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ABSTRACT

Results of four studies in which the semantic differential was used to evaluate teaching effectiveness of professors at the university level are presented. Conclusions based on comparisons between factors isolated in the four studies, as well as between these four studies and other data, are as follows: (1) some factors such as teaching dynamism, acceptance-change and action freedom appear over time and with different populations; (2) the proportion of variance accounted for by each of these factors varies between populations studied and from one factor analysis to another; and (3) the semantic differential seems to be an especially useful technique for quantifying emergent variables associated with student perceptions of teaching effectiveness and effective professors. Tables present the study data. (DB)

Measuring Dimensions of Teaching Effectiveness with the Semantic Differential

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The semantic differential has been used, more or less extensively, to evaluate teaching effectiveness and images of the professor at the university level. Various components and explanations have been related to these evaluations.

Most of the studies referred to below are quantitative and subsequent to the work of Knapp (1962) who suggested that to a large extent, images of the professor blended fantasy, stereotypes and cognitive elements. Several other studies have confirmed these findings (Nunnally, 1963; Gibb, 1955), and some have suggested explanations for them. Thistlethwaite (1960) presents evidence to indicate that students' motivation to pursue advanced training is associated with the view that the instructor is a person who encourages achievement and affiliative tendencies. Rezler (1965) suggests that needs are very important in producing and shaping these perceptions. Several factor analytic studies report a large amount of variance associated with the first factor extracted (Bendig, 1954; Husek and Wittrock, 1962; Gulo, 1966); whereas others report a tendency of the items to break up into a number of small factors rather than to form a few large ones (Nunnally,1963). Husek and Wittrock (1962) report considerable variance associated with the first factor accompanied by the formation of additional factors with very small and probably unreliable variances.

The amount of variance accounted for varies in different studies. Some account for the large proportion of the response variance (Bendig, 1954; Isaacson, 1964) and others a correspondingly small proportion (Husek and Wittrock, 1962). This pattern will also be evident in two of the four studies which are reported in this paper.

Two additional factors which contribute to the complexity of research in this area should be mentioned. First, there is considerable redundancy in the literature due to the large number of scales utilized and the evaluation of similar dimensions in lieu of a search for new dimensions. However, it appears that this obstacle is gradually being overcome (Isaacson, 1964; Nunnally et al, 1963). Second, interactional effects have not been sufficiently taken into account.

The present paper pulls together the results of four studies to create a background for perspective in this area. These studies were carried out by the author over the past several years. The earliest of these was carried out eight years ago and the most recent three months ago. Two of these studies were carried out at a rural New England state university, and two were carried out at large university in the metropolitan Boston area. One of the studies used the concept Professor, two used the concept The Effective Professor, and one used the concept the Ideal Professor.

The results of these four studies are presented chronologically from earliest to most recent, and are referred to as studies, I, II, III, and IV.

Study I was carried out in 1964 at a state university in northern New England. 676 Sophmores taking a course in general psychology rated the concept "Professor". Factor analysis of the data and subsequent varimax rotation produced eight factors which accounted for 55% of the common variance. The factors appear in Table 1 along with the amount of variance accounted for by each.

Table 1 about here

The eight factors in study I account for 55% of the common variance. Factor I accounts for 22% of this variance and is the dominant factor in this

study. This is attested to by the fact that each of the remaining seven factors accounts for 7% or less of the variance. Factor I has been labelled a teaching dynamism factor. The large amount of variance accounted for by it, the number of scales with high loadings, and the appearance of this factor in other studies, attest to the importance of this dimension in students' perceptions of the professor image. The size of this factor and its relation to the other factors in this study confirm earlier findings that the amount of variance associated with the first factor tends to be large (Bendig, 1954) and tends to be broken up into a number of small factors (Husek and Wittrock, 1962). This factor appears to persist over time and across campuses, unlike other sporadically reported factors.

The amount of variance is accounted for by Factors II through VIII is small. They represent considerable fragmentation, although taken together they account for 32.92% of the variance. The existence of at least the last two may be questioned. These factors were labelled acceptance-change, action freedom, intellectual approach, intellective adjustment, intellectual skepticism, opportuness-approriateness, and ego involvement.

Several points are worth making about this study and its relation to other studies.

First, the study attests to the multidimensionality of the professor image. Second, it attests to the persistence and importance of the perception of dynamism in evaluating the professorial image. Third, it confirms previous findings which have referred to the tendency of one factor to be considerably larger than others as well as to previous findings which report the tendency toward fragmentation of subsequent factors extracted.

Study II was carried out in 1967 at a state university in northern New England. 386 Juniors rated the concept "the Ideal Professor". Ss were two groups of psychology majors, a group of chemistry majors, and two groups of sociology majors, making five groups in all. Data from each group was factor analyzed

separately and subsequently subjected to varimax rotation. This produced five separate factor analyses. The number of factors and the amount of variance associated with each appears in Table 2.

Table 2 about here

Unlike Study I, this study carried out three years later at the same university, using a slightly modified concept, produced between eleven and twelve factors. Table 2 reveals several interesting points.

First, all of the five factor analyses produced a large number of factors, unlike Study I or some of the studies referred to. This is in part attributable to the use of the concept "ideal professor" and in part attributable to the fact that all Ss were from the same university and tested within a one week period. It is surprising to find however such a large number of factors with what appear to be characteristics related to Ss majors.

Second, the data in Table 2 appear to confirm both the tendency for a large amount of variance to be associated with one factor, and an opposite tendency, for the existence of several large factors each accounting for a sizeable portion of the variance.

Third, unlike Study I or some of the research referred to, all of those analyses account for more than 63% of the variance. One of the analyses accounts for 93% of the variance, and interestingly enough, it is the one which does not have one factor accounting for a preponderant amount of variance. In fact, the first four factors in Column A are about equal in size and yet they barely account for half of the variance. This may be attributable to the fact that these were psychology majors as has been suggested. This is certainly worthy of further scrutiny.

Fourth, the existence of many of these factors can be questioned.

Fifth, the multidimensionality of the idea professor concept comes through clearly enough, but the differences in the amount of variance accounted for by the first four factors suggests that more attention can be given to Ss' college major as a determinant or component in their perceptions of ideal professors.

Study III was carried out in 1969 at an urban university. 548 Ss were a random sample representing an undergraduate population of 10,000 students. They rated the concept the Effective Professor. Factor analysis of the data and subsequent varimax rotation produced five factors which accounted for 54% of the variance. The factors appear in Table 3 along with the amount of variance accounted for by each.

Table 3 about here

The remarkable similarity in factor structures between study I and study III is apparent from an examination of the scales comprising Factors I, II and III of both studies, and to a lesser degree those comprising Factors IV and V.

The first five scales in Factor I of study III have factor loadings ranging from .77 to .84 and they are among the first six scales in Factor I of study I. This is the teaching dynamism factor reappearing in study III. On the strength of the similarity of the scales and the corresponding high factor loadings it is apparent that this dynamism factor is quite stable. This is the principle factor to emerge in both studies, accounting for 22% of the variance of Factor I, study III.

The first three scales in Factor II of studies I and III are similar. They differ slightly in the amount of variance accounted for, but the stability of the factor is striking. In study I this factor was labelled Acceptance-Change.

The same situation obtains with Factor III as with Factor II. The first three scales in both studies are similar, the amount of variance accounted for is slightly variable, but the factor is quite stable. This was labelled Action-Freedom in study I. In this case as in several of the other factors, considering that we are dealing with distinctly different samples separated by five years time, it is quite remarkable how stable some of these factors are.

Factors IV and V in study III show this same pattern of consistency, although there is a difference. The small amount of variance accounted for by these factors makes their existence and independence a moot point. What is interesting and impressive is that the scales defining two separate factors in study I (i.e., intellectual adjustment and intellectual approach) all combine in Factor IV. There is some consistency and persistence here over time.

Viewing study III as a whole, several points are worth making. First, using the concept "the effective professor" with a random urban sample, four of the five factors obtained in study I emerged five years later in study III.

Second, the use of a truly randomized sample contributed nothing to this study, except that it presented the views of students at a large urban university. Since essentially the same results were obtained in another university with a non-randomized, but large sample, the researcher can rest content that with an adequately large N and the utilization of appropriate techniques, the emergence of certain attitudes can be expected.

Study IV, the most recent, was carried out in 1971 at an urban university. 268 Ss enrolled in a videotaped course in human development rated the concept "The Effective Professor". Factor Analysis of the data and subsequent varimax rotation produced 6 factors which accounted for 54% of the common variance. The factors appear in table 4 along with the amount of variance accounted for by each.

Table 4 about here

It is safe to assume the existence of all of these factors, with the possible exception of Factor V whose scales account for 5% of the variance. Only scales with loadings of .300 or higher are reported in this study.

Factor I, the strongest factor to emerge in this study, is composed of twelve scales which account for 16% of the variance. Examination of the scales reveals the strong evaluative dimension of this factor. Interestingly enough, however, embedded in this evaluation are scales indicative of teaching dynamism, such as Passive-Active, Regressive-Progressive, Colorful-Colorless, Painful-Pleasurable, and Boring-Interesting. This is similar to other reported studies in which dynamism and general evaluation combine as a single factor. Since evaluation is more prevalent, and since dynamism sometimes emerges as a separate factor and sometimes as a part of evaluation, and since there is strong evidence for the existence of this dynamism factor, greater attention should be given to this distinction and the relationship of each, i.e., evaluation and dynamism, to effectiveness.

Factor II accounts for 8% of the variance and is composed of five scales, the strongest three of which define Factor III in study I. This was called Action-Freedom in study I.

Factor III accounts for 5% of the variance. It is made up of five scales. The first two, rational-intuitive and stable-changeable, also appear as the strongest two defining Factor V in Study I. In study I this factor was called Intellective Adjustment. The last three scales appear among the first four defining Factor IV in study I. In study I this was called Intellectual approach. The evidence from study I suggests we are dealing with two distinct, but related (in the sense that there is an intellectual component in each) factors, whereas

study IV has collapsed these two factors into one. This seems to suggest a relationship, possibly like that between evaluation and dynamism. Perhaps the use of additional scales and/or more studies will clarify the relationship between the components of Factor III in this study.

Factor IV is perplexing because it accounts for a sizeable 11% of the variance and half of its scales appear in Factor I of this study, which was the overlapping general evaluation-teaching dynamism factor. These same four scales appear in study I, Factor I, the teaching dynamism factor. These facts taken in conjunction with the four factors in study II suggest a need for greater refinement in our evaluation of effectiveness, because at different times and with different populations we may be tapping evaluation of one or more of the components of teacher dynamism.

Factor V composed of two scales with substantial loadings but accounts for 5% of the variance is difficult to relate to the other factors in this or the other three studies.

Factor VI accounts for 6% of the variance and reflects an emotional component in the students' rating of the effective professor.

Viewing this study IV as a whole, several points seem worth making:

First, the amount of variance accounted for is similar to study I, but is low in terms of study II.

Second, two factors with 12 and 17% of the variance emerged, both of which are related to dynamism, in contrast with study I in which only one strong factor associated with dynamism emerged.

Third, similarities in extracted factors, albeit in diluted form, are apparent in this and the preceding three studies.

In conclusion, several points may be made, on the basis of comparisons between factors isolated in four studies, as well as between these four studies and other data.

First, some factors such as teaching dynamism, acceptance-change and action freedom appear over time and with different populations.

Second, the proportion of variance accounted for by each of these factors varies between populations studied and from one factor analysis to another.

Third, the semantic differential seems to be an especially useful technique for quantifying emergent variables associated with student perceptions of teaching effectiveness and effective professors.

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Table 1. Factors and Factor Loadings of the Eight Factors Comprising Concept 1 (Professor)

Factor I		Factor II		Factor III		Factor IV	
Teaching Dynamism		Acceptance Change		Action Freedom		Intellectual Approach	
Boring		Positive		Eccentric		Objective	
Interesting	74	Negative	-67	Conventional	71	Subjective	-69
Colorless		Approving		Liberal		Defensive	
Colorful	73	Disapproving	-65	Conservative	65	Aggresive	56
Regressive		Optimistic		Free		Direct	
Progressive	62	Pessimistic	-59	Constrained	41	Circuitous	-39
Passive		Sensitive		Painful		Motivated	
Active	61	Insensitive	-40	Pleasurable	32	Aimless	-33
Fair		Motivated		Approving		Sensitive	
Unfair	54	Aimless	-33	Disapproving	-20	Insensitive	28
Painful		Serious				Covert	
Pleasurable	53	Humorous	-30			Overt	27
Reasonable						Serious	
Unreasonable	-51					Humorous	
						Regressive	
						Progressive	24

Table 1 (Continued). Factors and Factor Loadings of the Eight Factors Comprising Concept 1 (Professor)

Factor V		Factor VI		Factor VII		Factor VIII	
Intellective Adjustment		Intellectual Skepticism		Opportuneness Appropriateness		Ego Involvement	
Stable		Skeptical		Untimely		Egotistic	
Changeable	60	Believing	76	Timely	64	Altruistic	83
Rational		Free		Covert		Rational	
Intuitive	60	Constrained	-43	Overt	-50	Intuitive	-27
Excitable		Rational		Serious		Positive	
Calm	-55	Intuitive	34	Humorous	-32	Negative	-23
Fair		Excitable		Stable		Serious	
Unfair	-46	Calm	27	Changeable	-27	Humorous	23
Contented		Contented		Contented			
Discontented	45	Discontented	-23	Discontented	-23		
Reasonable				Excitable			
Unreasonable	40			Calm	-23		

Concept	Amount of Variance Accounted for by Each Factor								
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Total
Professor									
% Variance	21.65	6.65	5.23	4.79	4.38	4.15	3.95	3.77	54.57

Table 2. -- Percentage of Variance Associated with Each of the Factors (the Ideal Professor)

Factor	Professor				
	Psychology		Chemistry	Sociology	
	A	B	C	D	E
1	15.26%	13.59%	23.22%	15.61%	18.56%
2	12.84	7.84	11.66	8.34	10.07
3	12.02	6.84	8.14	6.03	7.91
4	10.25	6.05	7.46	5.35	7.23
5	8.35	5.04	6.68	4.67	6.24
6	7.73	4.25	4.81	4.33	5.26
7	5.52	4.12	4.28	4.21	4.87
8	5.15	3.99	4.09	3.97	4.12
9	4.75	3.50	4.03	3.74	3.89
10	4.26	3.28	3.39	3.48	3.68
11	3.94	3.10	3.13	3.39	3.44
12	3.10	2.88			3.18
	93.17%	64.48%	80.89%	63.12%	78.45%

Table 3. --- Factors and Factor Leadings of the Five Factors Comprising the Concept (The Effective Professor)

FACTOR I		FACTOR II		FACTOR III		FACTOR IV		FACTOR V	
Passive Active	-.84	Optimistic Pessimistic	-.77	Liberal Conservative	-.70	Rational Intuitive	.76	Fair Unfair	-.84
Painful Pleasurable	-.81	Positive Negative	-.72	Free Constrained	-.63	Stable Changeable	.59	Reasonable Unreasonable	-.78
Regressive Progressive	-.80	Approving Disapproving	-.72	Eccentric Conventional	-.55	Objective Subjective	.53		
Colorless Colorful	-.79	Contented Discontented	-.60	Sensitive Insensitive	-.54	Direct Circuitous	.52		
Boring Interesting	-.77			Skeptical Believing	-.52				
Defensive Aggresive	-.69			Motivated Aimless	-.47				
Covert Overt	-.58			Excitable Calm	-.44				
Serious Humorous	-.53								
Excitable Calm	-.44								

Amount of Variance Accounted for by Each Factor

FACTOR I	FACTOR II	FACTOR III	FACTOR IV	FACTOR V	TOTAL
20.00%	10.73%	10.76%	7.46%	6.56%	55.5%

Table 4 -- Factors and Factor Leadings of the Six Factors Comprising the Concept (The Effective Professor)

FACTOR I		FACTOR II		FACTOR III		FACTOR IV		FACTOR V		FACTOR VI	
Approving	-73	Liberal	69	Rational	-72	Boring	-66	Skeptical	-76	Excitable	78
Positive	-70	Free	69	Stable	-67	Fair	64	Covert	-56	Contented	-52
Passive	65	Eccentric	54	Objective	-35	Reasonable	61			Objective	-42
Regressive	61	Defensive	-52	Motivated	-33	Painful	-60			Direct	-32
Optimistic	-61	Serious	-30	Defensive	30	Serious	-60				
Motivated	-53					Direct	54				
Colorless	53					Colorless	-47				
Sensitive	-51										
Boring	45					Motivated	30				
Painful	49										
Reasonable	-39										
Liberal	-37										
Free	-35										

Amount of Variance Accounted for by Each Factor

FACTOR I	FACTOR II	FACTOR III	FACTOR IV	FACTOR V	FACTOR VI	TOTAL
16.65%	8.32%	5,86%	11.77%	4.98%	5.66%	53.24%