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ABSTRACT

The response to 20 attitudinal items on the University of New Mexico Educational Foundations "Education Scale" by 149 UNM students were used as the basis for a factor analysis. The analysis yielded five rotated factors. The factors were difficult to interpret and the analysis did not lend any support to the a priori grouping and judgements of educational concepts of the authors. Interpretations made by an educational philosopher provided a different perspective. What were thought to be attitudinal items were statements of philosophies. Apparently, while the authors were looking for surface relationships regarding educational concepts, deeply rooted philosophies were functioning. A recommendation for completely different use of the scale was made. A copy of the University of New Mexico Educational Foundations Education Scale is included in the Appendix. (Author)

A Factor Analysis

of

The Education Foundations "Education Scale"

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Paper

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of the

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Abstract

The responses to 20 attitudinal items on the University of New Mexico Educational Foundations "Education Scale" by 149 UNM students were used as the basis for a factor analysis. The analysis yielded five rotated factors. The factors were difficult to interpret and the analysis did not lend any support to the a priori grouping and judgements of educational concepts of the authors. Interpretations made by an educational philosopher provided a different perspective. What were thought to be attitudinal items were statements of philosophies. Apparently, while the authors were looking for surface relationships regarding educational concepts, deeply rooted philosophies were functioning. A recommendation for completely different use of the scale was made.

If an evaluation is to be successful, it should be planned and carried out from design to conclusion just as a good research project is carried out. Other evaluations run into problems, shift gears, punt, get help from others and hobble home. This is one of those evaluations. Many thanks are due to John Zepper for providing the clue to the analysis.

Background

In the fall of 1972, three graduate assistants at the University of New Mexico, teaching the first education course that the College of Education students run into, developed a very basic question -- does the teaching provide any opportunity for attitude changes toward educational concepts. Specifically, does the content which is taught provide for attitude changes.

Each semester approximately 500 students enroll in the course (known as Foundations of Education 290). Including the summer session, 1200 students can be expected to take the course each year. The notion of attitude change is obviously quite important.

It was quickly agreed that the easiest way to measure attitude change was to utilize some available instrument. However, out of the variety of attitude scales which were found, none were suitable for the objectives we had in mind. Therefore, we borrowed items from the instruments and developed one scale which contained items we felt would measure the educational concepts in which we were interested.

Twenty items, all geared toward specific concepts, were prepared. The items were statements about typical educational concepts, e.g., goals or objectives, child-centered, discipline, curriculum, academic freedom, etc. The students had five choices from strongly agree to strongly disagree (the scale can be found in the appendix). All items measuring the same

concept were grouped. Secondly, according to the way the items were stated, they were determined to have a negative or positive relationship. For example, items 1 and 10, both dealt with goals or objectives of education and were expected to have a negative correlation due to the way they were worded.

Out of the fall population of 500 students, three sections were chosen to provide a convenient sample of 75 subjects to be utilized in a pilot run of the scale. The pilot was to determine which items were ambiguous or otherwise unclear. Students were instructed to check such items and provide notes. Items would be reworded or completely changed according to the frequency and magnitude of the notes.

While one objective of the pilot was to develop the clearest scale possible, another was to validate the scale. The second objective included a factor analysis and is the basis for this paper.

Procedures

Responses to the 20 items were coded 1 - 5 and punched on cards. A canned statistical program, BMD x 72, was used and provided the following output:

1) Means and standard deviations
2) Correlation matrix
3) Eigenvalues and cumulative proportion of total variance
4) Communalities
5) Factor loading matrix before rotation
6) Rotated factor matrix
7) Correlation matrix of rotated factors with items

For this study both orthogonal and oblique rotations were used with alternate eigenvalues of 1.0 and 1.3 to stop rotation. In addition to the eigenvalues,

the "Scree Test", described by Cattell (1966, pp. 206-207) was utilized to check factor extraction.

Results of the pilot

1) The students provided feedback on many items only five of which were serious. Proper changes were made.

2) The factor analysis provided no understandable interpretation. The highest correlation was a .42; the next highest correlations were between .30 to .35. The rotated factors, both orthogonal and oblique, could not be interpreted due to the spread of the items throughout many factors, i.e., the items simply did not load in the expected fashion.

3) A decision was made to test the revised instrument with more subjects.

Results of the second run

Very little changed during the second run. 149 subjects were chosen from different sections, but the analysis was similar.

1) The highest correlation was a .55; the next highest correlations were between .30 to .39. Very low correlations showed up between items which were judged, on an *a priori* basis, to be highly correlated, e.g., items 1 and 10 were expected to correlate negatively. While the correlation was negative, it was so low as to be zero. While a possible explanation would be that there was item independence, we felt this was not the case, due to the method of scale construction.

2) Five to seven factors were extracted in each of four different analyses (orthogonal rotation, oblique rotation and eigenvalues of 1.0 and 1.3). Increments in the amount of variance were minimal. The cumulative proportion of total variance for the seven factors was 61%, and for the five factors was 50%. The problem with the seven factors was that 5 to 10 items were distributed across two or more factors, not providing one high

enough loading with any one factor to provide maximum interpretation. With the five factor analyses,only four items were distributed over two or more factors.

In keeping with the structure of factor analysis, an orthogonal rotation with an eigenvalue of 1.0 to stop extraction, seemed to offer the most explanatory power since it accounted for the most items. Cattell's "Scree Test" was employed to check factor extraction which indicated that between four to six factors should be extracted. With this general agreement, attempts were made to interpret the factors from the data at hand.*

This proved to be so difficult that the project was almost dropped. In desperation, the aid of faculty members representing various academic disciplines was enlisted. The clue to the interpretation was provided by Dr. John Zepper, an educational Philosopher. Dr. Zepper felt that the attitudes in question were really philosophies. He labeled all but one item with the first and second most probable philosophy, the statement represented. All statements fell within the following broad categories: progressivist, existentialist, pragmatist, perrenialist, essentialist and realist. The non-labeled item was determined to be amenable to all philosophies.

Factor Interpretations

Factor I had items loading on it which had no a priori connection. The loadings had only one common connection -- they were all items labeled "Pragmatist." Three of the items were also labeled "Existentialist." However, all the loadings were negative, indicating the subjects disagreed with the items. The factor was interpreted as follows: If the items could not be positively associated with any philosophy, then it is a case

* The Factor Extraction Graph (Scree Test) and the table of Rotated Factor Loadings appear in the Appendix.

of most subjects being against such statements which represent pragmatic beliefs. Thus, Factor I was simply titled "Not Pragmatist".

Factor II fared better. Three of the loadings had an a priori connection, that of subject matter as the most important part of the curriculum. The other loadings also had an a priori connection -- arrangement of subject matter to be taught. For these reasons, the factor could be labeled "subject matter". However, the loadings had one major communality -- most were terms labeled "Essentialist". Three of the items had second labels of "Realist", while two items were also labeled "Perrenialist". No negative loadings were found, therefore, Factor II was titled "Essentialist".

Factor III was similar to Factor I, however, 4 of 5 loadings were items labeled "Realist". Two of these loadings were negative. After close analysis, it was decided one of the items was stated in two parts, thus causing ambiguity. The other negative loading was the non-labeled item. Factor III was titled "Realist".

Factor IV also provided problems in interpretation. Two items were related because of the concept "subject matter". However, three of the four major loadings grouped together under the "Essentialist" label. The fourth was labeled "Pragmatist" but was a negative loading. Here we found Factor IV competing with Factor II. This problem was interpreted as follows: Each factor measures Essentialism and its relationship to different kinds of "subject matter" in different ways. Thus, Factor IV was titled "Essentialist".

Factor V offered the only opportunity for interpretation in terms of educational concepts -- the original intent of the authors. The two related concepts of "liberal attitudes" and "academic freedom" showed up, however, for each of these loadings "Pragmatism" was strongly related.

Thus, Factor V was titled "Pragmatist".

Discussion

Since only 50% of the total variance was accounted for, true parsimony was not really obtained. The results provide less than marginal evidence for the support of any a priori reasoning of item grouping due to educational concepts. While the analysis failed to support the original judgement of the authors, it does show enough consistency of the statements as items useful in measuring philosophies of education so that the instrument could be used for such a purpose. Such use would be dependent upon rewriting those items which are still ambiguous from the standpoint of particular philosophies. And, further, such a rewrite should be directed by someone involved in educational philosophy.

Appendix

The University of New Mexico
Educational Foundations

Education Scale

INSTRUCTIONS: Use the RED side of the answer sheet. Provide age, sex, and class level (sophomore, junior, etc.).

Given below are 20 statements on educational ideas and problems about which we all have beliefs, opinions, and attitudes. We all think differently about such matters, and this scale is an attempt to let you express your beliefs and opinions. Respond to each of the items as follows:

Agree Very Strongly:	1	Disagree:	4
Agree:	2	Disagree Very Strongly:	5
Don't Know:	3		

1. The goals of education should be dictated by the interests and needs of the children.

2. No subject is more important than the personalities of the pupils.

3. Schools of today are neglecting the three R's.

4. The backbone of the school curriculum should be traditional subject matter.

5. Public school teachers, like university professors, should have academic freedom--freedom to teach what they think is right and best.

6. The curriculum should consist of subject matter to be learned and skills to be acquired.

7. Teachers should encourage pupils to study and criticize our own and other economic, political and educational systems and practices.

8. Right from the very first grade, teachers must teach the child at his own level of competence and not at the level of the grade he is in.

9. Learning is experimental; the child should be taught to test alternatives before accepting any of them.

10. Society on the whole should reserve the right to dictate the objectives of education.

11. The true view of education is for the teacher to arrange learning so that the child gradually builds up a store house of knowledge that he can use in the future.

12. One of the big difficulties with modern schools is that discipline is often sacrificed in favor of more freedom for activities.

13. The curriculum should contain an orderly arrangement of subjects that represent our American cultural heritage.

14. Discipline should be governed by long-range interest and well established standards.

15. Education and educational institutions must be sources of new social ideas; therefore, education must be a social program undergoing continual reconstruction.

16. Education can be defined as "learning by doing", therefore, activities are the true methods of achieving an education while the teaching of subject matter is not.

17. Children should be allowed more freedom than they usually get in the execution of learning activities.

18. Children need and should have more supervision and discipline than they usually get.

19. Learning is essentially a process of increasing one's store of information about the various fields of knowledge.

20. In a democracy, teachers should help students understand not only the meaning of democracy but also the meaning of the ideologies of other political systems.

ROTATED FACTOR LOADINGS

FACTOR I

NOT PRAGMATIST

Item	Loading
1	-.55436
2	-.71897
8	-.56656
9	-.42114
15	-.57354

FACTOR II

ESSENTIALIST

Item	Loading
4	.29140
6	.55880
11	.82994
13	.49479
19	.77708

FACTOR III

REALIST

Item	Loading
5	-.51147
10	.66317
13	.41767
14	.55309
16	-.48164

FACTOR IV

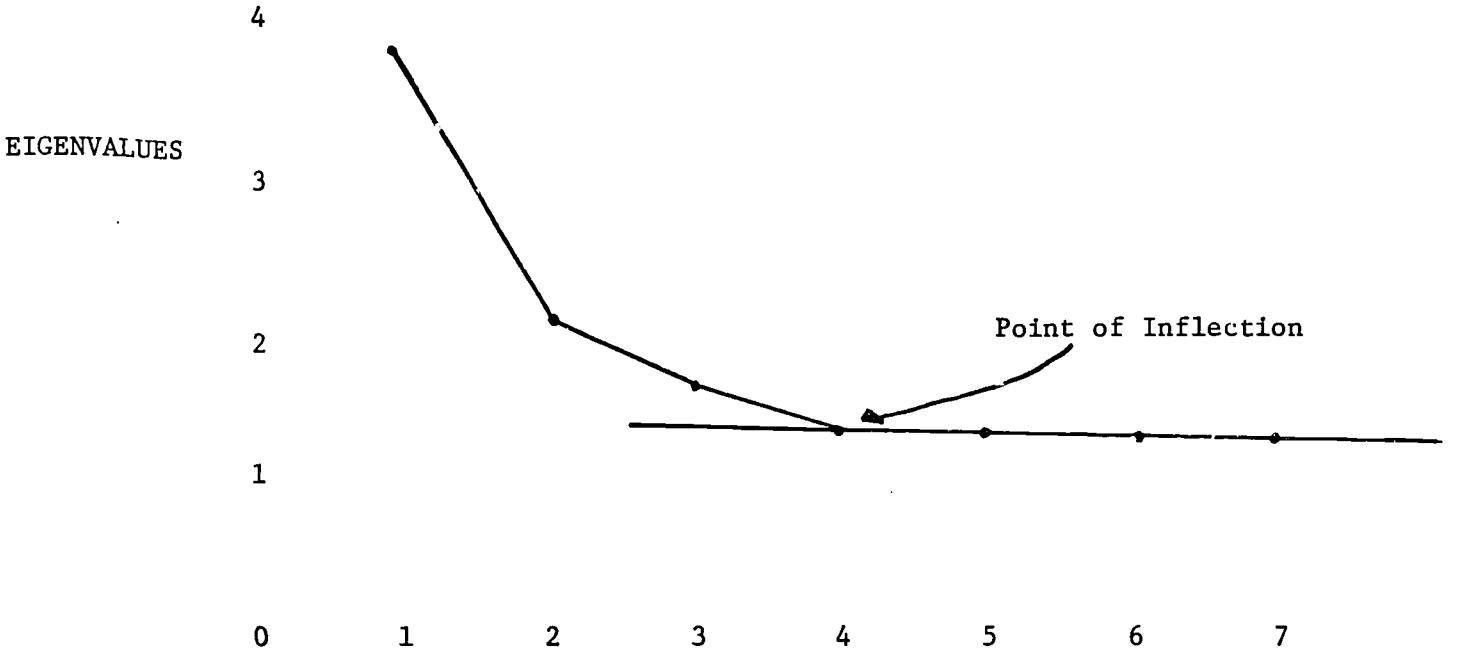
ESSENTALIST

Item	Loading
1	-.44238
3	.85897
4	.41831
12	.52218

FACTOR V

PRAGMATIST

Item	Loading
4	-.28588
7	.72354
9	.44979
17	.67382
18	-.41552
20	.60389



(The point of inflection indicates the probable range is from four to six factors)

Factor Extraction Graph

"Scree Test"

References

Cattell, Raymond B., ed., Handbook of Multivariate Experimental Psychology, Chicago: Rand McNally & Company, 1966.