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ABSTRACT

From a search of (mostly French) literature, a hypothesis was formulated that students with both academic training and work experience would solve a practical learning problem more easily than students with academic learning only. A study was conducted at the Conservatoire National des Arts et Metiers in Paris to test this hypothesis. Two groups, 16- to 18-year-old and 18- to 21-year-old students with academic education only and similar-aged students in a program of study and vocational work experience, were selected for the experiment. However, almost half of the 16 to 18-year-old work experience group refused to participate, so data were gathered only from the two subgroups of 18- to 21-year-olds. To test the hypothesis, the researchers constructed an electric schema problem-solving task. From a written description of how a washing machine works, subjects were asked to locate the different components and establish the relationships among them. Two tests were given to the groups--at the start of the program and after two weeks of academic study or work experience. The work experience group did not do a better job of integrating knowledge and practical problem-solving processes. In fact, the academic knowledge-only group did better on both tests. Possible explanations for these results were that the two-week time period was not long enough for work experience students to integrate both academic and practical problem-solving approaches, or that students in traditional education continued their use of logic to solve the problem. Further research was suggested in the area of the acquisition of practical experience and its effects on the thinking process. A four-page bibliography and three figures conclude the paper. (KC)

Learning process and vocational experience attainments

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This research was conducted in Paris at the Conservatoire National des Arts et Métiers, Centre de Formation de Formateurs directed by Dr. G. Malglaive. This study was part of an assesment project supported by the French Ministery of Vocational Education to study the New Education Plan for young people (1983). At present (1984) analyses of the data are being conducted at Boston University,Department of Psychology.

Learning Process and Vocational Experience Attainments

More and more frequently, young people enrolled in vocational educational programs are spending part of their time receiving on-the-job training in actual work settings. Moreover, young adults who have been employed often return to school for futher education. One of the questions raised by this phenomenon concerns the transition mechanisms used by people who are in transition between two settings -school and work. The perspective we have developed thus far is centered on the investigation of the intellectual processes implemented by people who are coping with new situations such as crossing from an educational situation to a work situation or,conversely, coming back into an educational setting following a period of employment. Our investigation focus on the cognitive mechanisms used by people to transfer their intellectual attainments, to adapt them to the demands of new situations .

The analysis of shool-work relationships is carried out on multiple levels, ranging from macro-economic and sociological approaches to more finely-tuned investigations focused on activities in learning situations and/or in work situations (Colardyn & Lantier, 1982). Here we have chosen to emphasize one aspect of school-work relations--i.e., the building of vocational experience. In particular, we are concerned with analyzing evolution in the process of mental representation in young people undergoing vocational experience.

The present research has its origin in the field of cognitive psychological research on mental representation, understood as a special structuration by people from the information with which they deal. This theme has enormous implications for research with young people and adults with a variety of educational plans. In fact, it is connected with a pedagogical movement concerned with modernizing pedagogical understanding of technological innovations (Lantier & Colardyn, 1980).

Theorical Approach.

The attainment of vocational experience is characterized by progress in the control of the work system, the development of particular expectations, mastery of schedules, and the ability to deal with modifications or technical mishaps in the work process. The first initiation into the work world provides the genesis for this experience. In fact, at the time of the individual's entrance into the work system, cognition undergoes a process of transformation destructuration ans restructuration which has its aim bringing prior knowledge (scholary knowledge, or school-learning, in this case) into operation in the work world,with the objective of productivity. Subsequently, vocational experience, having its own developmental pathway, provides a continuous educational experience for adults through the modifications in cognitive activities it generates in professional life.

Thus, an analysis of cognitive activities can give substance to the investigation of the concept of vocational experience as well as to investigation of the conditions of various confrontations and adjustments between scholarly (school based) knowledge and vocational attainment.This investigation involves several hypotheses concerning behaviors, activities and the intellectual functioning of people in work situations. Moreover, the analysis of cognitive activities, particularly the analysis of the coherence between sets of external information and the internal (or mental) representations that people develop has become more and more the object of systematic investigations which support our approach. For school-work relations, we currently are examining the influence of work experience on the mobilization of scholarly knowledge, our study of problem solving in a sample of young adult in a vocational education program is the focus of this paper. In the future, we will look at the content of mental representations and their evolution.

Development of cognitive analyses of the vocational transition process.

Much of the research in work psychology has implicitly opted for a cognitive-behavioral approaches in which central importance is given to understanding mental representations from the point of view of the human operator.It is possible to find in this research theoretical support for our approach,which gives a new prominence to the analysis of cognitive processes in people who are seen as active participants in their own learning and in their own vocational transitions. The field of knowledge concerned with an analysis of the genesis and evolution of processes of representation in the work situation contributes to our understanding of basic cognitive processes. This field provides a fruitful approach to the mechanism of utilization and transformation of mental representations which are needed to meet the demands of school and work, and the transitions between school and work. However, while this field provides a theoretical basis for such research, it does not provide a basis for answers to questions about encounters between natural reasoning and the logic of a scholarly program. That is, it does not help us understand the processes underlying the progressive control crossing from a school-learning logic to a use logic (in the work situation)-- and the reverse, in the case of adults coming back to school. To analyze the relationship between learning process and the utilization of this learning process in the work situation, we need a cognitive theoretical perspective going beyond the implicit cognitive-behavioral approach found in work psychology.

This research has two major underlying concepts. First, mental representation is viewed as a developing structure which is elaborated through the actions of people (Pylyshyn, 1973a,b;Inhelder et al, 1974). Second, there is a process of actualization diversification of mental representation which develops the regulation of activities. The process of successive structurations (involved in the developing structure) can be tested in various vocational transition situations where we can examine the regulation of activities made through the actualization-diversification process (De Keiser,1982;Leplat,1976,1982;Weill-Fassina,1979,1980).

As Ochanine (1978) explains," At each moment,people dispose and use an informational configuration. What is prominent in mental representation is whatever has relevance in the action we make. The other characteristics of the object represent a background on which we draw whatever is functiornaly important for a given action. The informational complex is constanly modified : it is a constant re-elaboration process. The constant evolution takes into account the integration of the theoretical and practical confrontations and this is what opens the whole world as it is known and conceived by people".

Analyses of the work system make an important use of this approach. A lot of the results of the past 20 years of research give us a more precise knowledge of the human operator's mental representation processes.

<u>Work process and mental representation.</u>

Since 1965,Leplat,Bisseret have been analyzing human information processing. In one study of air traffic controllers,they observed that the detection of a conflict does not result from an immediate perception of different facts but rather stems from an analytic and sequential process of information treatment. Similarly,Cuny and Deransart (1972) showed that the more or less elaborate representation of a work system depends on the work organization. In situations of dysfunction multi-purpose factory workers achieved solutions more quickly and demonstrated anticipatory processes which revealed that they had a more complex understanding of the work system than was possible for stationary workers confined to a single job. Another investigator (Faverge & Delahaut,1966) analyzed the activities of a dispatch controller in the iron and steel industry. Delahaut and Faverge identified two working modalities depending on vocational experience. One modality was "to think rolling-mill";this modality was found in people who already had worked in real contact with employees in the rolling-mill and who grasped the problems involved in this work. The second modality was " to think schedule", this modality was found in people who never worked directly with the rolling-mill employees and who only knew the schedule problems.

Evidence from studies such as these suggests that vocational experience gives rise to diversified and well-articulated mental representations. De Keiser and Piette (1970) note that information seeking needs and follows various representations of the work process. On the one hand, the work universe becomes more and more restrictive as the demand for competencies diminishes. On the other hand,when experience is broader it seems to stimulate the development of a structure based on informal information, making a subtle balance between formal and informal information.

In their analyses of the process of diagnosis electronic troubles in a processing plant, Rasmussen and Jensen (1974;1983) distinguish among three models of cognitive functioning underlying problem solving activities, these models are derived from an analysis of the elements people take into account when trouble shooting a system. In the topographic model, people focus on spatial relations without taking into account the functional role of each element in the system, as could be in the case of the functional representation model. The third diagnostic approach --i.e.,the symtomatic model --involves creating a hypothetical mental system and imposing it on the troubleshooting situation.

Other research, centered on mental load, has demonstrated that an increasing load leads to modifications in mental activities. Experienced people are able to adapt their mental activities to the demands of the situation, novice workers do not appear to make these adaptations. Indeed, novices show a temporary destabilization of regulation processes in performance. The particular activities shown by novices is of particular relevance to the present study of work-school linkages, because such linkages also generate considerable destabilization in cognitive processes.

These research examples give an idea of developments during the last 20 years in the analysis of knowledge attainment at work as a function of professional and vocational experience. Regularly, claims are made as to the benefits and repercussions of this research for pedagogical and learning processes, however, until recently, the implications of work research for pedagogy have scarcely been investigated. More recently, researches have looked with special interest at the evolution of the contents of mental representation. This new research focuses on the regulation processes of action (Strizenec,1981; Weill-Fassina,1979,1980;Faverge,1980).

Analyses of activity regulation have led to new views of the learning process. Authors such as Hacker (1981),Michard (1980) and Cavallo (1982) specify that a simple diagnostic process does not exist,rather, the notion of a variety of different processes fits better with reality.

Vocational transition and the content of mental representation.

Students use a process of "construction and structuration" by which they take into account new knowledge and build new attainments on pre-existing representations (Closset,1983;Rabardel,1982). In education,these natural reasoning processes are expressed through the "learning logic" with which people assimilate scholarly content. With initiation into the work world, people will have to manage new situations. They need to understand the new situation and make sense out of it (Iosif & Ene,1971,Piolat,1982,Piolat & Massonnat,1981). In fact people have to learn how to use their knowledge and attainments in a different and specific logic. By successive restructurations, individuals will use their previous knowledge to build a new logic --i.e. the use logic-- to apprehend and control the work world.

With successive and progressive cognitive restructurations, the novice worker begins to build vocational experience (Leplat,1971; De Keiser & Piette,1970; De Keiser,1982; Karnas,1981). The structure of mental representation continues to configurate itself throughout the work life. As Leplat (1981) says, "It (the structure of mental representation) is an extension of the reference field in space and time... Intellectual organization can concern the activity as well as the more or less broad conditions of this activity ". While this complicated structuration is a real fact of vocational experience, it remains, nevertheless, only partly actived. In fact, most of the time,with weak cognitive loads, people have reccurse to relevant aspect of their action; their action shows a "saving" form of cognitive process (Sperandio,1977,1980; Hacker,1977).

So, we can aks about the consequences of this kind of saving on the content of mental representation (Cavallo,1982). We can also wonder about the requirements introduced by new situations, which involved a different mobilization of mental representation and the "destructuration-restructuration process". It is exactly these processes which enable people to transfer competencies from one situation to another.

In what way do experienced adults arrive by successive structurations and simplifications at an operational mental representation that works in usual vocational situations? First, they have integrated their scholarly knowledge in the work situation. Next, a use logic is built upon completed attainments (scholarly and vocational). The competence transfer is more or less complete depending on the integration of anterior knowledge with the knowledge required to cope with the new situation.

The notion of a destructuration-restructuration process gives rise to a number of questions.Number of studies suggest that learning at school and using that learning at work are distinct processes which are not easily superimposable. There are very significant differences between what we learn (the structure we develop) and how we use this learning (which introduices changes into the structure) (Bisseret & Enard,1970).

What we want to look at here is what kind of processes are involved in the achievement of such structural modifications? The question concerning school-work relations is no longer "to learn and to do" but is " learning to know what we can do". That is to say,how do we integrate what we know with what we do? Our major purpose in the present research was to examine this process.

Our general idea is that one of the operational linkages between work and the school system is focused on the learning process and on progressive control of the work system (Colardyn, 1984a,b). Thus,it was important to develop a technique for evaluating the learning process. Our development of the "electric schema" described in this report, offers both opportunity to learn more about learning difficulties (Cuny & Boyé,1981;Closset,1983; Fredette & Lochhead,1980) and about difficulties encountered by adults in circumstances, for example, of trouble shooting (Michard,1980;Rasmussen & Jensen,1973; Rasmussen,1983).

The electric schema and mental representation.

Our perspective here is focused on the content of mental representation. The electric schema can be seen as symbolizing an inferential mental process by which an electrician links actions and effects of actions --in this case, in a wash machine. The pedagogical aims involved in reading and writing diagrams are not ends in themselves; rather, they are part of the conception,the assembly and the trouble shooting of an installation. The electric schema is designed to make it possible to analyze the cognitive processes involved in learning such inferential processes as well as their use by experienced people.

The electric schema is useful because it is not only a replication of an installation but it includes another kind of information. In practice, it is possible and useful to write and read a diagram without seeing the real installation. Cuny and Boyé (1981) have show that a presentation independent of " technical support" increases the implementation possibilities of the students, who learn to build and conceptualize schema (e.g. diagrams).

Our general hypothesis in this study was that we could find signs of integration between "learning logic" and "use logic" in populations who are part time at school and part time at work. Analyzing the consequences of an on-the-job training period, we hoped to discover the first signs of an integration between the two logics.

Method.

Procedure.

To test our hypothesis, we constructed the electric schema problem-solving task (figure 1-3). From a written description of how a wash machine works , we asked subjects to locate the different components and establish the relationships among them(1). Figure 2 illustrates the most simple solution to the task.

We must acknowledge that students at the level studied are not prepared for this kind of exercise, in that they have never done one at school. Nevertheless, various results indicate that the conception of a simple schema can be achieved under these circumstances (Cuny & Boyé,1981). On the other hand, a global comprehension of a circuit as a system is not universally used (Closset,1983;Fredette & Lochhead,1980) even with experienced workers (Rasmussen & Jensen,1983; Rasmussen,1983). In fact, all these results suggest that conceptual activities are accessible but not necessary for everyone at these level of qualification and in vocational practice.

So, being presented with a conceptual problem of a non-studied machine placed students in an unusual situation : the particular machine (a wash machine) has some elements already learned at school (heat,motor) but in regard to other machines--thus, resolution was not inaccessible. However, the novel elements of the problem favored reason ng and the systematic appearance of errors associated with certains elements, components, or functions of the schema. We expected that the phenomenon of restructuration of attainments could be specified through analysis of the process used in the conception of the schema. People who are part time at school and part time at work have opportunities for breaking down usual problem solving techniques and trying processes other than simple reproduction of learning. Going into a work situation and coping with a use logic should make a further mobilization of scholarly knowledge easier. For students in this situation, we should see different kinds of elements appear after a training period, including errors of a different nature as well as the integration of new parameters.

A measurement device such as the electric schema seemed especially relevant because its conceptualization,like its use, permitted application of various logics; thus it is possible that a breakdown in habitual approaches would make the integration of work and learning logics occur more quickly. If learning logic is expressed first through simple reproduction of school learning (where memory is a matter of learning things by heart), then a training period given rise to a "use logic" may be a useful approach to the breaking down of that learning logic.

Sample.

To look at the consequences of a training period on the mobilization of scolarly knowledge, we chose, as first step, two samples at different levels of knowledge. These sample were composed of adolescents (16-18 years old) preparing the French degree CAP and young àdults (18-21 years old) in specialization after another French degree,the BEP. Both groups were pursuing education in electricity. Within each of those groups there were two subsample--the experimental group, consisting of students who were part time at school and part time at work, and the control group consisting of students who stayed in school full time.These sample are describe in more details below.

The 16-18 years old sample.

This sample included one group of students in the New Vocational Education Plan of the French Ministery of Vocational Education and another group in the traditional system (Ministery of Education). The experimental subjects were participants in one of five curriculum programs on electricity,four of the curricula programs took 2 years to complete and one program covered a year. Students in the experimental group spend 30% of their time in on-the-job training. They completed the electric schema in the second part of the curriculum, before and after a vocational training period which lasted either two weeks (for 3 of the 5 programs) or four weeks (for 2 of the 5 programs). The control group consisted of young people beginning the third year of preparation for the degree CAP. This curriculum has no training period. Subjects were tested in the first quarter of the 1983-84 school year--3 weeks after school begin and again one month later.

The 18-21 years old sample.

Subjects in this age group all have a degree called the BEP. Following a selection,they entered a year of specialized training in electricity in consular establishments (similar to United States's Chambers of Commerce).The experimental subjects,drawn from the class of 1982-83, were tested before and after a two week training period. The control subjects, enrolled in the same program with the same teachers, were drawn frcm the class of 1983-84, they were tested twice, with two weeks interval, before participating in any training.

Rationale.

Administration of the electric schema before the training period provided a means of assessing the students knowledge structuration at a particular point in time. Because the task is not a standard one in the students' curriculum, it was assumed that various signs of "another partially organized knowledge"(Closset,1983) would appear, and it would be possible to capture the relevant elements of a mental representation. Students build such elements throughout their curricula and when dealing with the difficulties they have to solve--at school and more generally in life. The electric schema is like a coded derivation,expressed in the symbols of electricity,of a mental representation.Moreover, the students do not have to write in symbols, so there expression of their mental representation is not impeded by the limitation that would imposed if writing in symbols was necessary. What the students have to do is recognize the already symbolized components,indicate their function and establish the relationships among the components to obtain the described functioning of the washing machine.

The second administration of the electric schema--after the experimental subjects returned training and after an equivalent interval for the control subjects--provided data relevant to the question: has the structuration been modified? Have cognitive attainments been restructured? Thus ,the training period offered an opportun ty to acquire a different structuration of knowledge, more than being a chance to acquire new knowledge. The learning logic associated with education was expected to change with immersion in a training period during which the use logic was prevalent.The question was what traces would remain from this exercice in use logic when the students returned to school and during vocational involvements in the future.

Precise Hypotheses.

The electric schema task contains two types of components (figure 3)--a) those taught at school (type A) and b) those demanding a process of mental reflection because they are not learned at school (type B). Previous results on sequential reasoning as in a diagnostic plan strongly suggest various models of mental representation which help us to specify our hypotheses.

The topographic model : This approach is focused on topographic relations and is a translation of a spatial representation. The components are not linked through their functional roles in the circuit and the circuit is not seen as a system.For example, it is possible to symbolize the heat and/or the motor without capturing the relationship between them.

Our first hypothesis is that experimental subjects will not be significantly different from controls on those A-type components which reproduce school learning (A1,A2,A3,A5). On the other hand, the experimental subjects should do significantly better on component A4 because their access to nonscholarly information during the training period let them see and explore another structuration of knowledge.

The functional model: this approach involves understanding the functional role of each element of the schema. In the wash machine schema, people using a functional approach will not only detect some functions (e.g. heat or motor) but will also be able to link them. Our second hypothesis is that on the first test, few subjects will be able to link type A and type B components. On the second test, there will be significant differences between experimental and control subjects; better results will be found in the experimental subjects, whose training should help them access and use type B components , and go beyond a simple reproduction of learned elements. Given the expected new linkages between knowledge components, and new structuration of knowledge, there are three relations for which the training period should be especially advantageous:

B1- the connexion between the different steps of the washing machine program;

B5- the connexion which makes the machine able to wash with water in the drum; and

B6- the connexion which makes the machine able to spin when the drum is emptied of water.

Results.

The school-work transition had an unexpected effect on the 16-18 years old students: 46.5% of the experimental group refused to complete an exercise which had " nothing to do with training for their future job". This type of non-compliance did not occur in the three other subsamples (i.e. the 16-18 year old control subjects and both experimental and control subjects within the 18-21 year old group). One wonders what happened during the transition to produce this kind of consequence in the young school-work transition sujects.

Results relating to the learning process and the genesis of vocational experience are reported only on the two samples of 18-21 years old; here we compare results from two administration of the test. First we will look at the result on the 12 items (A and B components) of the first test; then we will analyze the evolution between the two tests.

As can been seen in Figure 4, the experimental group performed better than the controls on only 3 of the 12 items--components A1, A4 and B5. Essentially, we considered the two groups to be performing at the same level but decided to pay special attention to the patterns of answers subjects gave depending in their response to items A1,A4 and B5. Homogeneity of the groups on the first test, despite significant differences in the three items was based partly on the assumptionthat while the class of 1982-83 differed from the class of 1983-84 on these items, these differences were not of nature that biased the testing of the hypotheses.

Two types of improvements were found across the two administrations of the test (see Figure 5) (χ^2 3.84 - .05) :
a) significantly increasing evolution (improved results) was found in the control group on 7 of the 12 items (58.3%0 necessary to solve the problem -- A1,A3,B1,B2,B3,B5,B6.

b) significantly increasing evolution in both the experimental and control groups --B4.

This improvement may stem from the fact that all subjects took the same test twice within a relatively short period -- which may have had a stronger effect on the results than either the training period or the continuous educational experience.

In fact, ne significantly increasing evolution was found in the experimental group.

Our hypothesis that there could be an integration between two logics during a period of work in the work world was not supported. During the period when the experimental sample was participating in a work experience, the control sample.still at school,continued his progression in a specific logic ("learning logic)-- even through in the experimental sample there was actually a stagnation.

In summary, the two groups of young adults (18-21 years old) were roughly homogeneous at the first test. Our hypothesis of positive consequences of a training period on the mobilization of knowledge was not supported.

Discussion.

On a cognitive level, we did not find evidence supporting the notion of a breakdown in one logic giving way to the genesis of an integration between learning and use logics. In a part time school, part time work educational organization,there does not appear to be sufficient time for a destructuration which can give way to a cognitive functioning in which different logics are integrated. In fact, it appears that people work with a "learning logic" at school and are not able to take advantage of their activities in a training period; indeed, people may need the coexistence of two functioning models. In our experimental subjects there may have been a new born use logic developing during the training period, and this new logic may have contributed to a breakdown in cognitive structure, thus explaining the poorer results of the experimental subjects as compared with the controls. But in any case, what happens during the training appears to have little connexion with the learning logic, which seems to be reduced to a "minimum" during training and then rediscovered back at school.

Other elements can be mentioned in relation to the results, such as the short time period at work and the taking of the second test immediately on return to school. Perhaps, the time period at work (2 weeks) was too short to permit both a full destructuring of the old school logic and an integration of learning and use logics. On the other hand, taking the second test just on the return may have had as consequence the masking of a possibly slow cognitive phenomenon of taking use logic in account.

It appears that the mental activities involved in the work world were too recent to be an object of symbolic manipulations. May be integration of use logic represent a high mental load: the information and fact of the work situation may be treated,organized, structured and stored by a more slow process, which can appear latter during curricula. Nevertheless, in the inherent load effect on this breakdown apparently cannot permit an almost immediate integration of new elements in a mental representation. Another possibility is that for people in traditional education, learning logic continued its evolution. These people appeared able to take care of new elements (A and B components) ,which means moving away from a topographic model and trying to link various functions. Moreover the control group did not increase their mental load during the period the experimental subjects were in training. The cognitive functioning stay of the same nature all the time. Maybe this situation justified the substantial improvement (in 2 weeks) in problem solving. In this sense, mental representation operativity of people functioning in only one logic (" learning logic" here)works even when, in breakdown cases, this operativity is temporarily disturbed.

There are a number of issues we would like to examine in future studies of mental representation in school-work transition situation e.g.: a) the relation between progress on logical problems and the pattern of errors; b) evidence for a pattern of breakdown in logical processes followed by an integration of logics; and c) evidence that vocational experience can contribue to a new structuring of mental representation in adults who combine school and work experience.

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Figure 1 : the test presentation of the problem solving task

- the wash machine-

MACHINE A LAVER LE LINGE
PRESENTATION

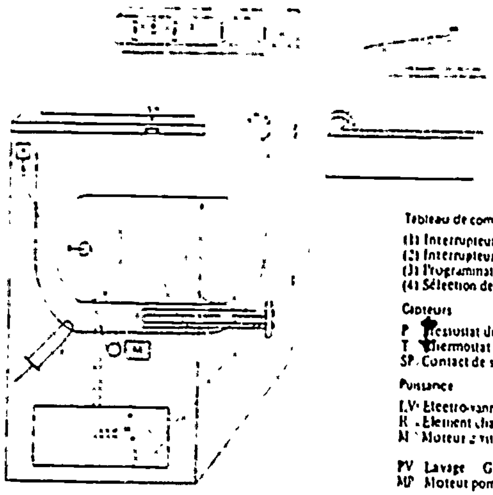


Tableau de commande
(1) Interrupteur marche arret
(2) Interrupteur d essorage
(3) Programmateur a cames
(4) Sélection de température

Capteurs
P Pressostat de niveau d eau
T Thermostat
SP. Contact de securité porte

Puissance
EV. Electro-vanne arrivee d'eau
R . Element chauffant
M Moteur 2 vitesses (PV).(GV)

PV Lavage GV Essorage
MP Moteur pompe

PRINCIPE DE FONCTIONNEMENT DE LA MACHINE A LAVER

1) Sélection du programme de lavage par commutateur du programmateur.
2) Sélection de la température de lavage par thermostat
3) Fermeture de la porte (S.P.) Sécurite empechant la mise en route si la porte n'est pas fermée
4) Mise sous tension par l'inter general (M/A)
   - alimentation du micro-moteur du programmateur
   - remplissage d'eau de la cuve commandé par l'électro-vanne qui est lui-meme commande par le pressostat.
5) Mise sous tension de l'élément chauffant quand le niveau d'eau est atteint (pressostat)
6) Mise sous tension du moteur lavage (PV) par la came n° 2 qui tourne dans un sens [illegible] dans l'autre apres un bref arrét entre les inversions.
   C'est l'operation prelavage ou lavage
7) Vers la fin de l'operation lavage, le thermostat coupe le chauffage, puis au bout de quelques minutes, la came n° 4 enclenche la pompe qui évacue l'eau usagee
8) L'operation rincage commence, commandée par la came n° 6 et le pressostat commande l'électro-vanne
   Le moteur PV fonctionne toujours dans un sens et dans l'autre
9) Si l'inter essorage a eté enclenché a la fin du 2eme rincage, il y a une operation essorage qui se fait (GV)
10) L'opération 8 et 9 recommence 4 fois
11) A la fin de la 4eme opération, il y a l'operation essorage finale jusqu'à la fin du cycle de programmation.

Faire un schéma de principe, [illegible] des
différents éléments pour assurer le fonctionnement
indiqué dans la présentation de la machine

SCHEMA DE PRINCIPE

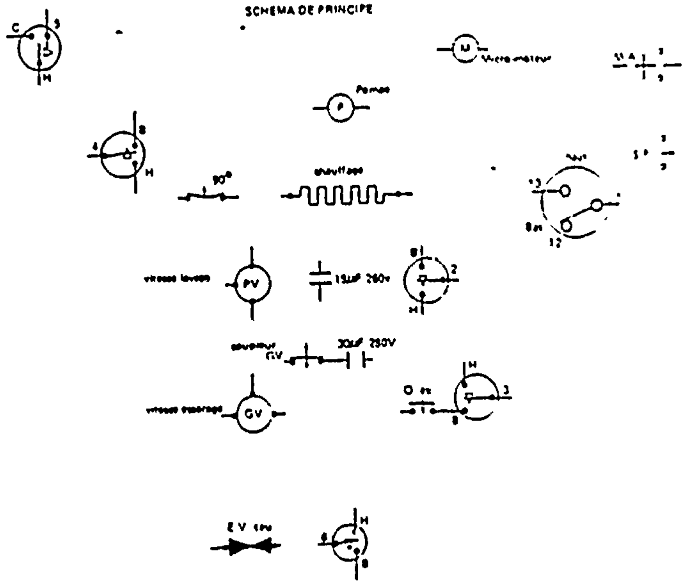


Figure 2 : the most simple solution to the task.

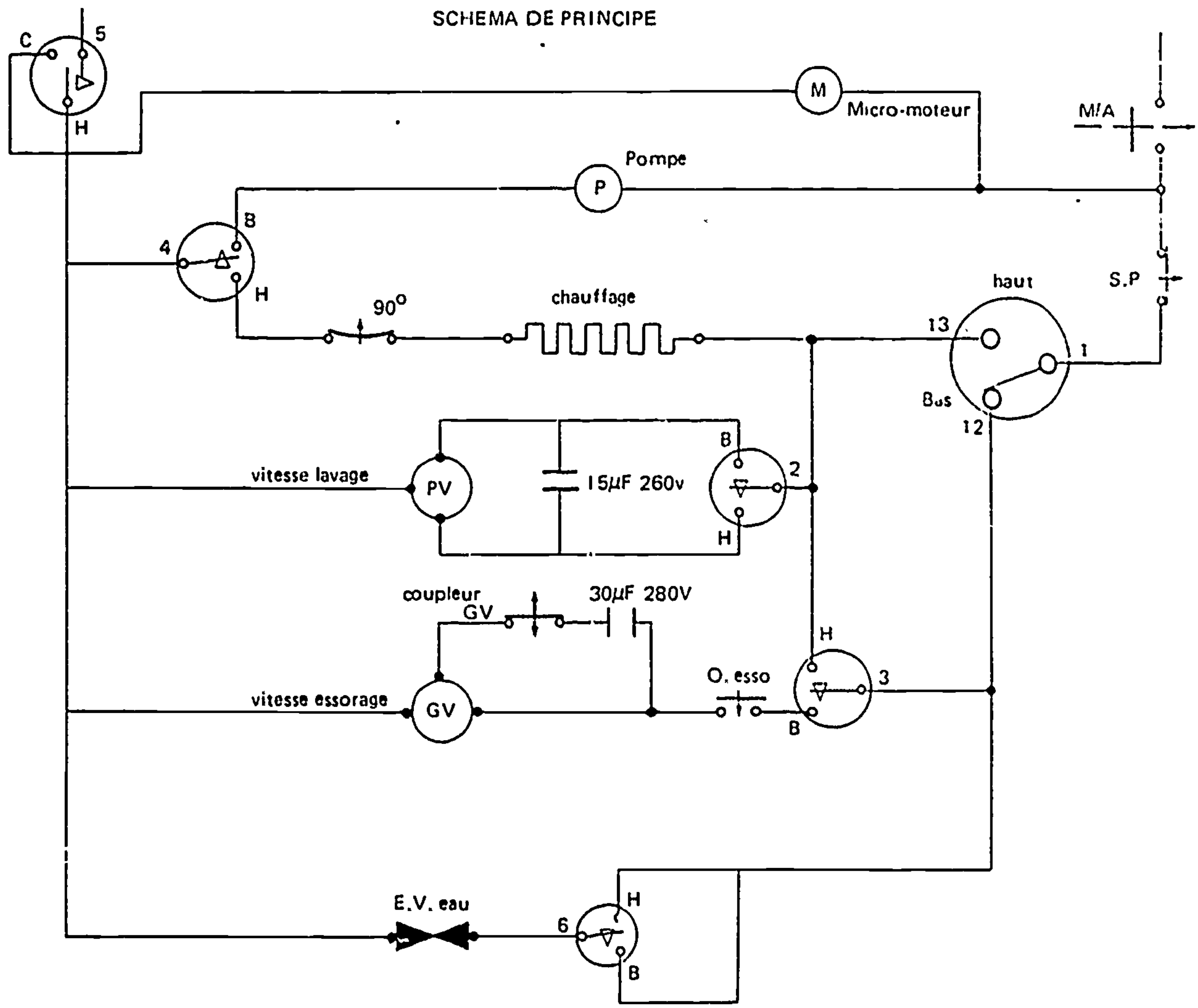
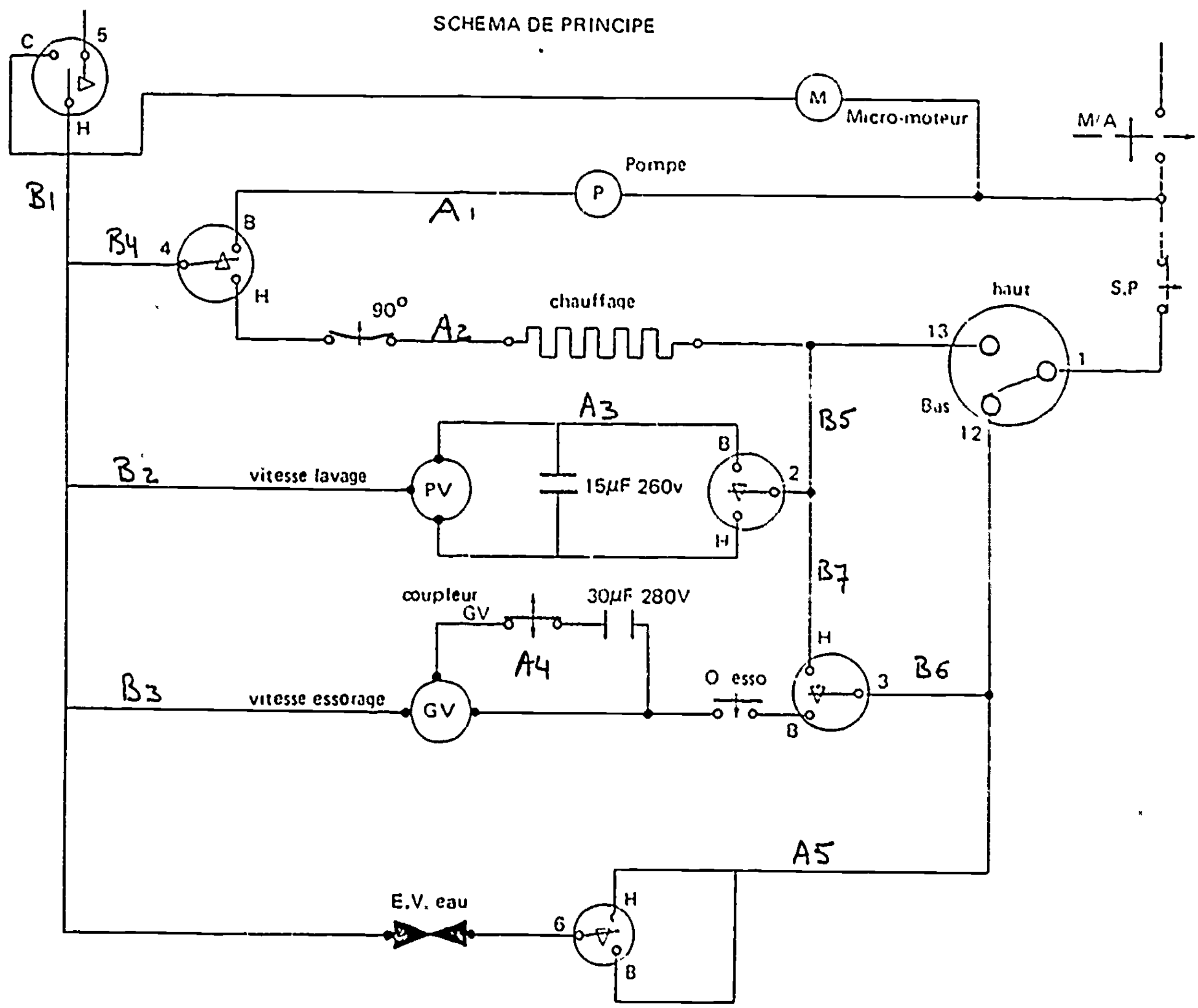


Figure 3 : the A and B components.



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