

Asian Journal of
Applied
Sciences

Social Representation of Students from Two Engineering Schools According to Their Future Professional Activities

L.K. Houssou

Department of Languages and Humanities,
Institut National Polytechnique Félix Houphouët Boigny (INP-HB),
B.P. 1093, Yamoussoukro, Côte d'Ivoire

Abstract: This study examines the social representation of students from two engineering schools at the Institut National Polytechnique Félix Houphouët Boigny (INP-HB) according to their future occupations. It contributes to the general literature of social representation by focusing on the quantitative method of paired comparison. The investigation was carried out by establishing a scale of preference for nine statements expressing various professional activities performed by engineers. A group of students from two engineering schools (College of Industry (ESI) and College of Commerce and Business Management (ESCAE)) participated in this research. Results have shown that the application of the method of paired comparisons in the hypothesis of three by Thustone makes the discriminative variance process remains constant whatever the pairs considered. The calculation of scores is made from the conversion of frequency into standard deviation. This conversion has allowed us to obtain the matrix of standard deviation for each school. The average of standard deviation for each item column is calculated to obtain the average score for the items considered. According to the items selected, students have divergent choices depending on their membership to a particular school. Thus, knowledge produced by the analysis of representation is not only a mere analysis of speech or interpersonal exchanges, but it constitutes an invaluable means for the understanding of the basic system of thought and personal or collective actions of the students

Key words: Multidimensional, comparison, professional, items, conceptual

INTRODUCTION

This study focuses on the classical problem related to the study of social representation (Abrie, 1994; Abrie and Guimlli, 2000).

The first studies of social representation can be attributed to the study of Durkheim (1995), however, it was in the 1960 and after Moscovici's (1976) study that the concept of social representation took greater dimension, involving other social sciences such as anthropology, history, linguistics, psychology, psychoanalysis and sociology.

Moscovici (1976) showed how a new scientific or political theory is spread in a given culture, how it is transformed during this process and how it changes in turn the vision that people have for themselves and the world in which they live.

This conceptual approach to the social representation attracted the attention of many researchers in psychology such as Chombart de Lauwe (1965), Farr and Moscovici (1984), Farr (1991), Jodelet (1984, 1989) and Herzlich (2005), in anthropology such as Laplantine (1987), in sociology like Bourdieu (1982), in history such as Aries (1960) and Duby (1978).

The contribution of the various authors has triggered a growing interest in the study of social representation, as highlighted by Jodelet (1989), because social representation constitutes an interface

between psychology and the society. It presents a heuristic value for all human sciences. Each of these sciences sheds light on this complex concept. All the different aspects of social representation must take into account psychological, social, cognitive, communication considerations, that is why the social representation, a linguistic construction of what we are, where we live, our relationship with the external world, assigns meaning to the actions of a person socially situated within elements and situations that are relevant to him.

Thus, the concept of social representation is so rich and so complex that it is not always easy to define (Doise, 1985; Doise *et al.*, 1992). The word representation comes from Latin *repraesentare* meaning make/present. The dictionary Larousse specifies that in philosophy, representation is how an object is presented in the mind while in psychology, it is a perception, a mental image, the content of which refers to an object, to a situation, to a scene and the world in which a person lives. This means that the term representation is to make something delicate through a figure, a symbol and a sign. Clearly, these different definitions contain the following keywords that make it possible to see the concept of representation: subject, object, image, figure, symbol, sign, perception and action. Social representation can, therefore, be defined as all organized information, opinions, attitudes and beliefs about an object or situation. For present study, the emphasis on social representation could be seen as an indispensable element for any action in the world of engineers; representation can be considered as a tool, a guide to an action. It is, thus, a contribution to the general literature relating to the understanding of social representation.

Based on these representations an engineering student could construct a positive or negative image of his profession, establishes a relationship of satisfaction or dissatisfaction at work, a relationship of involvement or lack of involvement in his work (Guichard and Bidot, 1989). The concept of social representation of profession seems therefore doubly relevant to the extent that it is theoretically justified, but also in practice, especially in the field of psychology of man at work.

Thus, present study will focus on the social representations of engineering students from two engineering schools at the National Polytechnic Institute Félix Houphouët-Boigny and their future professional activities.

The study of social representations is characterized by a wide range of theoretical models and methodological approaches (Lorenzi-Cioldi and Joye, 1985). Present approach in this research is based on the methodology of Le Bourdec (1984), which demonstrates how we can quantitatively examine the scope and attitudinal direction through the method of paired comparisons.

This method is inspired by an approach very similar to pairs of words. It consists in proposing all possible pairs of a corpus of words. That is $n(n-1)/2$ in pairs, by asking them to choose a scale of similarity between the two terms, from very similar to very dissimilar for each pair. One can therefore construct matrix similarities allowing a statistical treatment by using multidimensional method, reflecting a hierarchy of factors and realizing what Le Bourdec (1984) considered as primitive plot or fundamental of representation.

An engineer can be defined primarily as a person who possesses profound scientific and technical knowledge or a person specialized in the implementation of certain scientific applications. An engineer must therefore, undertake frequent scientific research in order to make an important contribution to the development of science, economy, industry and society as a whole. An engineer is also a teacher who explains the subtleties of work to technicians, using all methods that facilitate the understanding of the task; he is the one who initiates the study of projects, who makes the programmes for successful realisation of work and makes sure that it is put into practice, he is the one to whom it is assigned the highest level in research and production. So, the main objective of this research is to investigate and analyze the social representation that a group of engineering students make about their future occupation.

MATERIALS AND METHODS

Place of Research

This research was conducted from September 2006 to February 2007 at the National Polytechnic Institute Félix Houphouët-Boigny, Yamoussoukro (INP-HB) in the Ivory Coast, which is composed of six schools. Its primary mission is to train engineers and senior technicians in the field of industry, commerce, administration, civil engineering, mining and geology. The Institute also does applied research, expertise, production and serves as consultant for companies and Ivorian Civil Services.

In this study, we have chosen two engineering schools:

- College of Industry (ESI)
- College of Commerce and Business Management (ESCAE)

Description of Participants

Fourteen first year engineering students from each school participated in this research. These students have done two years' preparatory studies. At the end of the 2nd year, they have taken an entrance examination to qualify for engineering schools.

Hypothesis

The representation that an engineer student makes about his profession plays a crucial role in his adaptation to life and his involvement in the workplace. It is indeed one of the factors that determine the behaviour of the individual in work situation.

It would be possible, based on the characteristics of the existing representation of the future engineer, to establish a hypothesis on the nature of the relationship that might exist between the student and his profession. So, considering the level of responsibility, initiative in management, practical and scientific research would certainly have an impact on his life. In this case, representation can be seen as an organized set of specific knowledge and appreciation that a student has about the world of engineering.

Thus, the constant theory would be the one which mirrors accurately the complex relationship that the engineering student has with the profession for which he is preparing.

The data reflects the student's tendency as whether it is accurate, appropriate or false.

Instruments Used

Twenty eight students were provided with questionnaire. The questionnaire contained nine statements expressing various professional activities performed by engineers.

Proposed Activities

- A Organize the scope of work
- B Ensure the implementation of projects conceived in laboratories
- C Ensure the reliability of operation of machines tools
- D Improve production quality and quantity
- E Coordinate production activity and research with another similar organisation
- F Help workers fulfil themselves through trade union meetings that address moral and material conditions
- G Be an intermediary between the workers, technicians and the management

H Developing technology and economic prosperity

I Fighting against under-development

Procedure for the Investigation

We used the method of paired comparisons. Paired statements are presented to students in all possible combinations. Each student is requested to indicate which of the pairs of activities are highly preferred. The number of comparisons in pairs equals the number of students surveyed in each school that is the 14 students.

RESULTS

For this method, the sets of items to be evaluated are presented in pairs and the participants are asked simply to classify the pairs ($I_1 < I_2$). A contingency table has been drawn, indicating in each box the No. of occurrences where, the column item is considered higher than the line item.

Table 1 and 2 provide the absolute number of students for each school. The values 7 on the diagonal are arbitrary values.

The values in these Table 3 and 4 are converted into frequency values by dividing the number of students in each box by the number of comparison done on the pairs.

Table 1: Contingency Table (absolute number of students) ESCAE

	A	B	C	D	E	F	G	H	I	Total
A	7	0	8	7	6	5	4	10	8	48
B	14	7	6	11	10	5	13	10	5	74
C	6	8	7	10	12	7	4	12	10	69
D	7	3	4	7	5	3	3	7	7	39
E	8	4	2	9	7	3	2	11	8	47
F	9	9	7	11	11	7	9	13	10	79
G	10	1	10	11	12	5	7	12	10	71
H	4	4	2	7	3	1	2	7	3	26
I	6	9	4	7	6	4	4	11	7	51
Total	64	38	43	73	65	33	41	86	61	504

Table 2: Contingency Table (absolute No. of students) EST

	A	B	C	D	E	F	G	H	I	Total
A	7	8	12	13	7	8	8	13	7	76
B	6	7	10	8	7	6	11	7	5	60
C	2	4	7	6	5	6	10	9	6	48
D	1	6	8	7	6	9	7	10	3	50
E	7	7	9	8	7	8	6	10	4	59
F	6	8	8	5	6	7	7	11	5	56
G	6	3	4	7	8	7	7	9	6	50
H	1	7	5	14	4	3	5	70		29
I	7	9	8	11	10	9	8	14	7	76
Total	36	52	64	62	53	56	62	83	36	504

Table 3: Frequency Table ESCAE

	A	B	C	D	E	F	G	H	I
A	0.50	0.00	0.57	0.50	0.43	0.36	0.29	0.71	0.57
B	1.00	0.50	0.43	0.79	0.71	0.36	0.93	0.71	0.36
C	0.43	0.57	0.50	0.71	0.86	0.50	0.29	0.86	0.71
D	0.50	0.21	0.29	0.50	0.36	0.21	0.21	0.50	0.50
E	0.57	0.29	0.14	0.64	0.50	0.21	0.14	0.79	0.57
F	0.64	0.64	0.50	0.79	0.79	0.50	0.64	0.93	0.71
G	0.71	0.07	0.71	0.79	0.86	0.36	0.50	0.86	0.71
H	0.29	0.29	0.14	0.50	0.21	0.07	0.14	0.50	0.21
I	0.43	0.64	0.29	0.50	0.43	0.29	0.29	0.79	0.50

Table 4: Frequency Table ESI

	A	B	C	D	E	F	G	H	I
A	0.50	0.57	0.86	0.93	0.50	0.57	0.57	0.93	0.50
B	0.43	0.50	0.71	0.57	0.50	0.43	0.79	0.50	0.36
C	0.14	0.29	0.50	0.43	0.36	0.43	0.71	0.64	0.43
D	0.07	0.43	0.57	0.50	0.43	0.64	0.50	0.71	0.21
E	0.50	0.50	0.64	0.57	0.50	0.57	0.43	0.71	0.29
F	0.43	0.57	0.57	0.36	0.43	0.50	0.50	0.79	0.36
G	0.43	0.21	0.29	0.50	0.57	0.50	0.50	0.64	0.43
H	0.07	0.50	0.36	0.29	0.29	0.21	0.36	0.50	0.00
I	0.50	0.64	0.57	0.79	0.71	0.64	0.57	1.00	0.50

Table 5: Matrix of SD and scores ESCAE

	A	B	C	D	E	F	G	H	I
A	0.00	-7.93	0.18	0.00	-0.18	-0.37	-0.57	0.57	0.18
B	7.93	0.00	-0.18	0.79	0.57	-0.37	1.47	0.57	-0.37
C	-0.18	0.18	0.00	0.57	1.07	0.00	-0.57	1.07	0.57
D	0.00	-0.79	-0.57	0.00	-0.37	-0.79	-0.79	0.00	0.00
E	0.18	-0.57	-1.70	0.37	0.00	-0.79	-1.07	0.79	0.18
F	0.37	0.37	0.00	0.79	0.79	0.00	0.37	1.47	0.57
G	0.57	-1.47	0.57	0.79	1.07	-0.37	0.00	1.07	0.57
H	-0.57	-0.57	-1.07	0.00	-0.79	-1.47	-1.07	0.00	-0.79
I	-0.18	0.37	-1.07	0.00	-0.18	-0.57	-0.57	0.79	0.00
Score	0.90	-1.18	-0.30	0.37	0.22	-0.52	-0.31	0.70	0.10

Table 6: Matrix of SD and scores ESI

	A	B	C	D	E	F	G	H	I
A	0.00	0.18	1.07	1.47	0.00	0.18	0.18	1.47	0.00
B	-0.18	0.00	0.57	0.18	0.00	-0.18	0.79	0.00	-0.37
C	-1.07	-0.57	0.00	-0.18	-0.37	-0.18	0.57	0.37	-0.18
D	-1.47	-0.18	0.18	0.00	-0.18	0.37	0.00	0.57	-0.79
E	0.00	0.00	0.37	0.18	0.00	0.18	-0.18	0.57	-0.57
F	-0.18	0.18	0.18	-0.37	-0.18	0.00	0.00	0.79	-0.37
G	-0.18	-0.79	-0.57	0.00	0.18	0.00	0.00	0.37	-0.18
H	-1.47	0.00	-0.37	-0.57	-0.57	-0.79	-0.37	0.00	-7.93
I	0.00	0.37	0.18	0.00	0.57	0.37	0.18	7.93	0.00
Score	0.90	-0.09	0.18	0.17	-0.06	-0.01	0.13	1.34	-1.15

Determination of Scores

We have applied the method of paired comparisons in the hypothesis of three by Thustone. According to this hypothesis, the discriminative variance process remains constant whatever the pairs considered. The calculation of scores is made from the conversion of frequency into standard deviation. This conversion has allowed us to obtain the matrix of standard deviation for each school. Then we calculated the average of standard deviation for each item column. This constitutes the average score for considered item.

Table 5 and 6 provide us with the matrix of standard deviation and the scores for each school.

These different scores are ranked in growing order as showed by the following histograms (Fig. 1, 2). In ESCAE, item B is the less preferred while in ESI it is the item I. The item A is the most preferred whereas, in ESI it is the item H.

Results and Research Values

The results and the research scale values are shown here:

Results of ESCAE

- (A) Organize the scope of work = 0.90
 (H) Developing technology and economic prosperity = 0.70

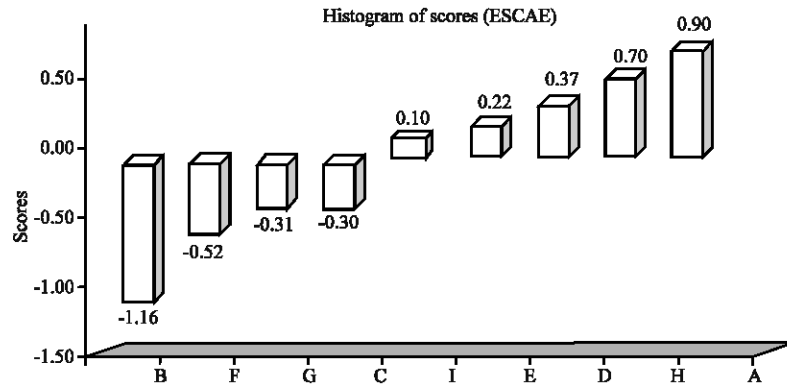


Fig. 1: Histogram of scores (ESCAE)

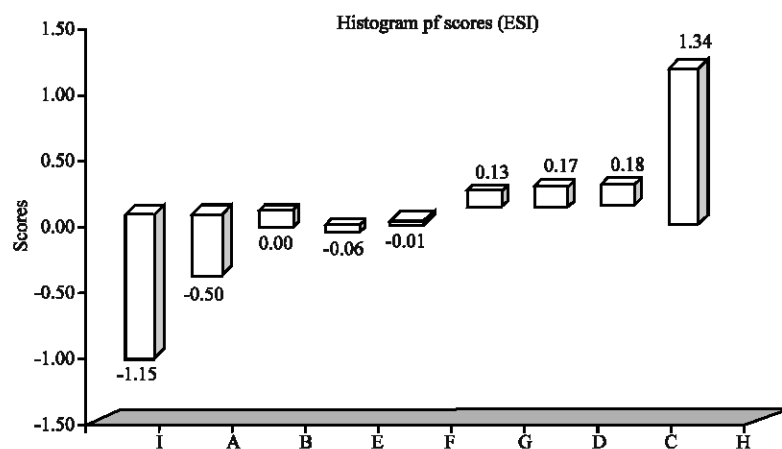


Fig. 2: Histogram of scores (ESI)

(D) Improve production quality and quantity	= 0.37
(E) Coordinate production activity and research with another similar organisation	= 0.22
(I) Fighting against under-development	= 0.10
(C) Ensure the reliability of operation of machines tools	= -0.30
(G) Be an intermediary between the workers, technicians and the management	= -0.31
(F) Help workers fulfil themselves through trade union meetings that address moral and material conditions	= -0.52
(B) Ensure the implementation of plans conceived in the laboratories	= -1.16

Results of ESI

(H) Developing technology and economic prosperity	= 1.34
(C) Ensure the reliability of operation of machines tools	= 0.18
(D) Improve production quality and quantity	= 0.17
(G) Be an intermediary between the workers, technicians and the management	= 0.13
(F) Help workers fulfil themselves through trade union meetings that address moral and material conditions	= -0.01

(E) Coordinate production activity and research with another similar organisation	= -0.06
(B) Ensure the implementation of plans conceived in the laboratories	= -0.09
(A) Organize the scope of work	= -0.50
(I) Fighting against under development	= -1.15

Calculation of Correlations

The correlation of ranking between the two scales was calculated to see whether they are similar. This correlation is 0.1. For the nine statements, we can read a value of 5% from the Table of critical values of Spearman, with a thematic correlation of 0.6. As 0.1 lower than 0.6 we can conclude that there is no correlation between these 2 scales. These two scales are not similar.

DISCUSSION

The concept of representation is, without doubt, the one in psychology which applies specifically to the type of opinion that each person forms spontaneously about his/her occupation. It can be said that the activities carried out by an engineer constitutes a representation since it corroborates the works of Huteau (1982) and Huteau and Vouillot (1988) to highlight the concept of a representation as a mental construction of an object. It is organized in a set of information, knowledge, ideas, attributes, about an object. In the representation, one can include feelings that go with awareness of the properties of the object, that is, the overall sentiments towards the object or feelings towards some of its elements or some of its properties.

Based on the fact that a representational structure cannot be a spontaneous representation, but rather the result of a process in which the level of knowledge is a key factor, it is believed that it is possible to highlight the statements relating to the future activities of engineering student as a representational structure.

In the same way, if the representation that an engineering student makes of his occupation as noted by Deneuve *et al.* (2002) can play a crucial role in his/her adaptation to profession and work, one can see quite well the way this representation is organized through the preferences from the statements submitted to the sample population. A difference in the preferences is clearly shown from one school to another depending on whether the answers come from commercial or industrial students. This demonstrates that the type of activity that a group of students performs shapes their representation about the work.

As far as the item ESCAE A is concerned, (organize the scope of work) is the most highly preferred by all students of this school, while at the ESI, preference is focused on the item H (develop technology and economic prosperity). This result confirms the significant differences in preferences reflected in the choice of students per school depending on the school of origin. However, such a response can be enhanced provided, as stressed Huteau (1982) that, for a preference to be seriously retained, it has to be examined on several occasions and as soon as new information is received.

The dynamic approach of our results has permitted us to establish some scale of values. The comparison of the 2 obtained scales shows a marked difference in the position of the item A (organizing the scope of work). ESCAE places it in the first position, while, ESI places it in 8th position.

Item D (improve production quality and quantity) occupies an equal position with students from both schools. Item H (developing the technology and economic prosperity) is also chosen by the two schools, the difference in rank is one. Students from ESI rank it first, while the students from ESCAE place it on the second position.

There is also, a difference to the statement I (fighting against under-development). It is the in the 5th position among students from ESCAE and in the last position among students of the ESI. The

statement B (ensure the implementation of projects conceived in laboratories) is the least chosen by the 2 schools. Students from ESCAE place in the last position while students from ESI places it the seventh position.

It may be noted also, that the difference in rank is three for the following statements:

- F (help workers fulfil themselves through trade union meetings that address moral and material conditions)
- G (Be an intermediary between the workers, technicians and the management)

These comparative results of scale values make it possible to appreciate the attitudinal perception that every student makes about his/her future work. According to Doise (1985) and Doise and Palmonari (1996), the study of opinion, attitude and stereotype, even when present study is based on the most sophisticated techniques of data analysis cannot be considered as a study of social representation unless it connects symbolic realities with complex and changing social relationships.

CONCLUSION

The principal aim of this exploratory research presented in this study is to investigate and analyze the social representation that a group of engineering students make about the future of their professional activities

As the concept of representation enriches social sciences, taking it into account in psychological analysis contributes to the understanding of the individual and group of individuals by analyzing the way in which they represent themselves, the others and the world.

Thus, from the activities submitted to the students, a difference in the preferences is clearly shown from one school to another. The comparison of two scales obtained shows also a difference in the position of items. The two scales are not identical. One can, thus, confirm that the type of activities that a person does has an impact on his/her conceptual representation of work.

In spite of methodological improvements used in this research, it is fitting to consider these results as a stumbling stone for further research rather than an absolute certainty.

REFERENCES

- Abric, J.C., 1994. Social Practice and Representation. 1st Edn., PUF, Paris.
- Abric, J.C. and C. Guimelli, 2000. Social representations and context effects. *Connexion*, 72: 23-27.
- Aries, P.H., 1960. The child and family life under former political system. Plon, ED. Paris.
- Bourdieu, P., 1982. What speaking means, the economy of linguistic exchange. Fayard, ED. Paris.
- Chombart de Lauwe, P.H., 1965. Essay in sociology. Ouvrier, ED. Paris.
- Deneuve, P., J. Genty and V. Dru, 2002. Modification of interoccupational affinities, intergroup depending on shared activities and skills in school environment. *Cahiers Int. De Psychol. Social*, 54: 71-71.
- Doise, W., 1985. Representations: Definition of concept. *Conversion*, 45: 243-253.
- Doise, W. and A. Palmonari, 1986. The study of social representations. Delachaux and Nieslé, ED. Lausanne.
- Doise, W., Clémence, A. and Lorenzi-Cioldi, 1992. Social Representations and Data Analysis. 1st Edn., University Press of Grenoble, New York, pp: 87-94.
- Duby, G., 1978. The three orders or feudalism imaginary. Gallimard, ED. Paris.
- Durkheim, E., 1995. The advent of sociology. PUM, ED, Toulouse
- Farr, R. and J. Moscovici, 1984. Social Representation, 1st Edn., Cambridge University, Press, New York.

- Farr, R., 1991. Social representations. PUF, Paris
- Guichard, J. and H. Bidot, 1989. School courses and high-school students representations. *Int. J. Social Psychol.*, 2: 485-509.
- Herzlich, C.L., 2005. Health and Sickness: Social Representation Analysis. 2nd Edn., Ecole De Hautes Etudes En Sciences Sociales, Paris.
- Huteau, M., 1982. Psychological mechanism of attitude evaluation and professional preferences with respect to professional activities. *School Prof. Guidelines*, 7: 107-125.
- Huteau, M. and F. Vouillot, 1988. Representation and professional preference. *Bull. De Psychol.*, XLII: 144-153.
- Jodelet, D., 1984. Social Representation: Phenomenon, Concept and Theory, in Moscovici, Social Psychology. 1st Edn., PUF, Paris.
- Jodelet, D., 1989. Social Representations: A Field in Expansion, the Social Representations. *Sociology Today*. 1st Edn., PUF, Paris.
- Laplantine, F., 1987. Keys to Anthropology. 1st Edn., ED. Seghers, Paris.
- Le Bourdec, G., 1984. Contributions to methodological study of social representations. *Cahiers Psychol. Cognitive*, 4: 245-272.
- Lorenzi-Cioldi, F. and D. Joye, 1985. Representation social of socio-professional categories. *Methodological Aspect. Bull. De Psychol.*, 41: 377-390.
- Moscovici, S., 1976. Psychoanalysis, its Image and its Public. 2nd Edn., PUF, Paris.