this retrieved knowledge into specific solutions or solution prototypes, (6) behavioral try-outs or application of the solution to the need.... (Havelock et. al., 1969, pp. 11-11).

Should the try-outs fail to satisfy the need, the process is repeated until an adequate solution is reached.

Havelock et. al. (1969, pp. 11-13-15) expound upon five major points concerning this model. First, the practitioner's need is the paramount consideration. Second, diagnosis is part of the process. Third, the outsider is a catalyst consultant or collaborator but the practitioner must find the solution himself or see it as his own. Fourth, internal resources should be fully utilized. Fifth, self-initiated change has the firmest motivational basis and the best prospects for long-term maintenance.

The above three models show that communication may be viewed from differing perspectives. Also, a variety of modes may be utilized in disseminating knowledge. These may include specialized and generalized modes such as magazines, bulletins, leaflets, radio program material, handbooks, lectures, or formal courses, to name a few. Research has determined that these modes are used at differing levels. The following section illustrates some of those findings.

Review of Research

Researchers such as Copp (1956), Wilkening (1952), Beal and Rogers (1960), and Rogers and Burdge (1961) report that differential communication mode use was found among groups which they studied. Rogers and Burdge (1961, pp. 13-14) for instance found that certain commodity groups use differing communication sources in that vegetable growers in Ohio have more direct contact with the resource system that do average farmers; and these growers are less likely to utilize general sources, such as the Extension Service or farm magazines, than the average farmer. Copp (1956, p. 12) also found that earlier adopters use information modes which require more effort to utilize and that the greater the extent respondents relied upon technical information sources, rather than local or mass media, the more innovative they tended to be.

A study in which the diffusion of specific knowledge was studied was conducted by Menzel and Katz (1955). This concerned the spread of a new drug used by the medical profession. In this research it was concluded that interpersonal relationships seemed to be the most important factor in the adoption of new drugs and that the degree of social relationships was directly related to the adoption rate. Of the modes influencing doctors to adopt, it was found that opinion leaders relied more heavily upon verbal modes of obtaining information than did other doctors. Yet, all doctors relied more upon written modes than verbal sources. The modes in order of importance were: mail and periodicals from drug houses, articles in journals, detail men, colleagues, meetings, and other channels (Menzel and Katz, 1955, pp. 342-43).

Of the three models of knowledge utilization presented earlier, the NCCCS does not exemplify either. The system seems to use aspects from each of these models. Knowledge may be obtained by faculty members directly from resource systems, from resource systems by way of state level consultants, or from members of their peer group. These methods, thus, are varied and do represent each of the perspectivies discussed.

Yet, knowledge utilization activities are personal phenomena in that diffusion depends upon individual efforts to attain knowledge. Further, various factors have been shown to be related to the individual's acceptance of information of use of available communication channels. Studies such as those of Menzel and Katz (1955) or Wilkening (1952) have shown situational as well as

sociological factors influence the individual's knowledge utilization patterns. Since situational factors may be associated with utilization behaviors, it is the purpose of this study to examine the relationship of two such situational variables to knowledge utilization among NCCCS faculty members. These two situational variables are the area of instruction and the type of institution. These variables are defined in a later section. If there are differences among the groups studied, then this would have implications for the NCCCS in that differing knowledge utilization procedures may be required.

Katz and Lazarsfeld (1955), studying communication about public affairs, found further evidence to the effect that opinion leaders and their followers utilize different sources of information. Their research showed that opinion leaders are likely to seek information from experts; whereas, followers tend to seek out people like themselves. Thus, the opinion leader has two roles with one being a follower of an expert and the other as an expert within his own peer group.

The research reported above shows that communication modes are used at varying degrees by the populations studied. However, these contribute little to revealing the knowledge utilization procedures and modes employed by the North Carolina Community College System, and the remainder of this paper emphasizes that system and its present utilization procedures.

Operational Definitions and Measurement of Variables

Knowledge or information refers to any material which has utility for the individual in his subject or content area of instruction. Modes are the channels by which knowledge travels. The modes as identified in this study may be dichotomized as written and non-written. Written modes are all those channels which deal with the written word, and non-written include all those which rely on some form of expression other than the written word. Non-written would encompass not only verbal channels but also visual which would include such modes as demonstrations, slide programs, and films. The modes were also dichotomized into internal and external modes and are differentiated such that internal modes are those in which the message source is located within the NCCCS and external modes have the source outside that system.

The dependent variables are mode use and mode effectiveness. Mode use refers to the relative use of alternative modes and mode effectiveness is the respondent's evaluation of the effectiveness of alternative modes in transferring knowledge from the sender to the receiver. Thus, with the above dichotomies there are a total of ten dependent variables which are mode use, written use, non-written use, internal use, external use, and the counterparts of these for effectiveness.

The independent variables are (a) position classification and (b) type of institution. Position classification refers to the respondent's instructional assignment and includes only individuals with full-time responsibility for instruction in educational programs. This variable includes three positions: college transfer, technical, and vocational. Type of institution refers to the comprehensive community college and technical institute dichotomy. These differ in that the community college offers courses which are transferable toward a baccalaureate degree.

Methodology

The sample population was comprised of 386 respondents randomly selected from six technical and 6 comprehensive institutions. The research instrument was developed by the researchers through a process of determining communication modes from related literature and through interviews conducted within the NCCCS. Modes selected included only those items which were considered major modes of knowledge transfer within the NCCCS.

The questionnaire was pre-tested in a unit not included in the sample population. Modifications to improve the questionnaire were made based upon the pre-test. The modes selected to be included in the final questionnaire included only twenty-three. The original instrument had forty-three modes and twenty of these were determined to be less than satisfactory items.

Data collection by mailed questionnaires was accomplished in April, 1970, by two mailing to the sample population. Of the 386 questionnaires mailed, 87 per cent or 336 were returned. Table 1 presents the distribution of the 336 respondents by response category and the means, and standard deviations on the 23 scale items. Hereafter, scale items are referred to by the symbols in the left column. For example, U1 refers to the first item on the use scale.

The modes presented in Table 1 are those dichotomized to yield the dependent variables discussed above. Modes U1, U2, U3, U9, U10, U12, U15, U16, U18, U20, and U23 were averaged to produce internal mode use. Modes U4, U5, U6, U7, U8, U11, U13, U14, U17, U19, U21, and U22 produced external mode use. U1, U6, U9, U11, U14, U18, U20, U21, and U22 made up the written mode use variable. Non-written mode use was comprised of U2, U3, U4, U5, U7, U8, U10, U12, U13, U15, U16, U17, U19, and U23. Total mode use was determined by averaging all modes. The effectiveness variables were determined by using the same items in the manner described above for use.

Statistical tools used for descriptive purposes included means, standard deviations, and frequencies. For testing hypotheses, F tests, T tests, correlations, and Newman-Keuls Studentized Range Statistic were employed.

Table 1. Distribution of 336 respondent reports, means, and standard deviations on 23 modes by use and effectiveness.

	MODES	Not At All 1	Little 2	Moder-ate 3	Great 4	Very Great 5	Mean	SD	N*
U1	Utilizing material obtained from	82	117	92	20	6	2.20	.96	317
E1	the curriculum lab.	87	78	109	35	6	2.34	1.05	315
U2	Attending area subject matter	40	82	129	61	12	2.75	1.01	324
E2	meetings.	40	64	103	94	23	2.98	1.12	324
U3	Participating in faculty and	32	79	131	66	22	2.89	1.05	330
E3	departmental meetings.	47	102	114	60	6	2.61	1.00	329
U4	Participating in credit course	79	59	97	62	24	2.65	1.25	321
E4	work offered by institutions of higher learning.	76	24	80	97	42	3.01	1.36	319
U5	Participating in meetings, con-	60	80	111	50	25	2.69	1.16	326
E5	ferences, or training programs conducted by organizations other than the Community College System.	57	50	89	88	40	3.01	1.27	324
U6	Utilizing professional, trade	4	31	157	109	34	3.41	.84	335
E6	and research journals.	5	32	135	112	50	3.51	.91	334
U7	Consulting with sales	47	136	101	34	8	2.44	.95	326
E7	representatives.	61	117	97	41	10	2.45	1.03	326
U8	Consulting with subject matter	55	94	106	58	14	2.63	1.09	327
E8	specialists who are not Community College employees	54	52	94	95	32	2.99	1.22	327
U9	Utilizing bulletins, pamphlets, or	89	148	69	18	3	2.07	.89	327
E9	regular publications furnished by the Community College System (other than the curriculum lab).	92	129	82	19	5	2.13	.94	327

(Table 1 cont'd.)

MODES	Not At All 1	Little 2	Moder-ate 3	Great 4	Very Great 5	Mean	SD	N*
U10 Consulting with the subject	141	82	61	29	3	1.95	1.05	316
E10 matter specialist associated with your subject in the Community College System	134	68	58	45	8	2.11	1.19	313
U11 Utilizing instructional materials	7	53	124	105	43	3.57	.97	332
E11 obtained from outside the Community College System (for example: work-books, lesson outlines, manuals).	7	41	106	123	54	3.53	.97	331
U12 Consulting with your supervisor	43	84	106	67	28	2.84	1.15	328
E12 or coordinator	48	81	93	70	36	2.89	1.21	328
U13 Consulting with advisory groups	86	79	99	48	15	2.46	1.16	327
E13 and individuals who use the services of this institution.	86	73	83	61	23	2.57	1.25	326
U14 Utilizing textbooks or	0	2	51	179	102	4.14	.68	334
E14 reference books.	0	2	49	182	101	4.14	.67	334
U15 Participating in teacher-training	85	84	87	53	20	2.51	1.20	329
E15 workshops or in-service training programs conducted by the Community College System (local, regional, or state).	87	58	89	65	30	2.67	1.30	329
U16 Consulting with co-workers.	13	29	116	118	53	3.50	1.01	329
E16	15	30	105	119	61	3.54	1.03	330
U17 Utilizing slide programs, films	24	75	137	55	39	3.03	1.07	330
E17 video tapes.	24	37	119	105	45	3.33	1.07	330
U18 Utilizing curriculum material	140	122	53	7	1	1.77	.82	323
E18 prepared in other Community System institutions.	138	101	67	12	3	1.87	.93	321

(Table 1 cont'd.)

MODES			Not At All 1	Little 2	Moder-ate 3	Great 4	Very Great 5	Mean	SD	N*
U19 E19	Consulting with relevant organizations in carrying out educational programs (for example: the N.C. Employment Security Commission).		51 54	111 81	116 120	36 54	8 13	2.49 2.66	.97 1.06	322 322
U20 E20	Utilizing information prepared by co-workers within your institution.		51 54	111 81	116 120	36 54	8 13	2.49 2.66	.97 1.06	322 322
U21 E21	Utilizing material obtained from information storage and retrieval organizations (such as Educational Resources Information Center--ERIC).		181 176	92 75	33 43	7 16	2 5	1.58 1.72	.82 .98	315 315
U22 E22	Utilizing literature obtained from research and development centers.		93 93	122 84	78 94	25 41	3 11	2.13 2.36	.96 1.12	321 323
U23 E23	Drawing upon your personal experiences and observations.		0 0	6 4	98 92	156 159	73 79	3.88 3.93	.75 .74	333 334
Totals	Use	7491 100%	1520 20%	1862 25%	2193 29%	1377 19%	539 7%	2.67	.52	336
	Effectiveness	7477 100%	1544 21%	1460 19%	2068 28%	1715 23%	690 9%	2.81	.56	336

*Non-responses to some modes resulted in unequal N.

Results

Testing of the null hypotheses resulted in the following:

Hypothesis 1: There is no difference in the degree at which the identified modes are used. It was found in testing this hypothesis by Newman-Keuls Multiple Range Tests that the identified modes were used at differing degrees such that their rank order of use was:

14. Utilizing textbooks or reference books.
23. Drawing upon your personal experiences and observations.
16. Consulting with co-workers.
6. Utilizing professional trade and research journals.
11. Utilizing instructional materials obtained from outside the Community College System (for example: workbooks, lesson outlines, manuals).
17. Utilizing slide programs, films, or video tapes.
3. Participating in faculty and departmental meetings.
12. Consulting with your supervisor or coordinator.
2. Attending area subject matter meetings.
4. Participating in credit course work offered by institutions of higher learning.
5. Participating in meetings, conferences, or training programs conducted by organizations other than the Community College System.
8. Consulting with subject matter specialists who are not Community College Employees.
15. Participating in teacher-training workshops or in-service training programs conducted by the Community College System (local, regional, or state).
20. Utilizing information prepared by co-workers within your institution.
13. Consulting with advisory groups and individuals who use the services of this institution.
7. Consulting with sales representatives.
1. Utilizing literature obtained from the curriculum lab.
22. Utilizing literature obtained from research and development centers.
9. Utilizing bulletins, pamphlets, or regular publications furnished by the Community College System (other than the curriculum lab).
10. Consulting with the subject matter specialist associated with your subject in the Community College System.
18. Utilizing curriculum material prepared in other Community College System institutions.
19. Consulting with relevant organizations in carrying out educational programs (for example: the N. C. Employment Security Commission).
21. Utilizing material obtained from information storage and retrieval organizations (such as Educational Resources Information Center--ERIC).

Table 2 illustrates the procedure used testing this hypothesis.

Table 2. Newman-Keuls Multiple Range Test on Use of Selected Modes

	X	1.599 U21	1.684 U19	1.760 U18	1.955 U10	2.041 U9	2.123 U22	2.214 U1	2.432 U7	2.447 U13	2.485 U20	2.492 U15	2 [illegible]21 U8	2.656 U5	2.659 U4	2.757 U2	2.854 U12
U21	1.599	.085	.161	.356													
U19	1.684		.076	.276													
U18	1.760			.195													
U10	1.955				.086	.168	.259										
U9	2.041					.082	.173	.391									
U22	2.123						.091	.309									
U1	2.214							.218									
U7	2.432									.015	.053	.060	.189	.224			
U13	2.447										.038	.045	.174	.209	.212	.310	
U20	2.485											.007	.136	.171	.174	.272	
U15	2.492												.129	.164	.167	.265	
U8	2.621													.035	.038	.136	.233

(continued)

Shortest Significant Range

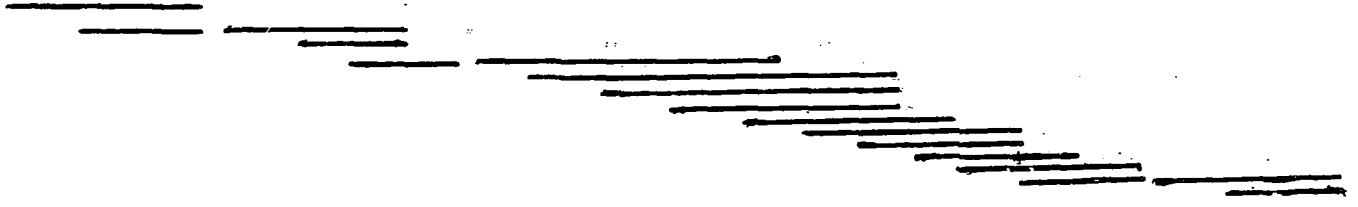
$R_2 = .152$
$R_3 = .182$
$R_4 = .199$
$R_5 = .212$
$R_6 = .221$

Table 2 (continued)

	X	U4 2.659	U2 2.757	U12 2.854	U3 2.889	U17 3.025	U11 3.395	U6 3.425	U16 3.526	U23 3.917	U14 4.170
U5	2.656	.003	.101	.198	.233						
U4	2.659		.098	.195							
U2	2.757			.097	.132	.268					
U12	2.854				.035	.171	.540				
U3	2.889					.136	.505				
U17	3.025						.369				
U11	3.394							.031	.132	.523	
U6	3.425								.101	.492	
U16	3.526									.391	
U23	3.917										.253

n = 317, Significance Level = .05[1]

U21 U19 U18 U10 U9 U22 U1 U7 U13 U20 U15 U8 U5 U4 U2 U12 U3 U17 U11 U6 U16 U22 U14



[1] Studentized Range Statistic from Table B.4, Winer, 1962.

Hypothesis 2: There is no difference in the effectiveness attributed the identified modes. The Newman-Keuls Multiple Range Test was used in testing hypothesis 2, and it was found that respondents attributed significantly different effectiveness to the modes. Their rank order of effectiveness was:

14. Utilizing textbooks or reference books.
23. Drawing upon your personal experiences and observations.
16. Consulting with co-workers.
11. Utilizing instructional materials obtained from outside the Community College System (for example: workbooks, lesson outlines, manuals).
6. Utilizing professional trade and research journals.
17. Utilizing slide programs, films, or video tapes.
4. Participating in credit course work offered by institutions of higher learning.
5. Participating in meetings, conferences, or training programs conducted by organizations other than the Community College System.
8. Consulting with subject matter specialists who are not Community College employees.
2. Attending area subject matter meetings.
12. Consulting with your supervisor or coordinator.
15. Participating in teacher-training workshops or in-service training programs conducted by the Community College System (local, regional or state).
20. Utilizing information prepared by co-workers within your institution.
3. Participating in faculty and departmental meetings.
13. Consulting with advisory groups and individuals who use the services of this institution.
7. Consulting with sales representatives.
1. Utilizing material obtained from the curriculum lab.
22. Utilizing literature obtained from research and development centers.
10. Consulting with the subject matter specialist.
9. Utilizing bulletins, pamphlets, or regular publications furnished by the Community College System (other than the curriculum lab).
8. Consulting with subject matter specialist who are not Community College employees.
19. Consulting with relevant organizations in carrying out educational programs (for example: The North Carolina Employment Security Commission).
21. Utilizing material obtained from information storage and retrieval organizations (such as Educational Resources Information Center--ERIC).

Hypothesis 3: There is no relationship between use of and effectiveness attributed the identified modes. This hypothesis was rejected and the data indicated that there was a close relationship, as shown by correlation values, between use of the modes and effectiveness attributed them.

Table 3. Analysis of Variance of External Mode use Scores of College Transfer, Technical, and Vocational Instructors

Source of Variation	df	ss	MS	F	P
Between	2	9.33	4.66		
Within	333	92.44	.27	16.8	.05
Total					

F .05 = 3.02

Table 4. Newman-Keuls Multiple Range Test of External Mode Use Scores of College Transfer, Technical, and Vocational Instructors.

		College Transfer	Technical	Vocational	Shortest Significant Range
	Means	2.54	2.66	2.95	
College Transfer	2.54		.12	.41	R_2 = .08
Technical	2.66			.29	R_3 = .09

Hypothesis 4: There is no difference in degree of use between (a) written and non-written and between (b) internal and external modes. Both comparisons by use of t tests illustrated differences in mode use such that non-written was used more than written and external was used more than internal modes.

Hypothesis 5: There is no difference in effectiveness attributed the modes between (a) written and non-written and between (b) internal and external modes. These two comparisons by t tests indicated that non-written was more effective than written and external was more effective than internal modes.

Hypothesis 6: There is no difference among vocational, technical, and college transfer instructors in the use of modes, (a) total, (b) written, (c) non-written, (d) internal, and (e) external. The data indicated that for each of the five comparisons --total, written, non-written, internal, and external mode use-- that significant differences existed among vocational, technical, and college transfer instructors as shown by analysis of variance. Examination of these differences by Newman-Keuls Multiple Range Tests illustrated that for each type mode use the vocational instructors reported the highest use with technical instructors being second and college transfer having the lowest use scores. Tables 3 and 4 illustrate the statistical testing of these hypothesis.

Hypothesis 7: There is no difference among vocational, technical, and college transfer instructors in effectiveness attributed the modes (a) total, (b) written, (c) non-written, (d) internal, and (e) external. This hypothesis was rejected and for all mode types rated for effectiveness, the vocational instructors rated them highest, with technical being second and college transfer last. Here, as in Hypothesis 6, analysis of variance and Newman-Keuls Multiple Range were employed.

Hypothesis 8: There is no difference between comprehensive and technical institute instructors in the use of modes (a) total, (b) written, (c) non-written, (d) internal, and (e) external. Results of testing this hypothesis by use of t tests yielded the following results: Comprehensive and technical institute instructors differ on total, internal, and non-written mode use with technical institute instructors using these three to a greater degree than comprehensive unit instructors; however, no differences exist in the use of external and written modes.

Hypothesis 9: There is no difference between comprehensive and technical institute instructors in effectiveness attributed the modes (a) total, (b) written, (c) non-written, (d) internal, and (e) external. Testing of this hypothesis by t tests indicated that significantly different effectiveness ratings were attributed total, non-written, internal, and external modes by technical and comprehensive institute instructors such that technical institute instructors rated all four higher than did the comprehensive unit instructors. No difference in the rating of written modes was obtained.

Hypothesis 10: There is no difference between comprehensive and technical institute instructors in the use of modes (a) total, (b) written, (c) non-written, (d) internal, and (e) external, when college transfer instructors are controlled. In testing this hypothesis, college transfer instructors were removed from the analysis. With these instructors removed, no significant differences existed between comprehensive and technical institute instructors such that total, written, non-written, internal, and external modes were used to the same degree by both type institutions as determined by t tests.

Hypothesis 11: There is no difference between comprehensive and technical institute instructors in effectiveness attributed the modes, (a) total, (b) written, (c) non-written, (d) internal, and (e) external, when college transfer instructors are controlled. This hypothesis was tested in the same manner as Hypothesis 10 and similar results were obtained. With college transfer instructors removed from the analysis no significant differences were illustrated between comprehensive and technical institute instructors in effectiveness attributed total, written, non-written, internal, and external modes.

Discussion

It would seem, from the above empirical results, that use and effectiveness among the selected modes vary significantly. Additionally, the dichotomies illustrated significant differences in use and effectiveness by the independent variables.

Recognizing these differences, it appears that the NCCCS should incorporate those modes into its knowledge diffusion activities which were shown to be most used and effective by the faculty.

Should the system elect to retain its present dissemination procedures, the following general implications need to be considered:

1. Utilize for dissemination purposes those selected modes which were shown to be most used and attributed most effectiveness by instructors, such as textbooks or reference books or consultations with co-workers.

2. Utilize non-written modes in preference to written modes when practical.

3. Utilize external modes in preference to internal modes when practical.

4. Realize that college transfer, technical, and vocational instructors use the modes at increasing degrees respectively; and expend increasing efforts as required when executing a knowledge diffusion program on vocational, technical, and college transfer instructors.

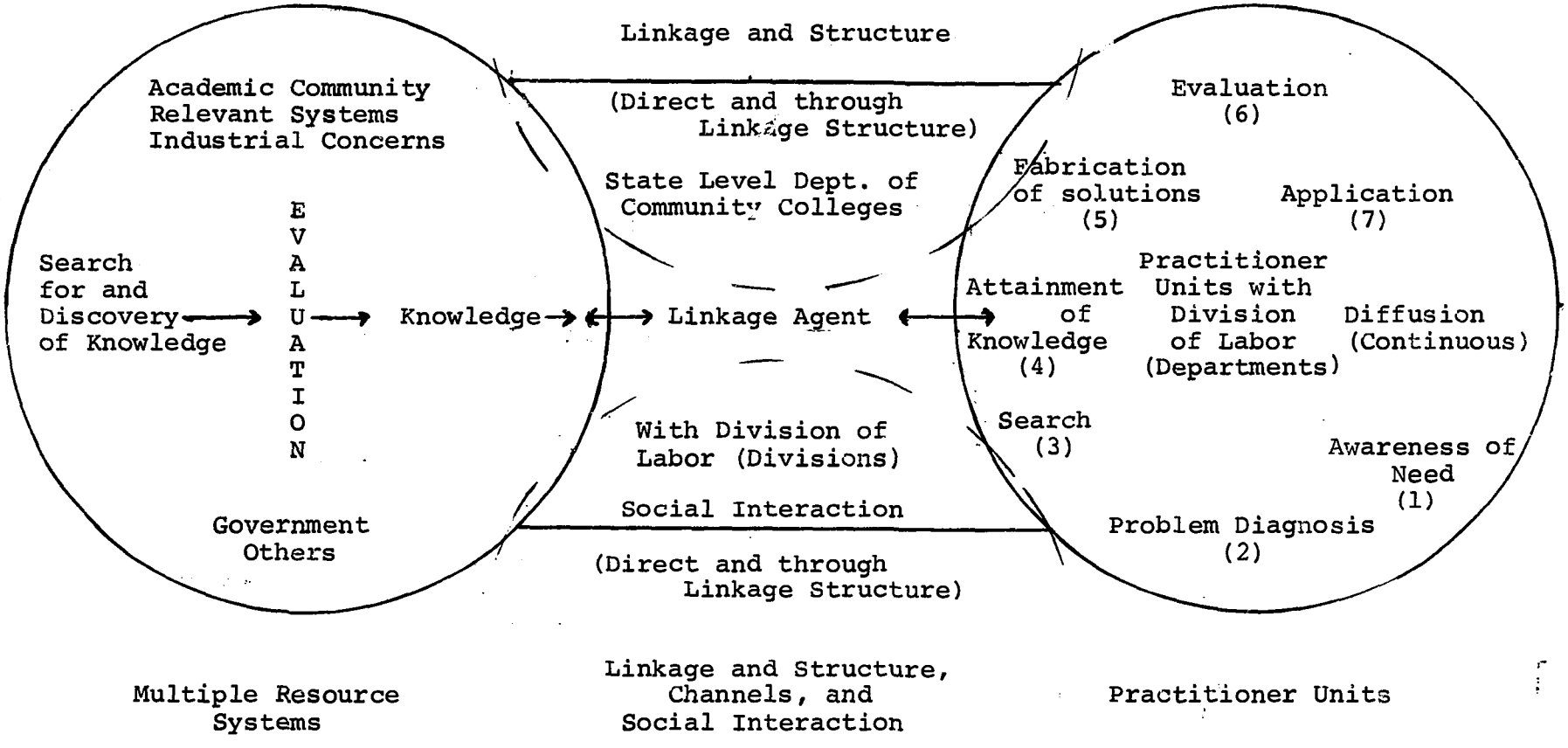
5. Differentiate between comprehensive and technical institutions in knowledge diffusion efforts only to the extent of providing communication methods for college transfer instructors.

However, should the system elect to restructure its dissemination activities in order to better provide its faculty information required to educate the clientele being served, both the above implications and the models of knowledge diffusion presented earlier need to be considered. Through a synthesis of these three models as applied to the NCCCS the model in Figure 2 was developed. The linkage agent located between the resource system and the practitioners unit could serve an important function.

This linker could operate much as do specialists within the Agricultural Extension Service. These specialists act as resource persons for practitioners and disseminate information to them. Additionally, these persons are housed at the resource center and have some responsibility for applied research. Ideally, linkers competent within the several subject matter areas dealt with by the Community College System would be needed. These linkers could operate directly from a resource center, possibly the North Carolina University System, and deal with practitioners in assisting with their information needs.

To illustrate how this might operate, within the technical area of drafting, a Community College System linker could be housed on one of the University campuses in an engineering school. From this location the linker would have immediate access to the University's resources, and he in turn could make these available to practitioners in the Community College System units. The same situation could be created for the Community College linker in the academic area of English. This linker could be housed on a University campus in its English department. Both these linkers would have the benefit of greater resources than are presently available within the Community College System. From such a position the linker would be able to develop competencies in his area of assignment and disseminate information to those practitioners working in the subject field. Thus, the linker should be considered a resource person, and his role would be to remain aware of available resources and to instigate activity on the part of practitioners in making use of resources brought to their attention. In reality he would be a problem solver for the practitioner unit. Figure 2 presents the recommended knowledge diffusion system. The major points of this system are contained in the three perspectives discussed earlier--Research, Development, and Diffusion, Problem Solver, and Social Interaction Perspective. First of all, knowledge is developed and placed into a usable form by the resource system; this knowledge is transferred to the practitioner unit either through the linkage and structure provided by the State Department of Community Colleges or through other linkage and structure mechanisms. This transfer also relies greatly upon social interaction between individuals in the systems concerned. The knowledge is utilized by the practitioner unit in the problem solver process, and it is also diffused to additional members in the unit.

Figure 2. Knowledge Diffusion System for the Community College System.



Implications for Further Research

This study has examined empirically only one aspect of the complex knowledge diffusion problem. Within this aspect only two independent variables were examined, position classification and type of institution.

Additionally, the dependent variables were examined in only two dimensions, mode use and effectiveness. A third dimension which should be considered in any additional study should be that of mode availability. The duplication of this study with the added dimension of mode availability could possibly produce results different from those reported above.

There are many variables which could be examined in relation to mode use; for example, what are the sociological and psychological characteristics of individuals utilizing the modes at differing levels? Do instructors who use the modes at a high degree present more informative lectures than those who use the modes little?

Additional questions which need answering are these: Why do these differences in mode use exist among the three types of instructors? Does a higher level of mode use mean that more knowledge is being imparted to those using the modes most?

Similar studies conducted with administrative personnel in practitioner units and personnel at the State Department would reveal insights into the knowledge utilization patterns of these personnel. Conducting this type of study in similar organizations would be beneficial to the study of knowledge utilization.

Additional study is also needed to answer questions implied by the recommendations. Among these questions are: Is a linker required for the Community College System? Are practitioners obtaining sufficient information from presently available sources such that no linker is needed? If a linker is needed, where should he be located. What should be the role of the linker?

These and other questions need answering in order to develop a full understanding of the knowledge utilization process. Only through concerted efforts to examine the field may the vast store of knowledge available for use be conveyed to those individuals who may put existing knowledge into practice.

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