

**A SMALL-SCALE INVESTIGATION OF THE  
EXTENT TO WHICH THE SKILL OF  
MINDMAPPING IMPROVES CONCEPTUAL  
LEARNING IN HISTORY IN STANDARD 8.**

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MINDMAPPING IMPROVES CONCEPTUAL LEARNING IN HISTORY IN STANDARD  
8

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## **ABSTRACT**

This study investigated , in a small-scale , the extent to which the skill of mindmapping improves conceptual learning in history in Standard eight. The study was carried out using two Standard eight classes. Each class had approximately 30 pupils. One group (8C) formed the experimental group while another (8D) formed the control group.

The lesson planning and structure for the experimental group was carried out using Vygotsky's mediational teaching methodology.

The design and construction of the pre-and post tests corresponded with each other with regard to the type of questions asked. Questions were designed to test the learner's ability to interpret and use mindmaps as learning aids and the ability to recall with understanding . During the period between testing the groups received different types of intervention. The control group , 8D, received "normal" instruction ( i.e. that which they usually received in their History lessons).

This instruction consisted of eighteen lessons and the French revolution was the principal topic from which other topics were taken. This instruction was both teacher -centred and textbook-centred. The learners' participation was limited to answering of questions.

Intervention in the experimental group ,8C, involved teaching in the normal way and also modelling how to interpret and use mindmaps on simple non history at the beginning. Learners were given the opportunity to practice how to interpret and use mindmaps as learning aids under controlled guidance until they were able to operate in an autonomous way. The same procedure was used to teach simple and complex history content.

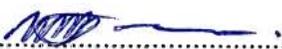
The tests results were analysed quantitatively and statistically . The results obtained supported

the hypothesis that conceptual learning in History can be greatly improved through the use of the skill of mindmapping.

The study ends by suggesting some recommendations for further research.

## DECLARATION

I hereby declare that this dissertation is my own work. It is being submitted in partial fulfilment of the requirements for the degree of Master of Education (Curriculum Development) in the Department of Education, University of Natal Pietermaritzburg. It has not been submitted to any other university for any degree.



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## CHAPTER 1

### INTRODUCTION AND OVERVIEW

#### 1.1 Background to the study.

As a secondary school deputy principal and history teacher, the writer is aware of a number of shortfalls of content based teaching. These problems comprise rote learning, poor thinking and underachievement on the part of the students. Various writers such as Perkins (1992, pg. 200 ) and Wallace and Adams (1992,pg.4) believe that a major problem resulting from the transmission mode of teaching is the lack of development of cognition of children in schools. What transpires in classrooms need to be highlighted. Schools seem to be dominated by the "recitation script" of rigid methods of teaching and assessment, which promote rote-learning and the regurgitation of information learned, exclusive authority structures and the lack of thought provoking type of teaching.

David Perkins (1992), in his book, "Smart schools: From training memories to educating minds", describes the principal shortfall in the outcomes of our education system as the fragile knowledge syndrome. By this he includes declarative, procedural and conditional knowledge. He states that ".....youngsters do not know bits of information they ought to know. Missing knowledge, we could call it, Missing from the minds of students who have been exposed to it and might have remembered it."

(Perkins, 1992, pg 21 ).

Perkins also speaks about "inert knowledge" - which he describes as knowledge that learners have gained , but would not make use of , unless quizzed about .

"Naive knowledge " - Perkins defines as failure on the part of learners to grasp the meaning of the main concepts and as a consequence, they cannot display knowledge of ideas.

Perkins goes on to write about "ritual knowledge" - which he describes as knowledge that students acquire and use only in school tasks and which therefore does not have value outside the school .

He writes, "Unfortunately, these schoolish performances make little connection to their intuitions about the way things are. When asked to explain something or ponder a situation or express a view , they reveal the old naive theories, as much alive as ever". (Perkins ,1992 , pg 25 ).

## 1.2 Motivation and aim of study.

The researcher's interest in this study started with a concern that content-based approach to history teaching in Black Secondary Schools appear to predominate. Examinations set by teachers in history clearly show that content-based teaching has been deeply entrenched, because examination questions do not require candidates to give answers that demonstrate insight. The poor results in Standard 10 in these schools , bear testimony to this state of affairs. Although separate marks for history are not available , the total percentage for standard 10 examination is 54% of which 15% is Matric Exemption. (The Education Foundation ,1997, pg 6 ).

However, the Senior Certificate History papers require candidates to have some insights into historical concepts and be able to grasp content. In this context, the researcher believes that teachers need to re-examine their teaching strategies in order to prepare students for the examination. In an attempt to shift from a content-based approach to teaching, teachers would have to plan lessons with specific concepts and skills in mind. In this regard, the researcher opted for the skill of mindmapping which he hoped would develop students' interest and knowledge in the subject.

The need for a paradigm shift that has already been described above, is in line with the Department of Education and Training, March 1997, Curriculum 2005. The outcomes-based approach that is being introduced by the government is primarily due to the growing concern around the effectiveness of traditional methods of teaching and training which were content-based. In terms of Curriculum 2005, success in learning is determined by outcomes rather than teacher input in terms of syllabus content. According to the Curriculum 2005, some of the following Critical Outcomes should be "successfully demonstrated" by learners:

- identify and solve problems by using creative and critical thinking
- organise and manage themselves and their activities responsibly and effectively
- collect, analyse, organise and critically evaluate information
- understand that the world is a set of related systems. This means that problem-solving contexts do not exist in isolation
- work effectively with others in a team, group, organisation and community

-show awareness of the importance of effective learning strategies, responsible citizenship, cultural sensitivity, education and career opportunities and entrepreneurial abilities " (Curriculum 2005, 1997, p.16).

Other Specific Outcomes which could have something to do with history or social sciences include general skills ,abilities , specific knowledge, attitude and understanding which learners should be able to demonstrate. (Curriculum 2005, 1997,p17)

Clearly a need exists to change from recitation script , from transmission of facts to construction of meaning. Mindmaps are a way of helping learners to become active and be able to construct their own meaning. The aim of this study is to investigate "The extent to which the teaching of mindmapping as a skill improves conceptual learning in History in Standard 8".

It is, however, worthnoting that the researcher's interest in this study also developed from other assumptions . The influence of Vygotsky's (1978) "Zone of proximal development " cannot be underestimated. For Vygotsky , the Zone of Proximal Development is ".....the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers ( Vygotsky , 1978, pg 86 ).

Feuerstein , Rand , Hoffman and Miller (1979) have had a profound influence on this study when they argued that " humans have a unique capacity to modify their cognitive functioning in response to changing demands across the life span . This modifiability can occur irrespective of age, etiology and severity of condition, which are often considered barriers to change "

( Feuerstein et al , 1979, pg 4) ).

### 1.3 Overview of the research project

A careful study of literature on Cognitive Development , including Information Processing System Theory, Piagetian and Neo-Vygotskian aspects of scheme theory was undertaken with a view to deriving a conceptual framework and a theoretical background. The quantitative approach was adopted by the researcher in this study. The researcher identified opportunities to teach mindmapping as a skill within the Standard Eight (Grade 10) history syllabus in a Secondary School in which all pupils and teachers were Black . One class was the experimental group in which the skill of mindmapping was explicitly taught and another was the control group. However , before any teaching occurred, the researcher administered a pre-test on the ability to interpret and use a mindmap as a learning aid and the ability to recall with understanding the content of a section of the History syllabus as presented in ( History in Action , Standard 8) (Davel and Rautenbanch , 1988).

The intervention programme consisted of eighteen lessons in three weeks and within those lessons, six lessons were used for training students to use mindmaps within the history subject. During those six lessons, the experimental group was taught content plus the ability to interpret and use a mindmap as a learning aid, while the control group was only taught content. The researcher used Vygotskian approach to skill training. The teaching methodology used in the intervention programme is of a "mediational" nature. In terms of Vygotsky, mediational teaching implies adult guidance. Vygotsky states that through "modelling" a person can be assisted to perform a complex skill. (Vygotsky in Tharp and Gallimore, 1988, pg 49).

It should therefore be noted that the researcher began by modelling the skill of mindmapping, using simple examples. Learners were given adequate opportunity to practice how to interpret and use the skill under controlled guidance, until they were able to use the skill independently. However, as soon as children gained mastery of interpreting and using mindmaps in simple tasks, the researcher proceeded to teach this skill in more complex tasks. The researcher gradually reduced the level of participation in this activity from that of being a full supporter to that of an observer.

At the end of the three weeks period, the researcher administered a post-test in both experimental and control groups, on the ability to interpret and use mindmaps as learning aids and the ability to recall with understanding.

#### 1.4 Chapter outline

Chapter two gives an overview of the literature survey on the Theories of Cognitive Development , the role of schemes in information processing and instruction , and the concepts of meaningful learning and transfer of learning.

The focus of Chapter Three is an in depth look at the research design . This incorporates research technique , study site, study population , study sample, subject material , design of the pre and post tests, administration of the pre and posts tests and the design of the intervention programme.

Chapter Four, focuses on presentation, analysis and discussion of results. This involves analysis and discussion of pre and post tests results.

Chapter Five the observations, critique and suggestions for further research are put forward.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter aims at reviewing theories of cognitive development relevant to the formation and elaboration of schemes. This discussion of how various writers perceive the development of cognition, will be followed by an overview of the role of schemes in information processing and instruction and the concept of meaningful learning . Finally, the role of meaningful learning in teaching students information that will enhance subsequent learning and transfer of learning will be discussed.

#### 2.2 Theories of Cognitive Development

Much research has been conducted on the cognitive development of children. This research has been approached from several theoretical perspectives. However, for purposes of this study , attention will be focused on the three main theories of cognitive development. These are Piagetian theories, Vygotskian theories and Information Processing theories. All three are constructivist theories , Information processing and Piaget's theories being cognitive constructivists, while Vygotsky's is a social constructivist theory.

### 2.2.1 Piagetian theory of assimilation and accommodation as a model of the cognitive development

Piaget's theory is premised on the notion that knowledge construction is a dynamic and continuous process, whereby the individual interacts with the environment, thus bringing about cognitive development. (Gredler,1992,pg222)

Piaget operates within the framework that the child is an active learner and the teacher's role is simply that of providing the environment to enable the child to discover things on his own. Piaget's theory of cognitive development demonstrates how the mind develops and change its structure through repeated interaction with the environment. For Piaget, the mind meets the environment in an "extremely active and self-driven" manner. (Flavell,1977,pg 6)

Various writers such as Meadows (1983, pg 70) , Kluwe and Spada ( 1980, pg 252) and Murray (1979,pg 166) all indicate that the child has a constructive role to play in the development of his own cognition. This s/he does through the process of adaptation to the environment. For Piaget, adaptation to the environment is absolute requirement for growth. He argues that the "process of growth is gradual and the child has the whole of childhood to accumulate growth". Implicit in the theory is the idea that cognitive growth could enable an individual to handle with skill, various kinds of information. (Piaget in Flavell,1977, pg 8)

It is worthnoting that the adaptational process has two complementary aspects which Piaget refers to as "assimilation" and "accommodation". In his view, these are fundamental processes in cognitive development.

Assimilation is the integration of the new data with existing cognitive structures. It involves the interpretation of events in one's familiar way of thinking about things.

The new information fits with what an individual already knows. Accommodation incorporates taking into account the structure of the external data . When accommodation has occurred, an individual's mode of understanding things changes, for he discovers something he was not previously aware of .

Piaget argues that "assimilation" and "accommodation" are independent aspects which operate jointly in encounters with the environment at all levels of cognitive functioning. Both aspects make a vital contribution to the construction of knowledge. Piaget writes, "what you know already will greatly shape and constrain what environmental information you can detect and process, just as what you can detect and process will provide essential grist for the activation of present knowledge and the generation of new knowledge". (Gredler,1992, pg 223)

Through the recurrence of assimilation and accommodation the mind is being developed and prepared to deal with more unfamiliar assimilations and accommodations. Piaget argues that during the process of cognitive development ,both assimilation and accommodation are regulated by "equilibration" This "equilibration" is indispensable to cognition. (Gredler ,1992, pg 227)

Piaget describes equilibration as a continuous "self correcting and self regulating" process that allows a person to develop and undergo transformation , while also retaining some

elements of firmness. For him "equilibration" is the fundamental concept on which development depends. (Meadows,1983, pg 8)

However, various writers such as Murray (1979, pg 167) and Meadows (1983,pg 8) agree that the development of cognition is also dependent on the following factors:

- (a) physical and logico-mathematical experience
- (b) maturation
- (c) social interaction and transmission

When cognition occurs , Piaget maintains that the three above-mentioned factors are coordinated by equilibration.

Gredler distinguishes between the following two ways in which knowledge is constructed:

#### Physical experience

She describes this as a process whereby the physical features of the objects are abstracted by the learner and assimilated into his cognitive structure, while accommodation takes place simultaneously.

#### Logico-mathematical experience

For Gredler, this refers to a process whereby the learner reflects on his actions with a view to organize them logically.

Piaget approaches cognitive development within the broad concept of stages. For him each stage is characterized by underlying structures or schemes.

Schemes are defined as "an action or series of actions , coordinated and systematic in its application across environmental situations". Piaget distinguishes between sensorimotor schemes and cognitive schemes. According to him, sensorimotor schemes involve among

other things, grasping, sucking and looking and they "are not abstract mental structures". Cognitive schemes are defined as "mental actions rather than motor actions". They are the outcome of a modification and change in the sensorimotor schemes. (Piaget in Daehler and Bukatko 1985, p 29).

For Piaget, individuals operate within the system of these structures or schemes and cognition is determined by advances through the stages. He believes that each stage is distinguished by a particular mode of thinking (Meadows,1983, pg 17)

However, in Piaget's view, a state of "cognitive conflict" or "disequilibrium" may occur when the learner discovers that there is a contradiction between his mode of thinking and the activities in the environment . This can be as a consequence of unfamiliar data with which an individual may be confronted. Unless this kind of conflict is sorted out through assimilation and accommodation , it could have a negative impact on a person's cognitive development (Piaget in Gredler ,1992, pg 225).

Piaget's theory of stages can be summarized as follows :

- \* sensori-motor period : This period is characterized by "practical schemes" such as reaching, grasping and pulling. This stage comes to an end when sensorimotor schemes are changed into logical cognitive structures.

- \* pre-operational period : Although cognitive schemes do exist during this period ,they are not well organized. The cognitive activities at this stage are not absolutely logical.

\* concrete operations : At this stage , the child begins to reflect on his behaviour and has rudimentary knowledge of the physical world.

\* formal operations : This is the stage where thinking is at the highest level. In terms of Piaget, this is also the stage of advanced form of logical thinking which is often associated with the adolescent and adult years. The development at this stage depends on the individual's earlier adaptations. The researcher's subjects ( 8C and 8D) responded to tests questions in ways that seemed to be suggestive of Piaget stage of formal operational thinking.

Interestingly , for Piaget, development is seen to be a gradual process which manifest itself through the stages. The theory suggests that at each stage, vigorous cognitive structures are constructed. (Gredler,1992,pg 230 ; Meadows, 1983, pg92-3 and Daehler and Bukatko (1985, pg 30)

Piaget's theory has been a valuable contribution in the study of the child's cognitive development, for it demonstrated that in every cognitive encounter with the environment, assimilation and accommodation function together in an interdependent way. It further demonstrated that children have a capacity to develop, depending on the cognitive structures available to them at each stage.

### 2.2.2 Information Processing Theories

In the Information Processing theory, the focus is on how the individual acquires, processes, stores, retrieves and applies knowledge. Cognitive development and problem solving are the major goals of the acquisition and processing of data. (Gredler ,1992, pg192)

Information processing differs markedly from Piagetian and Vygotskian theories in that its proponents believe that learning is a consequence of the learners actions and the environment has absolutely no impact in this regard. The fundamental premise underlying information processing theory is that, human memory is central to cognition. In terms of this theory , human memory is perceived to be an intricate organizer and processor of information. (Gredler ,1992, pg180)

For information processing theorists, cognitive activities are regulated by "schemes". These "schemes" have an influence on how the individual comprehends information. Gredler (1992), define a scheme as "a large organization of the knowledge structure". The information processing theory suggests that cognition is to a large degree , dependent on the activation of the knowledge structures or schemes possessed by an individual. Gredler states that the information processing theorists place emphasis on strategies as the bases for academic activities. The perception is that if properly introduced , modeled and well practised in time, strategies can be applied in almost every sphere. She further maintains that the information processing theorists concern themselves with the concept of the lack of "transfer". Gredler describes transfer as "skills or knowledge learned in

one context or situation that later are applied in new a context" (Gredler ,1992, pg 200). In terms of information processing theorists, the problem of the lack of transfer is rooted in rote learning, which " occurs if the learner lacks the relevant prior knowledge necessary for making the learning task potentially meaningful, and also if the learner adopts a set merely to internalize it in an arbitrary, verbatim fashion". (Ausubel in Entwistle ,1985,pg 72).

For information processing theorists, cognitive development can only be attained through meaningful learning. The theory suggests that this kind of learning occurs if the new information is integrated with already existing concepts or schemes in the cognitive structure.

### 2.2.3 Vygotsky's theory

The basic premise of Vygotsky's theory is that human cognition develops through social interaction. Vygotsky argues that the "symbol systems of the culture and the interactions with members of the culture are the essential factors in cognitive development." (Vygotsky in Gredler ,1992, pg 270)

Piaget therefore suggests that the level of cognitive development attained by an individual, is contingent upon a particular culture to which he or she belongs.

In terms of Vygotsky's law of genetic development , all intricate mental activities commence on the interpsychological plane, that is, as social interactions between people and gradually proceed to the intrapsychological plane, which means they are internalized

by the learner. Vygotsky states that "we observe those in the social environment acting in certain ways and we internalize their actions so that they become part of ourselves. (Vygotsky in Sternberg,1990, pg 242).

Vygotskian theorists suggests that the interaction with the members of a particular culture gives rise to higher forms of mental development. This stands in marked contrast to Piagetian approach which maintains that cognitive development is dependent of the mental structures governing cognition at a particular stage rather than on socialization by members of a particular culture. While Vygotsky believes that different kinds of knowledge exists among different cultures, in contrast, Piaget maintains that a persons knowledge differs at different ages. (Meadows,1983, pg 3)

The concept of internalization is also central to Vygotskian theorists. Internalization is aptly described as "the process by which the social becomes the psychological " This implies that the child , through the actions and speech of others, is assisted to ultimately engage in action and speech in an autonomous way. (Vygotsky in Light,1991, pg 163) Vygotsky places emphasis on the role of speech and other symbols in the process of internalization. Tharp and Gallimore (1988,pg 44) write that, "language appears to be like the messenger who carries content from interpsychological plane to intrapsychological plane". This suggests that the symbols have a bearing on the psychological processes such as cognition and cognitive development.

The notion of the "zone of proximal development " is important in Vygotsky's theory.

Vygotsky defines the zone of proximal development as "the distance between the actual development level as determined by the individual problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers". Vygotsky in Tharp and Gallimore ,1988, pg 30)

The potential to gain from instruction is central to Vygotsky's theory. He argues that the interaction between adults and children could result in new schemes being constructed. The theory of the ZPD also suggests that development into autonomous level of performance can only be attained through assistance. Implicit in Vygotsky's concept of the ZPD, is the notion that learning should be a joint activity, characterized by mutual cooperation between the teacher and the child . In terms of the theory, the teacher has to perform the task of controlling and guiding the learning process. Wertsch writes "during the early periods in the ZPD, the child may have a very limited understanding of the situation, the task or the goal to be achieved, at this level , the parents , teachers or more capable peers offer directions or modeling and the child's response is imitative". (Wertsch in Tharp and Gallimore, 1988, pg 33)

Vygotsky refers to the kind of assistance that is provided by the teacher as "scaffolding". Tharp and Gallimore (1988) describe "scaffolding " as a metaphor that was first used by Wood, Bruner and Ross (1976) to explain the role of the teacher in structuring the child's learning situation by attending to the difficult aspects of the task ,thus enabling

the child to participate in more manageable aspects of the activity.

One of the ways in which an adult can assist the performance of a child in a ZPD is by modelling. Modelling is " the process of offering behaviour for imitation". Tharp and Gallimore argue that modelling is one of the effective forms of assisting performance, often employed in cognitive operations. The theory suggests that through observing others, an individual can learn how to perform and also retain a complex skill. For Vygotsky, the child develops concepts that are jointly constructed, through interaction with those who already possesses them. (Vygotsky in Tharp and Gallimore ,1988,pg 31)

Vygotsky distinguishes between "schooled" and "everyday" concepts. He describes "everyday concepts " as those that are learned mainly through speech and are practical. He further describes "schooled concepts" as those that are learned principally through symbol and incorporate written language . Implicit in Vygotsky's description of these concepts is the idea that meaningful learning of the schooled concepts depends on the existence of the everyday concepts in the learner's cognitive structures. (Vygotsky in Tharp and Gallimore ,1988, pg 107)

Both Vygotsky and Piaget argue that the child is very active in his cognitive development. The sharp contrast between them emanate from Piaget's belief that cultural members do not have a role to play in a child's cognitive development.

### 2.3 The role of schemes in cognitive development and in learning .

The schemes are important in all three theories. Phye and Andre (1986) describe schemes as "information-based structures which determine how a learner will view, approach and interpret instructional content. These structures represent bodies of information available to the learner and they depend on the person's prior experience and knowledge of the world for their effects" (Phye and Andre , 1968, pg 118).

Schwebel (1974) agrees that schemes can be defined in terms of the total knowledge structures that the learner possesses. He writes, "When speakers have understood the rule of grammar, they can use it in all sorts of different artificial manifestation. Similarly, once the infant has made the connections, a scheme is at his disposition, and he uses it in all sorts of different superficial manifestations".

For Pye and Andre (1986), a specific schema that a person activates when studying is to a large degree contingent upon the new information that person will "mark for entry into the working-memory encoding system."

He further states that "people tend to activate particular schemes for use in given situations, depending on the particular context in which they perceive that particular situation and on the specific expectations they have regarding how the lesson material should be used".(Phye and Andre ,1986, pg 118).

Viewed in this way, a scheme furnishes a framework for people to understand new information. In terms of Phye and Andre (1986), the activation of a scheme actually facilitates the assimilation of new material. They suggest that the selection and use of the cognitive structures called schemes has an impact on the instructional process. According to Phye and Andre (1986) "there are many potentially available schemes for a given instructional task . Hence the learner uses contextual cues to help determine which specific scheme is most likely to apply to the instructional problem at hand." (Phye and Andre ,1986 , pg 118).

Implicit in the above statement is the idea that if properly taught, schemes can assist students' comprehension and memory of various kinds of information. It further suggests that it is imperative for educators to be conscious of learners' schemes during instruction.

Also central to Phye and Andre (1986) notion of schemes is the view that they are the outcome of our experiences of the world and they symbolize "dynamic systems" which are frequently being produced, combined, and maximized by new data which becomes available to the learner. For Pye and Andre (1986), people apparently interpret the new information on the bases of their inherent schemes. They write, " One way in which specific schemes are activated is controlled by the particular perspective the learner takes on some new unit of information". (Phye and Andre ,1986, pg 119)

Piaget in Phye and Andre (1986) also shows that in Piagetian theory, schemes determine how the individual perceives, interprets and responds to the new information.

They write, "every existing scheme seeks to assimilate into itself any object. For instance, a child of nine months may be observed to try all sorts of schemes on a new object, picking it up, rattling it, biting it etc". In terms of Piaget, accommodation into a scheme commences as a trial and error in order to grapple with an unfamiliar situation. He further explains that the activation of two schemes by the common stimulus may result in conflict if their interpretations contradict. He goes on to say that more often than not, the two schemes tend to accommodate to one another and the consequences of which could be the birth of a third scheme. Piaget also believes that mutual accommodation as a process proceeds until all conflict is resolved by the formation of an all encompassing scheme. According to Piaget, this process is referred to as equilibration. (Piaget in Phye and Andre, 1986, pg 278-9)

Goetz in Phye and Andre (1986) also agrees that when people process information, they do not just interpret what they find, but also contribute their knowledge and adapt it to suite their opinions and also make deductions about it, in order for it to be appropriate to their existing scheme. (Goetz in Phye and Andre, 1986, pg 120)

Anderson (1981) argues that in an attempt to understand a new situation, individuals interpret that situation in terms of their existing mental structures. He further states that if they become successful in their interpretation, then a need does not exist for the creation of a new scheme. However, if they fail to comprehend the new situation, then

they do create new schemes. Anderson also believes that various schemes could be "created for any given domain each with their own , built in , context dependencies determining when each one is applicable". (Anderson ,1981, p 357).

Anderson (1981) suggests that the learner's interpretation of the text is central to what he learns.

Phye and Andre (1986) also distinguish between two different types of schemes. They suggest that these schemes are a product of an "interaction between the learner and stimulus characteristics ". Phye and Andre describe these schemes as "the task scheme- the first structure which is a goal-oriented set of procedures that control the ways in which the learner will activate both overt and covert encoding activities in order to achieve the desired instructional outcome. knowledge scheme- the second structure represents the type of interpretation that the learner will apply in attempting to acquire the new information ". (Phye and Andre ,1986, pg 123 ).

Phye and Andre therefore postulate that the "task scheme" is carefully chosen as a consequence of what is expected in the material being presented, while a "corresponding knowledge scheme" is selected because it relates well to the learner's cognitive structures For Phye and Andre, this knowledge scheme is essential for interpreting new information.

#### 2.4 The concept of meaningful learning.

Ausubel in Entwistle (1985) defines meaningful learning as a process of knowledge acquisition whereby the new information is integrated into the learner's cognitive structure. Ausubel believes that the consequence of the integration that occurs between the new information and the prevailing mental structure "is an assimilation of old and new meanings to form a more highly differentiated cognitive structure." (Ausubel in Entwistle, 1985, p 74).

Hudgins (1977) also agrees that meaningful learning assists in integrating new information into the student's cognitive structure. He suggests that it is much easier to keep in mind information that has been learned meaningfully for a longer period of time, because the fundamental concepts can be retrieved even long after they have been gained. It should be noted that the possession of schemes of knowledge structures by the learner facilitate meaningful learning. Hudgins believes that a learner who has acquired broad concepts in a particular field can process information with ease than a learner whose knowledge has been gained by rote learning. (Hudgins, 1977, p36).

Ausubel explains that rote learning occurs when the material consists mainly of "arbitrary associations" and if the learner lacks appropriate basic knowledge necessary for comprehending the task at hand. In Hudgins view, rote learning is equal in effect to not learning at all. He argues that the material learned by rote can only be stored in a verbatim way and is easily forgotten. He further states that rote learning strains memory and hence much of what is learned in this fashion is prone to decay. He

believes that it is for this reason that students fail to recall material learnt in cram sessions for examination purposes. (Hudgins,1977,p36)

For Hudgins , one of the features of meaningful learning is that it enables the learner to express knowledge learnt in various ways. The learner is therefore emancipated from the burden of memorization and verbatim reproduction. Also , he states that the acquisition of knowledge in any level of education depends much upon understanding concepts. For him, concepts facilitate the assimilation of new information "into an appropriate place " within the student's framework. (Hudgins, 1977, pg 32-4).

Gredler (1992) also agrees with Hudgins when she emphasized the significance of schematic knowledge in learning (Gredler ,1992, p 192). Central to Hudgins' analysis of meaningful learning is the notion that verbatim reproduction and the inability to "paraphrase" concepts learned are both indicative of the lack of understanding on the part of the student. Hudgins, however, believes that if material is learned meaningfully, the problem of being unable to implement ideas learned as is often the case with rote-learning, can be eliminated. For him, meaningful learning appears to involve, principally, "understanding relationships between specific learning and broader bodies of content, concepts and principles ". (Hudgins, 1977, pg 59).

Hudgins also agrees that nothing is as futile as processing a large repertoire of knowledge which a student is not certain where and how to apply. (Hudgins ,1977, pg 59).

David Ausubel in Entwistle (1985) suggests that it is only through understanding concepts that students could be able to learn meaningfully. He writes, "Most pupils develop a rote-learning set if they conceal rather than admit original lack of genuine understanding". (Ausubel in Entwistle, 1985, pg 72).

Ausubel in Entwistle (1985) also distinguishes between two different types of meaningful learning.

"Representational learning" - he describes this as the fundamental form of meaningful learning upon which the rest of meaningful learning depend. It incorporates learning what symbols mean and represent.

Concept learning - he defines this as the acquisition of the same response to a number of stimuli that have common characteristics. This type of learning is a prominent feature in subject matter acquisition.

Ausubel goes on to say that concept learning can further be differentiated into two methods:

Concept formation - Ausubel in Klausmeier (1974), considers concept formation to be the learning of relevant "attributes" and "rules" by which instances can be categorized as examples or non-examples of the concept.

Concept assimilation - this method is predominant among adults and children of school going-age. This has been discussed in the section on Piaget's theory.

Ausubel in Entwistle (1985) suggests that concept acquisition is a stagelike process of

hypothesis generation , testing and generalization and also occurs through experience. To cite an example, the young child comes to know the concept "dog" through successive encounters with dogs, cats , cows and so on, until they can generalize these criterial attributes that constitute the concept of "dog".

Ausubel goes on to state that the integration of the new and the already acquired concepts, maximizes the learner's vocabulary. This often results in concept assimilation. In his view, the appropriate concepts that are prevalent could be employed to speed up the process of defining the "criterial attributes of new concepts". (Ausubel in Entwistle, 1985, pg 73-4)

The theories of both Ausubel in Entwistle (1985) and Hudgins (1977) on meaningful learning, place emphasis on the appropriateness of the existing ideas in the learner's cognitive structure as the pre-condition for meaningful learning. Both writers suggest that meaningful learning could be enhanced by the integration of new material into the learner's existing knowledge structure. Vygotsky in Moll (1990), also states that schemes assist learners to assimilate new knowledge . He argues that if they cannot assimilate because of contradiction between existing schemes, then they must accommodate by modifying existing schemes or developing new ones.

(Vygotsky in Moll,1990, pg 229)

#### 2.4.1 The role of meaningful learning by teaching students information that will enhance subsequent learning.

Phye and Andre (1986) emphasize the role of other "accessories" which are not an integral part of the instruction but are useful in terms of facilitating learning and remembering. They believe that the following can be used to enhance understanding of the instructional material.

##### 2.4.1.1. Advance organizers

Ausubel in Phye and Andre (1986) describe advance organizers as "techniques for teaching the student new information that could be used to ease the learning of subsequently presented instruction . The material will encourage the process of constructing a meaningful representation of the instructional material (Phye and Andre 1986, pg 105 ).

Ausubel in Phye and Andre believes that advance organizers serve as a scheme to minimize the difficulty of learning "subsequently presented material". He describes advance organizers as "statements that are presented at a higher level of abstraction , generality and inclusiveness than the new material to be learned. Ausubel goes on to say that advance organizers are a bridge between what the learner already knows and what he needs to know before he can meaningfully learn the task at hand ". (Phye and Andre ,1968, pg 103 ).

Ausubel in Phye and Andre therefore suggests that for advance organizers to be effective, it is essential to know what the learner already knows. Hudgins (1977) argues that advance organizers can help to lay firm foundations in those areas where students lack background information. He also states that organizers can be of great assistance in "orientating learners towards the new material". (Hudging,1977, pg 71).

Ausubel in Hudgins (1977) suggests that the role of the "organizational schemes" in providing the learner with a framework to "process and integrate, new information" , cannot be underestimated. (Hudgins,1977, pg 92 ). David Ausubel places emphasis on the facilitating effect of the advance organizers on the learning process, by preparing students for the subsequent instruction.

"Advance organizers consist of information which is presented before the student tackles the main instructional content. These organizers include rules and analogies that will apply to the target content or perhaps supply concrete instances which can later be used. The purpose of such organizers is to provide the learner with a knowledge vehicle for subsuming or assimilating the target material into memory." (Ausubel in Phye and Andre , 1986, pg 128).

It appears that advance organizers have a positive impact on subsequent lessons. It does seem also that this concept of advance organizers can be of greater instructional value. Advance organizers, from this perspective, are seen as providers of a framework that assist to hasten the integration of the new information. (Phye and Andre , 1986, pg 129).

#### 2.4.1.2. The teaching of cognitive skills

What do we mean by the term "skill"? Phye and Andre (1986) define a skill as a scheme or rule that has been learned so much that the learner has , through practice, progressed from "error-prone state" to quick automatic and relatively "error free state". ".....,a skill can be viewed as a highly developed sequence of procedures that acquire the characteristic of automatic processing." (Phye and Andre ,1986, pg 144).

Newell and Rosenbloom in Phye and Andre (1986) define "practice" as a "term for talking about learning skills through the repetition of their performance". (Newell and Rosenbloom in Phye and Andre ,1986, pg 143 ).

Hudgins (1977) agrees that the highest level of performance can be achieved only if skills are practised more often because improvement cannot be automatic. (Hudgins,1977,pg93)

However, Phye and Andre (1986) tend to describe cognitive skills within this paradigm. They write, " When cognitive skills such as problem solving and studying are developed to such a high level that their appropriate use is automatic , one makes reference to the skilled learner. So what is implied is a highly specific mode of information processing that requires little or no conscious monitoring . These highly developed schemes provide the basis for skilled performance. " (Phye and Andre , 1986, pg 144 )

For Phye and Andre (1986) skilled performance is rooted on the "automatic processing of sequences " that were earlier learned through conscious effort. They further state that, through practice, the much learned sequence stored in the long term memory could be processed automatically once activated, "via controlled processing." (Phye and Andre , 1986, pg 145).

Phye and Andre (1986) distinguishes between two different methods of processing. He writes, "Controlled processing"- incorporates the conscious processing of information "Automatic processing"- has to do with the "overlearned scheme of sequences " that are retained in the long term memory. This automatic processing, once activated, does not rely on the learner's conscious control. They suggest that "the scheme, plan, skill etc that has become an automatic process is activated automatically without the necessity of active control or attention." (Phye and Andre ,1986, pg 145 ).

#### 2.4.1.3 The skill of mindmapping as a mnemonic device

Novak and Gowin in Howard ( 1987) define mindmapping in terms of notation systems which are used to "represent the structure of some domain to be taught or learned". The key concepts in a domain are taken to draw a map and label pointers are to link the concepts. (Novak et al in Howard ,1987 , pg 169 ).

Lochhead and Clement (1979) suggests that mindmapping can be of great value in developing advanced "evaluation tools and also novel instructional methods which facilitate a higher level of comprehension in learners. (Lockhead et al,1979,pg 146).

Buzan (1994) argues that mindmapping as a skill can be used in almost every activity that incorporates ,amongst other things, thinking, remembering, planning, creativity, essay writing, examinations , meetings , communication and note taking. ( Buzan ,1994, pg 112 ). He further states that a mindmap can facilitate " a much greater ability to recall and a much greater overall understanding." (Buzan ,1994, pg 114 ).

He suggests that a mindmap ,if properly taught, can certainly assist the learners in various ways . These may include comprehending a complex domain and better performance at various tasks. Buzan provides a summary of the merits of mindmaps over linear form of writing. He writes

- "(a) The centre or main idea is more clearly defined.
- (b) The relative importance of each idea is clearly indicated.
- (c) The links between the key concepts will be immediately recognisable because of their proximity and connection .
- (d) As a result of the above, recall and review will be both more effective and more rapid.
- (e) The nature of the structure allows for easy addition of new information without messy scratching out or squeezing in etc.
- (f) In the creative areas of note making such as essay preparation etc, the open-ended nature of the map will enable the brain to make new connections far more easily." (Buzan ,1994, pg 91 ).

Buzan (1994) postulates that the school has and is still training learners to write in vertical lines and as a consequence ,there has been much dependence on linear information by society. However, he argues that a shift can be made from this paradigm. "The mind is perfectly capable of taking information which is not linear e.g. non linear forms of print like photographs, illustrations and diagrams". (Buzan, 1994 ,pg 90 )

Phye and Andre (1986) argues that" mnemonic devices " facilitate learning and retrieval of information. He points out that a long-lasting image of the material can be constructed through these devices. (Phye and Andre ,1986,pg 131). Phye and Andre suggest that mnemonic devices could enable a learner to encode and recall with accuracy enormous amount of information within a relatively minimum period. He emphasized that "mnemonic techniques can have a fruitful existence within the instructional milieu. ....actual learning of a useful mnemonic may require much practice and effort to achieve". (Phye and Andre ,1986, pg 132).

Phye and Andre (1986) therefore postulates that the focus should be on teaching learners about mnemonics "as a class of instructionally useful procedures", which can be helpful in tackling a wide variety of material. ( Phye and Andre ,1986, pg 133 )

Kulhavy , Lee and Caterino in Phye and Andre (1986) agrees that adjunct maps assist learners significantly in remembering information. He writes, " Studies have shown that the relation between maps and discourse is a facilitative one, and that the spatiality of the

map is an important variable for producing such facilitation ". (Kulhavy et al in Phye and Andre ,1986, pg 133)

For Kulhavy et al maps can be of great assistance in maximizing the extent to which learners can be able to remember.

### 2.5 Transfer of learning

The capability to use knowledge gained in the classroom to solve problems in real-world situations, demonstrates that learners have moved away from the recitation script referred to earlier in Chapter One.

Hudgins (1977) defines transfer as the ability to apply knowledge gained in a school context to real life context outside the school.

"Many people believe that transfer is the principal learning outcome of schooling. In that view, learning is important not only because it represents an immediate end but also because it paves the way for subsequent learning, and because what is learned in school today will transfer to later learning outside of school " (Hudgins ,1977, pg 144).

Hudgins also agrees that reading skills are taught at a primary level not because of the significance of content material but because of the "transferability" of such skills to other spheres of life in real world situations.

For Salomon and Perkins (1989), there are two processes for attaining transfer. He writes,

"We argue that transfer occurs in two ways . Low-road transfer depends on extensive, varied practice and occurs by automatic triggering of well-learned behaviour in a new context. High-road transfer occurs by intentionally mindful abstraction of something from one context and application in a new context. Such transfer can either be of the forward-reaching kind, whereby one mindfully abstract basic elements in anticipation for later application or of the backward-reaching kind, where one faces a new situation and deliberately searches for relevant knowledge already acquired " (Salomon and Perkins ,1989, pg 113)

What do we mean by the terms "abstraction" and "mindfulness"

Salomon and Perkins (1989) define an "abstraction" as a scheme that has an effect in a variety of situations. "If a cognition or behaviour comes to operate in a wide range of circumstances , this shows that it has in some sense become an abstraction."

The term "mindfulness" refers to deliberate application of processes that are not automatic, in a "metacognitively guided" fashion. (Salomon and Perkins ,1989, pg 122).

Implicit in Salomon and Perkins theory of transfer , is the idea that it is only meaningful learning, described earlier, which satisfies the requirements for high -road transfer.

Salomon and Perkins (1989) further suggest that despite the fact that transfer is not practised in classroom situations, however, it can certainly be promoted. "If we teach it, we are most likely to get ". Salomon and Perkins ,1989, pg 137 ).

Brown ,Bransford , Ferrara and Champione in Flavell and Markman (1983) argue that transfer of learning does not occur automatically, the onus is on the learner to search for resources which are to the solution of the problem at hand. Brown et al further state that transfer of learning also depends on the "ability to recognize the appropriate types of commonalities, otherwise, a problem may be misclassified". (Brown et al in Flavell and Markman, 1983, pg 143)

Brown et al also suggest that the concept of transfer is tantamount to what Feuerstein and his colleagues (1980) refer to as "bridging". In this context, a learner is taught a general principle "and then be helped to see how it applies to a particular situation, such as social-problem solving, learning mathematics and so forth". (Brown et al in Flavell and Markman, 1983, pg 143).

The concept of bridging is premised on the view that learners have to understand how a particular principle applies to new contexts, in order for them to be able to practice transfer in an autonomous way.

Central to Brown et al notion of transfer is the ability of learners to recognize how the new problem is related to previously encountered situations. However, the rote-learning of principles, formulas or concepts reduces the probability for high-road transfer to occur. (Brown et al in Flavell and Markman ,1983, pg 145).

The theories of transfer that have been discussed seem to be based on the assumption that education should enable students to solve problems in later life , more effectively and efficiently. They suggest that the more guidance the learner receives, the more chances that transfer will occur.

## CHAPTER 3

### RESEARCH DESIGN

#### 3.1 Introduction.

An experimentally-based research design using a pre-test , intervention and post-test was employed. The subjects were two groups of standard 8 pupils. One group (8 C ) formed the experimental group while another (8 D ) formed the control group. The two groups were initially tested for knowledge regarding the skill of mindmapping and the ability to recall with understanding .

The teaching of the skill of mindmapping within the standard 8 history topics on the French Revolution was used as the material for the intervention teaching, in which different teaching approaches were employed in each group. In the experimental group, a "normal" teaching approach (i.e. the teaching approach usually used in this school) plus the skill of mindmapping were employed. This was aimed at determining whether the teaching of the skill of mindmapping could facilitate understanding of the subject matter. The control group was taught in the "normal" approach without any additional skills training. The control group was used to determine whether the tests themselves has any significant effect on learning.

A post-test comparable to the pre-test was administered in an effort to determine whether the level of learning with understanding has improved.

The lesson planning and structure for the experimental group was carried out using Vygotsky's mediational teaching methodology referred to earlier in Chapter One.

### 3.2 Study site

The study was carried out at a Black Secondary School in Durban. At the time of this research the school was administered by KwaZulu/Natal Department of Education and Culture (Ex-KDEC). The medium of instruction in all school subjects was English with the exception of Isizulu language.

### 3.3 Study population

The school caters for approximately 750 pupils from standard 6 to standard 8. All pupils are Black, and almost all speak isiZulu as mother tongue.

### 3.4 Study sample

The study was carried out using Standard 8C as the experimental group and Standard 8D as the control group. Each class had approximately 30 pupils. The test questions were administered to all pupils in the two groups. These groups were mixed ability groups and both classes consisted of boys and girls in approximately equal numbers.

### 3.5 Design of pre-and post-tests.

The design and construction of the pre- and post tests corresponded with each other with regard to the type of questions asked. Questions were designed to test the learner's ability to interpret and use mindmaps as learning aids and the ability to recall with understanding. Correct answers to questions enabled the researcher to identify the level of understanding a specific learner has reached with regard to the ability to interpret and use mindmaps as learning aids and the ability to recall with understanding. The tests had two sections of 20 marks each ( i.e. section A and section B). Section A tested the pupils' ability to recall with understanding. If a question was answered in a full sentence with a correct spelling , 2 marks were allocated. If a question was answered correctly but with a wrong spelling , a 1.5 mark was allocated. If a question was answered by giving one word with a wrong spelling, s/he was allocated 0.5 mark . If a pupil answered by giving a correct answer in each space provided, 1 mark was allocated. But if the spelling was wrong 0.5 mark was allocated. Test questions and acceptable answers can be found in Appendix 2.

3.6.??

#### 3.6.1 Administration of the pre- and post-tests.

The pre-test was administered to both the experimental group and to the control group on the same day . In both classes, the test was administered by the researcher himself. In order to ensure that language barriers did not play a significant role in the results since all students were second language learners, each question was fully explained orally by the researcher.

The post-test was administered to the experimental group and to the control group in precisely the same manner in which the pre-test was administered. The post test was conducted two days after the sequence of lessons were completed.

3,62!

### 3.7 Design of the intervention programme

The control group , 8 D, received "normal" instruction (i.e. that which they usually received in their History lessons). This instruction was based on the regular programme of teaching and learning that occurs in schools on daily basis. It consisted of eighteen lessons and the French Revolution was the principal topic from which other topics were taken. It was a typical lecture-type of instruction which was both teacher-centred and textbook-centred. The scope of learners' participation was so limited that they were confined to answering of questions. Emphasis was placed on listening, memorising and regurgitation of information during tests and examinations.

Intervention in standard 8 C involved teaching in the normal way ( i.e how they are usually taught in history lessons) and also "modelling" or "demonstrating" how to interpret and use mindmaps on simple non history topics at the beginning. Vygotsky believes that modelling is one of the most effective method of assisting learners to gain mastery of complex skills. (Vygotsky in Tharp and Gallimore,1988, p 31). Learners were afforded ample opportunity to practice how to interpret and use mindmaps as learning aids under controlled guidance until they were able to operate independently. The same procedure was followed with the teaching of complex history content.

The intervention took place in eighteen lessons of 35 minutes each and within those lessons 6 lessons were used for training a new skill. Two lessons per week were used for training a new skill. These occurred on consecutive days. It should be noted that only those lessons which are specifically related to the skill of mindmapping are shown in appendix one. However, before these lessons began, a pre-test on previously taught sections was administered. Two days after the three weeks session, a post-test on both content and skill was administered. An outline of these lessons can be found in the preceding pages.

### 3.7.1: LESSON 1

#### SUBJECT MATTER

Mindmapping - subjects taught at school

- preparing for a party
- principles of the Congress of Vienna

#### INTRODUCTION

**In the experimental group** the lesson began when the teacher orientated learners in the skill of mindmapping . As a way of introduction , learners were asked to mention subjects that they do at school and the teacher used that information to demonstrate how to interpret and use a mindmap. (Appendix 1, lesson 1, mindmap 1)

This was done to make pupils aware that their ideas could be depicted in a map. Two other similar exercises were also done on the above-mentioned topics. It was hoped that

this would enable pupils to realise the role a mindmap could play in their own learning.

**In the control group**, the lesson was introduced by the teacher writing heading "Principles of the Congress of Vienna " on the chalkboard and informing the class that "Today we will learn about the principles of the Congress of Vienna".

### CONTENT

**In the experimental group**, learners were taught in the normal way and then guided on how to interpret and use a mindmap as a learning aid, using simple history subject matter. They were urged to "brain-storm" on subjects taught at school and on how they could go about preparing for a party. ( Appendix 1 , lesson 1, mindmap 2)

The main idea was placed at the centre of the drawing and all other contributions were noted on the chalkboard around the main idea in order to form a map.

The class then proceeded to learn about the Congress of Vienna. The learners were also shown for the second time how to interpret and use a mindmap , on that history content. The teaching followed the same pattern of "modelling" or "demonstrating " by the teacher, with learners participating by giving answers to fill in the open spaces. After having been reminded about one principle of the Congress of Vienna just as an example, the learners' contributions were filled in the empty spaces of the map that had already been drawn by the teacher. (Appendix 1, lesson 1, mindmap 3) The teaching pattern was used to enable learners to interpret and use a mindmap as a learning aid in an autonomous way.

**In the control group**, pupils were provided with notes which covered all the factual information students needed regarding the Congress of Vienna .

## CONCLUSION

**In the experimental group**, the lesson was concluded by the learners being given a home assignment on how to learn using mindmapping.

**In the control group**, the lesson was concluded when the learners were urged to study on their own at home what has been learned at school in preparation for the next lesson.

### 3.7.2: LESSON 2

SUBJECT MATTER: -Economic Revolution

-Social consequences of Urbanisation in Europe

## INTRODUCTION.

**In the experimental group** , the lesson started with the teacher reminding students of what has been learned in the previous lesson and what needs to be learned in this lesson.

The deliberation focused on the assignment that had been given to pupils. In this way the learners were afforded the opportunity to recall all the material that was covered in the previous lesson. The teacher continued to teach content in the "normal" way and learners were guided on how to interpret and use a mindmap , using simple history subject matter .

**In the control group**, the lesson began with the revision of the work that had been taught the previous day . The teacher then suggested to the class , "Tody we are going to learn about the Economic Revolution and the Social consequences of Urbanisation in Europe".

## CONTENT

**In the experimental group**, the teacher taught about the Economic Revolution and asked pupils to complete the mindmap which had been provided on the same topic. (Appendix 1, lesson 2, mindmap 4). Pupils were asked to apply their knowledge of interpreting and using mindmaps. The teacher went on to teach content material on the Social Consequences of Urbanisation in Europe. Pupils were also guided on how to interpret and use a mindmap on that history content. ( appendix 1, lesson 2, mindmap 5)

Since there was extensive use of mindmaps in all lessons in the experimental group, corrective and affirmative feedback from the teacher became a prominent feature of these lessons.

**In the control group**, the teacher explained the meaning of the concepts of the Economic Revolution and the Social Consequences of Urbanisation. He then imparted detailed information on each topic in an attempt to help students to comprehend their historical significance and explained how the two topics could be related to the South African context.

## CONCLUSION

**In the control group**, the lesson was concluded by the teacher asking pupils to study at home what had been learned at school.

**In the experimental group**, the lesson was concluded by the teacher asking pupils to practice how to interpret and use mindmaps on their own at home.

### 3.7.3: LESSON 3

**SUBJECT MATTER** - The Reign of Terror

- The Declaration of the Rights of Man
- The main causes of the French Revolution

### INTRODUCTION

**In the experimental group** : In an attempt to arouse the interest of the pupils, the teacher focused their attention of the work that was done the previous day and thereafter informed them that they would then interpret and use mindmaps as learning aids on simple history content, independent of the teacher.

**In the control group** , the lesson commenced when the teacher informed students that they were going to learn about the following :

- The Reign of Terror
- The Declaration of the Rights of man

### CONTENT

**In the experimental group**, pupils were asked to interpret and use three mindmaps on the simple history that they had learned. ( Appendix 1, lesson 3, mindmaps 6, 7, & 8 ). This work was performed by the students themselves, independent of the teacher's contribution. This exercise was aimed at finding out whether learners could then interpret and use mindmaps on their own.

**In the control group**, the teacher wrote short notes on each topic on the chalkboard. While he was writing on the chalkboard , he was also explaining the details of each topic as they appear on the above subject matter .

### CONCLUSION

**In the experimental group** , the lesson was concluded with the teacher checking the student's exercise books to see whether they have been able to interpret and use the three mindmaps as learning aids , on simple history content.

**In the control group**, pupils were asked to relate to the South African context what they have learned about the history of France.

### 3.7.4: LESSON 4

**SUBJECT MATTER** :-The Congress of Vienna

-The economic causes of the French Revolution

-The Congressional system

### INTRODUCTION

**In the experimental group** , the lesson commenced with the teacher directing the pupils attention to what has been learned in the previous lessons and what needs to be learned in this lesson. Pupils were afforded the opportunity to recall the kind of mindmaps that

have already been done and content material covered in the previous lessons.

The teacher stated that the difference between this lesson and others was that it would focus on mindmaps that involve complex historical subject matter.

**In the control group** , the lesson began with the revision of the work that has been learned in the previous lessons. The teacher then suggested to the class , " Today we are going to learn about the economic causes of the French Revolution".

#### CONTENT

**In the experimental group** , the teacher began by modelling how to interpret and use mindmap on complex history subject matter. The following leading questions were used:

- Can we suggest a model of a mindmap using complex history subject matter ?
- How do these models compare to other models of mindmaps ?

(Appendix 1, lesson 4, mindmaps 9, 10 & 11).

**In the control group**, the teacher explained in details the Congress of Vienna including its aims, principles , mistakes and consequences. The teacher also used the question and answer method to teach the economic causes of the French Revolution and the Congressional system .

## CONCLUSION

**In the experimental group** , the pupils were assisted to identify the difference between the mindmaps on simple history subject matter and the one on complex history subject matter .

**In the control group**, the lesson was concluded with the teacher asking questions to check whether the pupils did understand the subject matter. They were further asked to read at home what they had been taught .

### 3.7.5 : LESSON 5

SUBJECT MATTER :-The Industrial Revolution

-Urbanisation in Britain and Europe

## INTRODUCTION

**In the experimental group** , the lesson began with the teacher directing the pupils' attention to what has been learned in the previous lesson. In this way, the pupils were given the opportunity to recall the material covered in the previous lesson.

**In the control group**, the lesson was introduced by the teacher writing the following headings on the chalkboard :

"The Industrial Revolution " and "Urbanisation in Britain and Europe "

## CONTENT

**In the experimental group** , the teacher guided the pupils in interpreting and using complex mindmaps as learning aids , on complex history subject matter. The pupils' contributions were noted on the chalkboard and used to guide them in this learning process.

(Appendix 1, lesson 5, mindmaps 12 & 13).

**In the control group**, the teacher explained the meaning and relationship of the two concepts ,that is, the "Industrial Revolution " and "Urbanisation in Britain and Europe". The teacher also explained how both topics could be related to the South African context.

## CONCLUSION

**In the experimental group** , the teacher ensured that the pupils know how to interpret and use mindmaps as learning aids, on complex history subject matter.

**In the control group** , the lesson was concluded with the teacher giving pupils questions from the textbook . These questions served as home assignments.

### 3.7.6 : LESSON 6

#### SUBJECT MATTER :

- The New School of thought
- The main causes of the French Revolution

## INTRODUCTION

**In the experimental group** , the lesson began with the teacher revising the previous lesson and then informing pupils that they could interpret and use mindmaps independently, on complex history subject matter .

**In the control group**, the lesson began with correction of questions taken from the pupils' textbooks. The teacher then suggested to the class "Today we are going to learn about the new school of thought and the causes of the French Revolution " .

## CONTENT

**In the experimental group** , pupils were asked to practice the skill mindmapping independently, using complex history subject matter. The aim was to see whether they could be able to interpret and use complex mindmaps.

(Appendix 1, lesson 6, mindmaps 14 & 15).

**In the control group** , the teacher broadly explained how the whole idea of the new school of thought came into being in the history of Europe. He pointed out that the New school of thought prevailed as a consequence of a number of factors , which he explained. The teacher also focused attention on the causes of the French Revolution.

The teacher explained that these causes ranged from political , social and economic spheres.

## CONCLUSION

**In the experimental group** , the lesson was concluded by the teacher bringing to pupils awareness that the entire subject matter of the lesson could easily be covered through the use of a mindmap. The teacher pointed out that a mindmap also facilitates understanding .

**In the control group** , the lesson was concluded by the teacher asking questions in order to check whether the pupils have understood the lesson.

## CHAPTER 4

### PRESENTATION, ANALYSIS AND DISCUSSION OF RESULTS

A total of 70 pupils took the pre-test and 58 pupils took the post-test . Only those who completed both the pre-test and the post-test are included in the data below.

The level of understanding with regard to the skill of mindmapping and the ability to recall with understanding history content which each pupil displayed was determined and shown in the tables below. The ability of the pupils to interpret and use mindmaps as learning aids was indicative of their understanding at that particular level.

A mark was given for every correct answer. Through examining the diagram for each pupil, the researcher was able to determine the level of understanding of the skill of mindmapping and the ability to recall with understanding which each pupil displayed. This was performed for each pupil in each group.

**TABLE 1 : Results of the pre- and post-tests for the skill of mindmapping**

TABLE 1

	PRE-TEST	POST-TEST
Mean	2.40	8.12
<b>CONTROL GROUP</b>		
Standard deviation	2.64	8.57
	N=25	
Mean	3.2	16.61
<b>EXPERIMENTAL GROUP</b>		
Standard deviation	2.28	6.01
	N=28	

#### 4.1 Analysis and discussion of the tests results on the skill of mindmapping

At the beginning of this analysis, it is essential to mention that two classes were comparable with regard to the initial levels of the ability to interpret and use mindmaps as learning aids. In the **control group**, the mean of the pretest on the skill of mindmapping was 2.40 . In the **experimental group** , the mean of the pretest on the skill of mindmapping was 3.2. These means were close to each other and comparable.

In the **control group**, the mean of the post test on the skill of mindmapping was 8.12 . In the **experimental group**, the mean of the post test on the skill of mindmapping was 16.61. This implies that in the **experimental group**, a significant shift in the learner's ability to interpret and use a mindmap as a learning aid was demonstrated. This increase could be attributed to the effect which the intervention had.

In the **control group**, the mean of the pretest on the skill of mindmapping was 2.40 while the corresponding mean on the post test was 8.12 . In this type of quasi-experimental research, it is assumed that the difference displayed by the control group in the post test could be ascribed to the effect of the post-test.

In the **experimental group**, the mean of the pretest was 3.2 , while the corresponding mean in the post test was 16.61 . There has been a tremendous increase in scores . This implies that the ability of the experimental group to interpret and use a mindmap as a learning aid has improved . The intervention has certainly had a great effect.

**TABLE 2 : Results of the pre- and post-tests for ability to recall with understanding.**

	PRE-TEST	POST-TEST
Mean	15.04	13.2
<b>CONTROL GROUP</b>		
Standard deviation	9.14	4.19
	N = 25	
Mean	22.25	26.61
<b>EXPERIMENTAL GROUP</b>		
Standard deviation	13.58	10.47
	N = 28	

#### 4.2 Analysis and discussion of tests results on the ability to recall with understanding.

In the **control group**, the mean of the pretest on subject content was 15.04. In the **experimental group**, the mean of the pretest on subject content was 22.25. These means were not exactly comparable . The reason being the general lack of seriousness in school work amongst some pupils in the control group.

In the **control group**, the mean of the post test on subject content was 13.2. In the **experimental group**, the mean of the post test on subject content was 26.61. Although the mean of the experimental group was higher than that of the control group in the pre test on subject content, the scores in the experimental group have enormously increased . This implies that the intervention has certainly had a positive effect.

In the **control group**, the mean of the pre test on subject content was 15.04 while the mean of the post test was 13.2. This implies that the scores have reduced. This difference could be attributed to the level of difficulty of the post test on the control group since they were taught in a "normal" way. (i.e. what they normally received in history lessons).

In the **experimental group**, the mean of the pre test on subject content was 22.25 while the mean of the post test was 26.61. This implies that the intervention has had some effect.

As a result of teaching the skill of mindmapping , the researcher observed that the learners were keen to come to school and their level of participation in learning was certainly high.

## CHAPTER 5

### OBSERVATIONS , CRITIQUE AND SUGGESTIONS FOR FURTHER RESEARCH

The experimental findings reported in Chapter Four suggest that the intervention teaching methodology was successful in developing :

- students' ability to use and interpret mindmaps as learning aids
- the ability to recall with understanding through the teaching of the

skill of mindmapping.

#### 5.1 Implications for teachers, teacher trainers and others.

Both prospective and certificated history teachers should be made conscious of the deficiencies in the transmission mode of history teaching . As radical changes are taking place with regard to the curriculum, there is an urgent need to challenge fixed ideas and outdated instructional methods. As outlined in Chapter One , the outcomes - based education that is being introduced by the government focuses on developing skills. The appropriate place for this paradigm shift to take root , is in the colleges of education, where most of our history teachers are undergoing training.

Implicit in the experimental findings of this study is the notion that, there exists a need to make history specialists acutely aware of the significance of including skills in their lessons and especially the skill of mind mapping. Teacher training institutions should

also offer in-service education for teachers already in the profession. Such training would focus on empowering history teachers themselves with skills such as mindmapping. In addition, teachers need to be involved in developing their mediational teaching methods. These in-service courses can also be conducted at regular intervals at schools. These in-service courses can also evaluate the progress made by teachers or offer help with regard to problems experienced by teachers in implementing the skill of mind mapping. Experience specialists can also be asked to prepare brief expositions of their experience in using the skill, for the benefit of others.

## 5. 2 Methods of instruction and methods of assessment.

The teaching method used in this study involved a close connection between the teaching-style employed and the method of assessment used. History tests and examinations in schools are often aimed at assessing only the learners' level of comprehension of the subject matter. The secondary school history examination comprise a combination of the so called essay-type questions and objective questions. Objective questions consists of a number of items the correct responses to which are all predetermined. These types of questions, test the learners' ability to recall and reproduce verbatim the information previously learned in the didactic situation. Objective questions are often used to assess learners who have been taught through the traditional teaching method referred to earlier in this study. Essay-type questions are used to assess learners' reflective or analytically inclined answer. What matters most here is the way in which the learner understands concepts and the ability to apply them in other contexts.

However, the "recitation script" teaching methods employed by the majority of teachers , do not facilitate the intended results. This study shows that unlike the conventional teaching methods, the skill of mindmapping would certainly assist learners to demonstrate understanding during tests and examinations. As already mentioned in the first chapter of this research , a skills approach to history teaching and learning provides an effective alternative to a purely content based approach.

### 5.3 Interest and motivation

Since the concept of mindmaps was novel to most pupils at school , it was considered to be an appropriate skill that would arouse interest in the subject matter. This would definitely be a motivating factor on the part of the learners who might have become so accustomed to conventional teaching methods that these are no longer stimulating . Also teachers are, from time to time, expected to introduce innovative methods in the presentation of their subjects.

### 5.4 Limitations and suggestions for improvement

While considering the nature and purpose of the study , it was necessary to shorten the period of research due to time constraints. The lesson preparation was so thorough that it demanded a lot of attention and effort on the part of the researcher . The teaching of

the skill of mindmapping which involved “modelling” and guidance, needed more time than would be required by conventional teaching methods. However, if properly implemented, this new method would prove to be more effective than normal instruction. It was considered that a more longitudinal study would need to be carried out in order to determine whether this method of teaching would have a lasting impact on the ability to interpret and use a mindmap as a learning aid and the ability to recall with understanding . A longitudinal study would also determine whether the attained results are a authentic reflection of the impact of the use of the skill of mindmapping in history teaching and not a consequence of the learners' exposure to a novel didactic situation.

### 5.5 Ease of application

The methodology that was used to teach the skill of mindmapping is not complex and therefore its relatively easy to apply since it does not require intensive training. The instructional strategies involved in this method can be implemented and evaluated with ease. Mindmapping as a teaching and learning skill , is so flexible that it could be used in a variety of contexts required by different classroom situations.

### 5.6 Transfer

It is worth noting that the notion of transfer referred to earlier in this study , is an important learning outcome of schooling. The skills gained at school are not of much value if they cannot be transferred to other real life world situations. The traditional rote-learning instructional methods mentioned in the first chapter of this study , satisfies the conditions of Salmon and Perkins (1989) "low road transfer". While the skill of mindmapping which improves the ability to learn with understanding , fulfils the conditions for " high road transfer". The results of this study are , however, not sufficient for one to claim to have attained high road transfer.

### 5.7 Concluding comments and suggestions for further research

After having taught six lessons, it became apparent that through the use of the skill of mindmapping , the effectiveness of the ability to recall with understanding was being greatly enhanced.

What also became clear , from informal-conversation with pupils and observation of their participation in interpreting and using mindmaps , was their positive reaction and enjoyment of lessons. A teacher's enthusiasm and his sensitivity to learners' cognitive level are also factors to be considered in successful teaching of mindmaps.

The use of the skill of mindmapping in teaching and learning , provides an interesting and potentially exciting alternative to a purely content based approach. Rote and purely

content based teaching and learning should be replaced by an approach that focuses on comprehension and also recognizes the necessity for gradually introducing pupils to skills and more especially the skill of mindmapping. This approach to teaching was also linked to the new national curriculum 2005, which is also a shift from content based teaching to the one based on outcomes.

However, the present research has identified some areas for further research. The researcher is of the opinion that a need exists to broaden the scope of further research to include secondary schools which were not controlled by the former KwaZulu Department of Education and Culture, but by other former education departments as well. This would help to investigate the impact of the skill of mindmapping upon various cultural groups and in multicultural settings. Furthermore, research should not be confined to secondary schools but should be conducted at primary schools where the ability to use and interpret a mindmap may be of equal importance.

It is also worth investigating in a more longitudinal study whether the results attained through the use of the skill of mindmapping would be maintained after learners have familiarised themselves with this new methodology. The potential impact of the uniqueness of the new teaching method on students performance would have to be investigated.

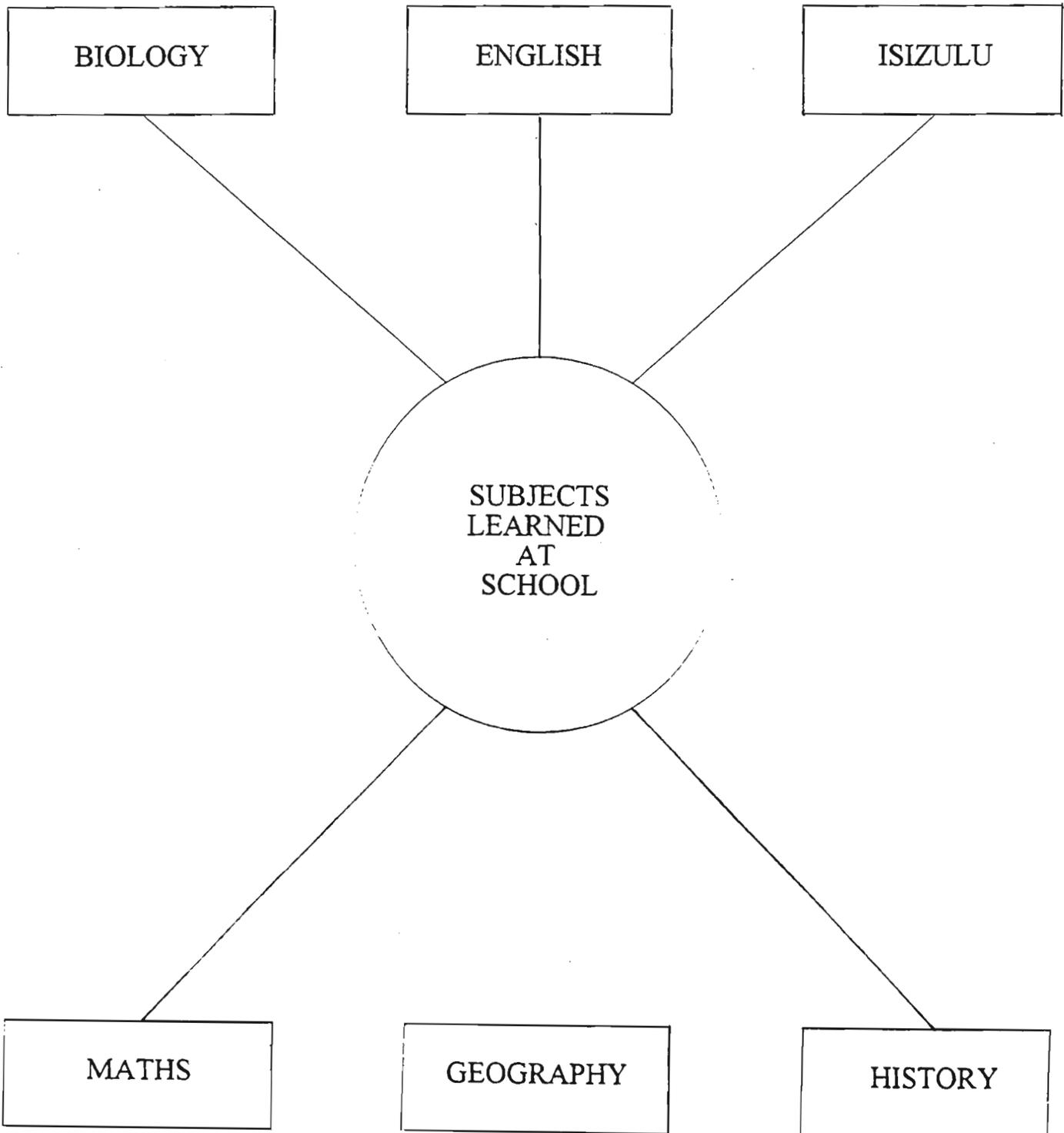
Further investigation should be conducted on history teachers regarding the effectiveness of the perceived role of teacher training institutions and in-service courses in equipping them with the mindmapping skills.

In conclusion, the results reported in the preceding chapter give a clear indication that if the skill of mindmapping is taught well enough, it will certainly have an impact on learning lives and in this way contribute to learners development. This approach to teaching is therefore recommended for adoption by history teachers , for it would result in conceptual understanding in history. The role of the skill of mindmapping in resolving the problems of rote learning , poor thinking and underachievement on the part of the students , cannot be underestimated.

APPENDIX 1:

LESSON 1:

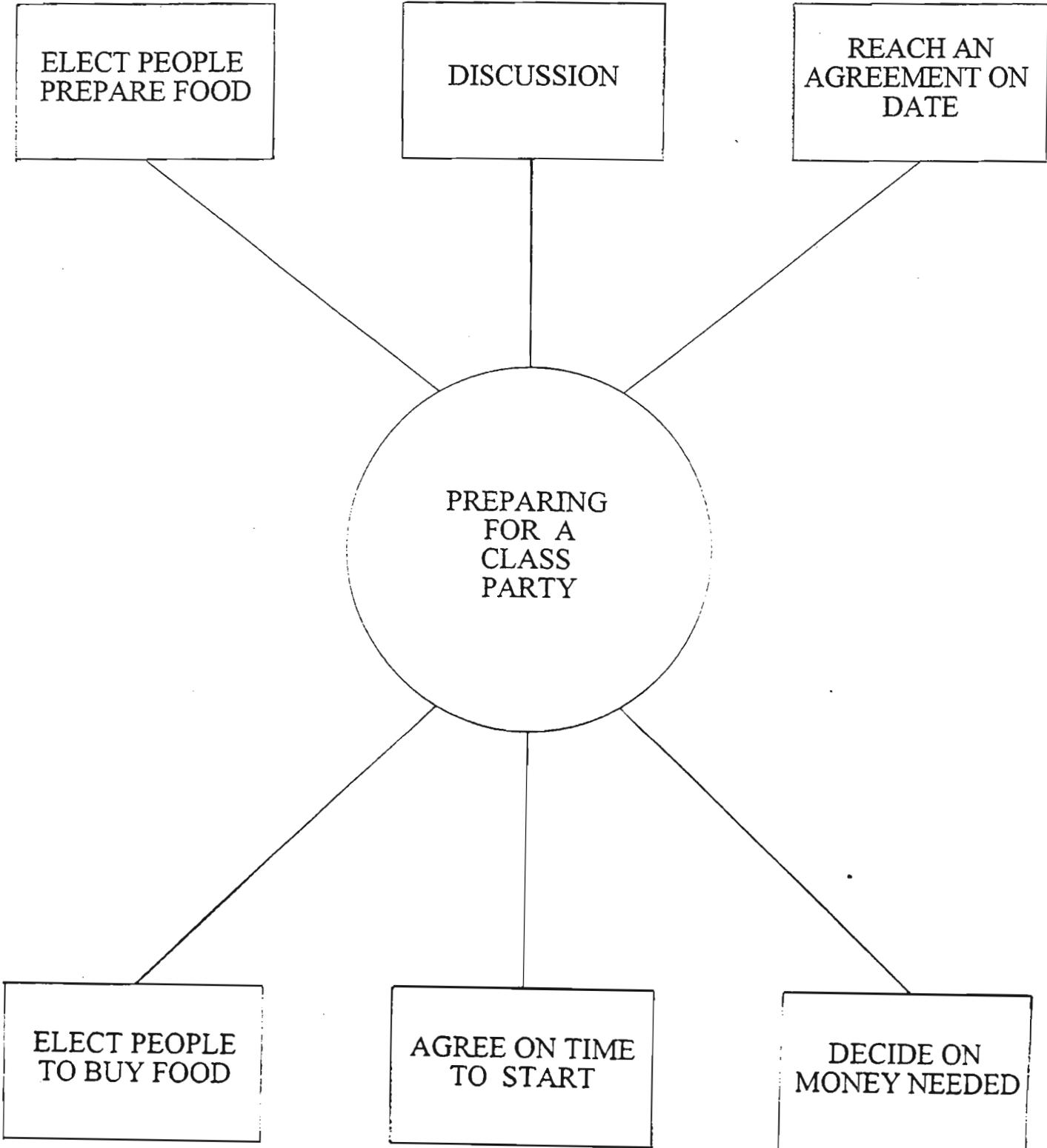
MINDMAP 1  
MODEL/DEMO SIMPLE NONE HISTORY



APPENDIX 1:

LESSON 1:

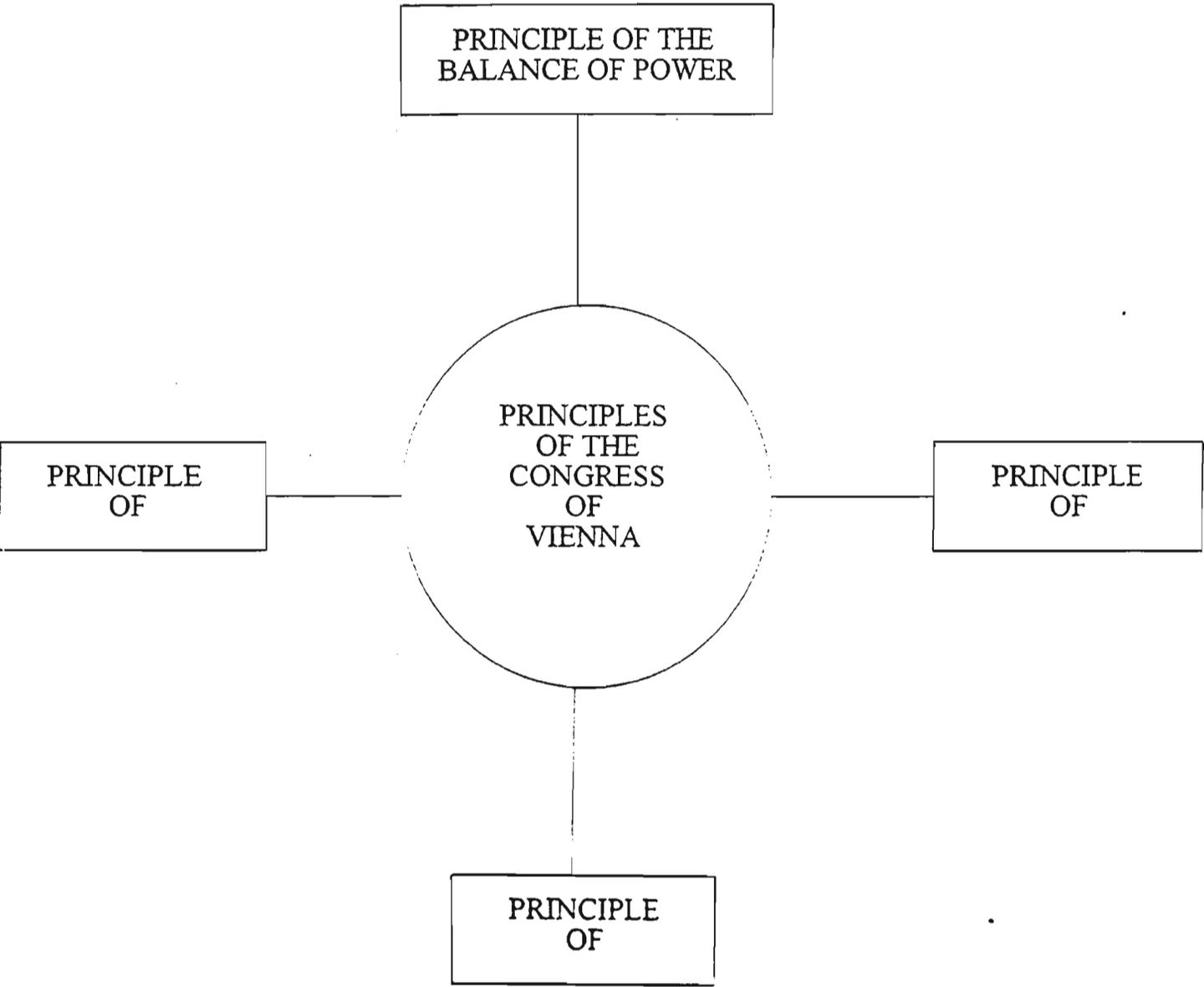
MINDMAP 2  
MODEL/DEMO SIMPLE NON-HISTORY



APPENDIX 1:

LESSON 1:

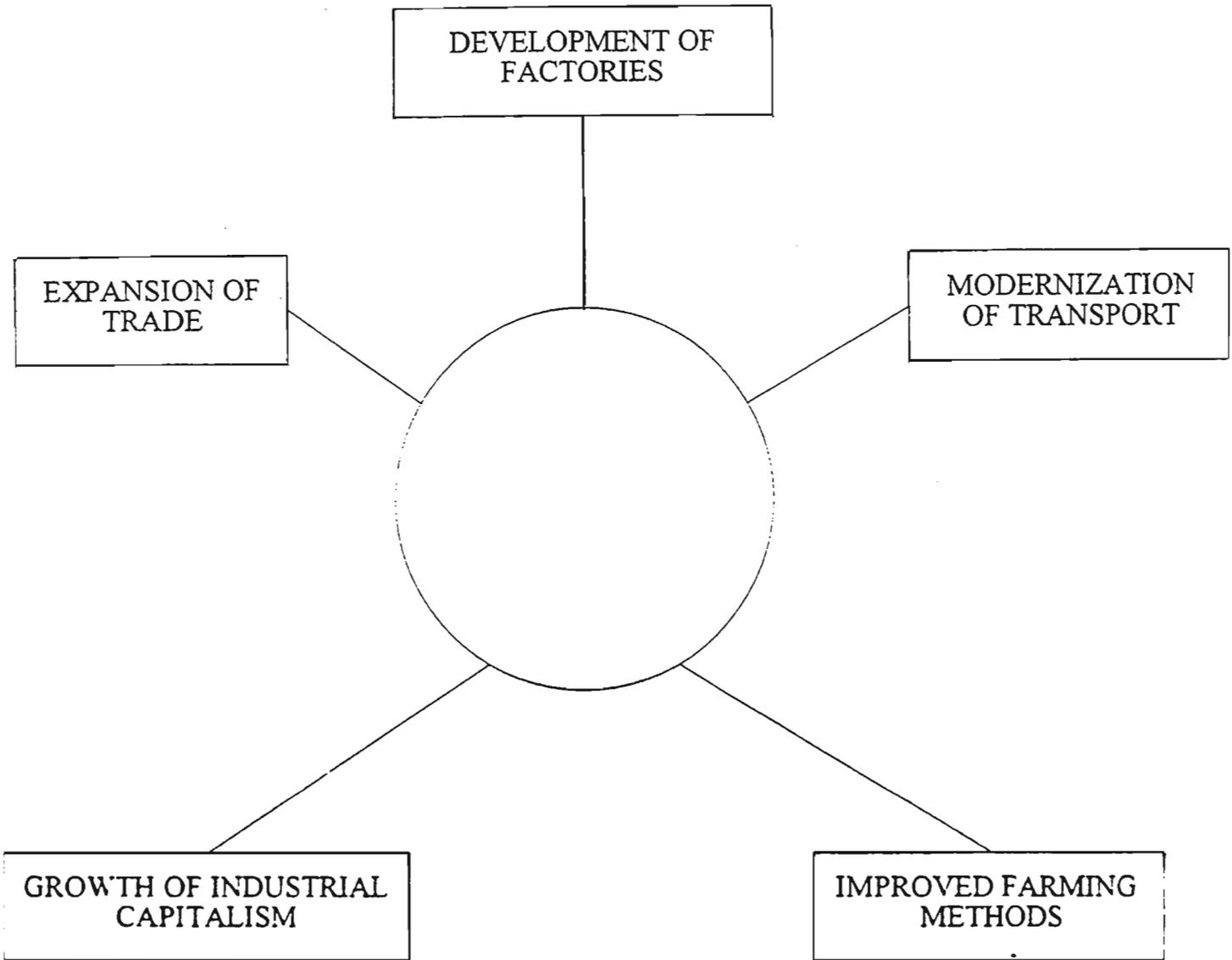
MINDMAP 3  
MODEL/DEMO SIMPLE HISTORY



APPENDIX 1:

LESSON 2:

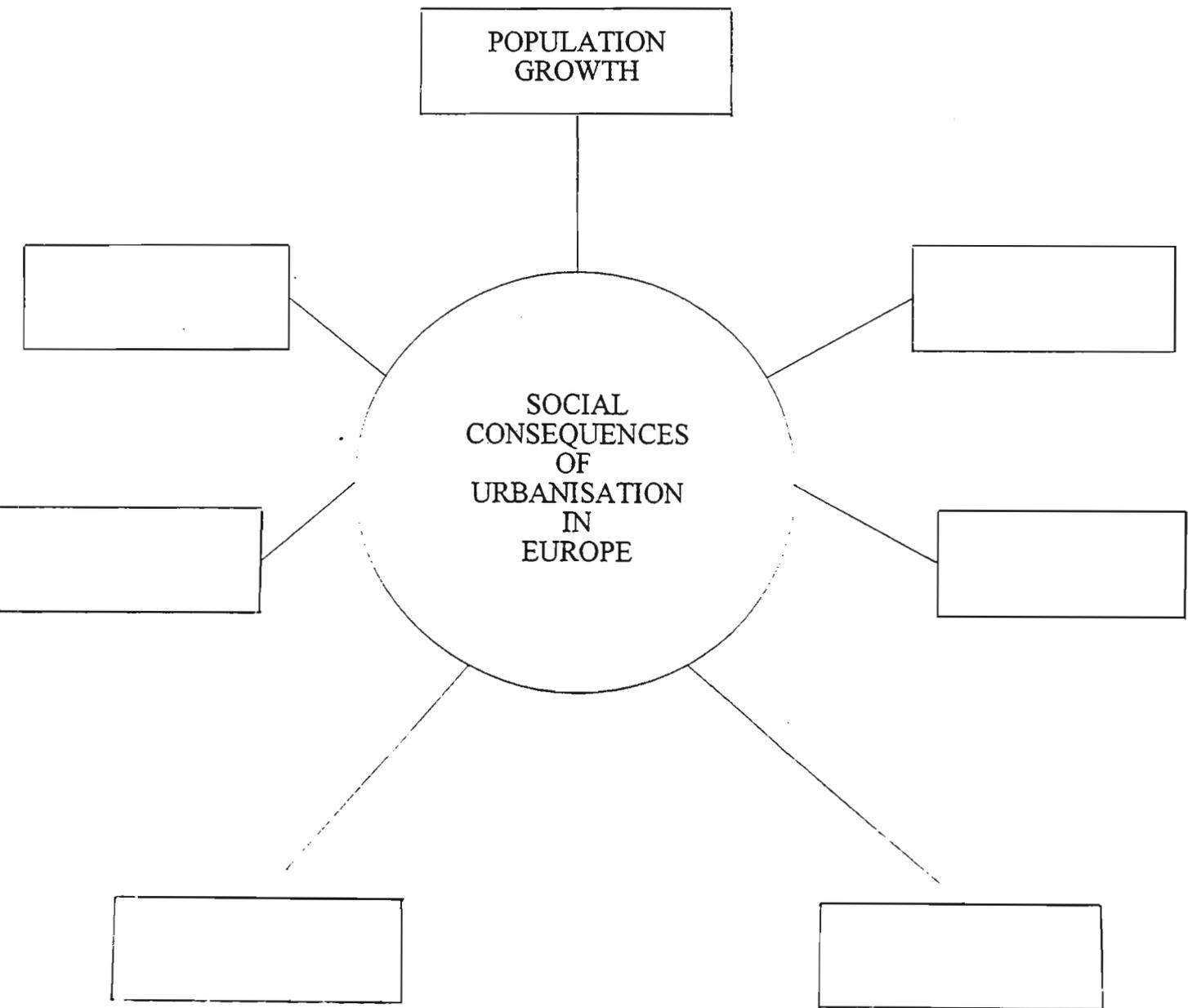
MINDMAP 4  
GUIDE SIMPLE HISTORY



APPENDIX 1:

LESSON 2:

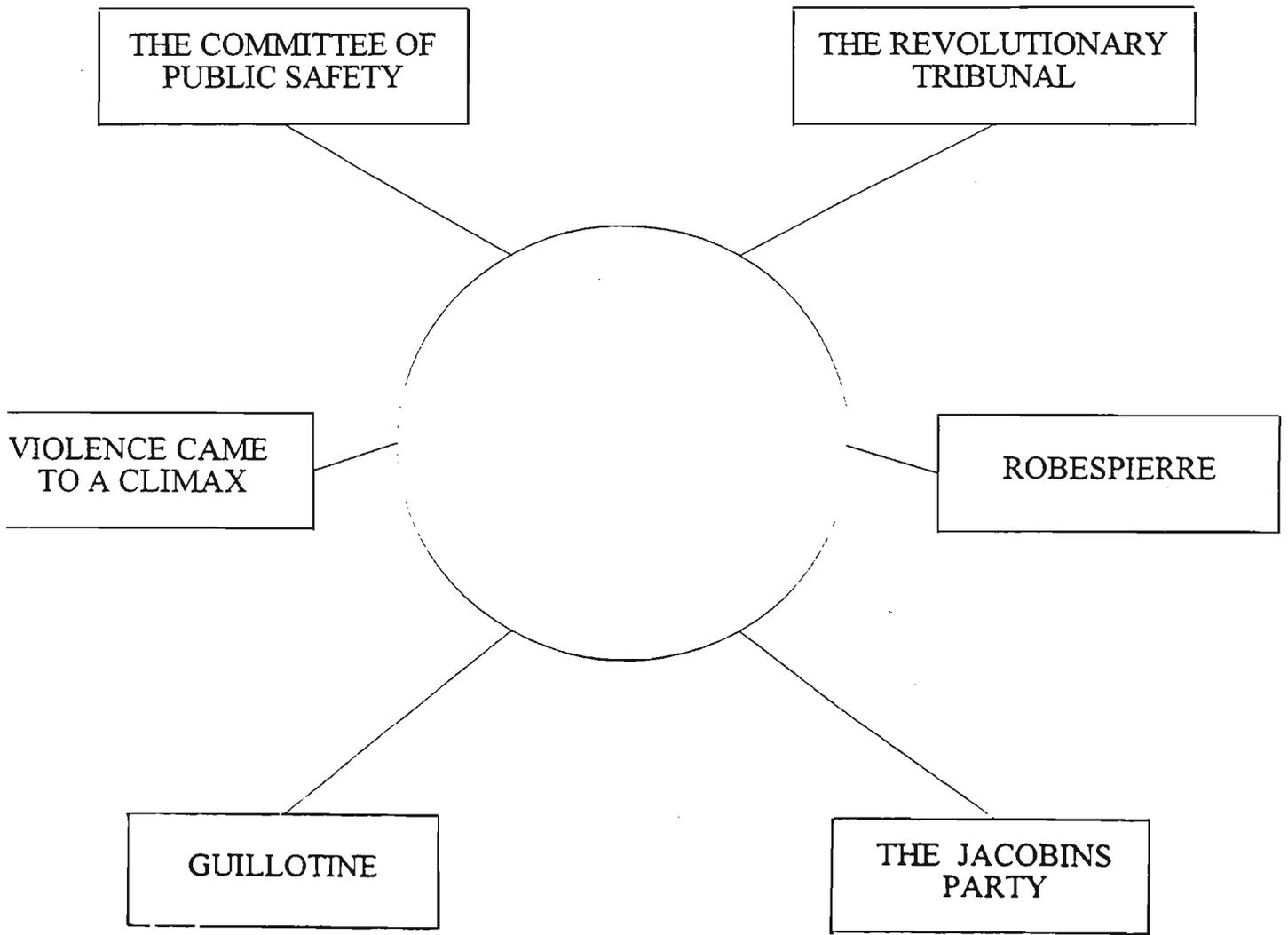
MINDMAP 5  
GUIDE SIMPLE HISTORY



APPENDIX 1:

LESSON 3:

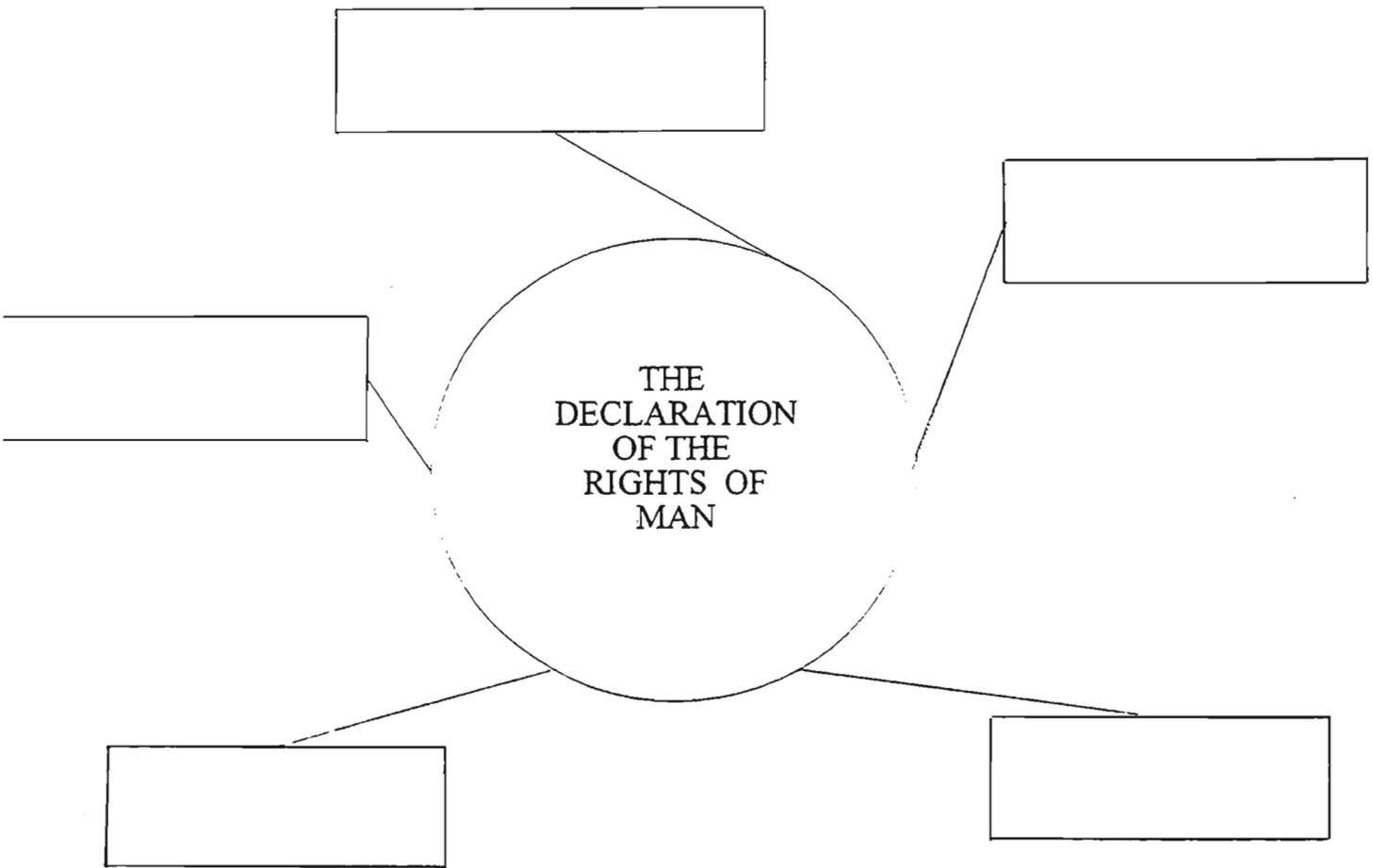
MINDMAP 6  
DO SIMPLE HISTORY



APPENDIX 1:

LESSON 3:

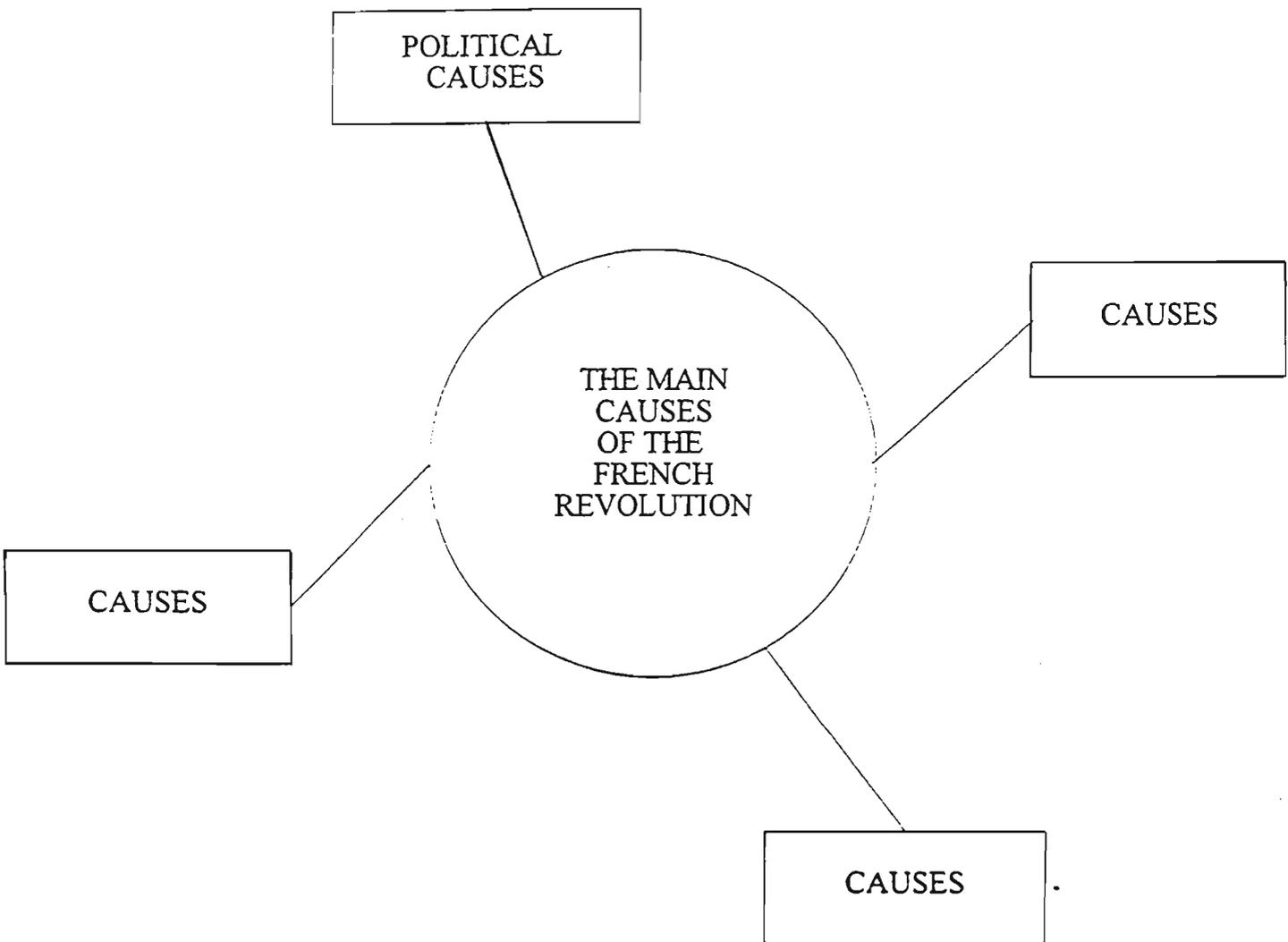
MINDMAP 7  
DO SIMPLE HISTORY



APPENDIX 1:

LESSON 3:

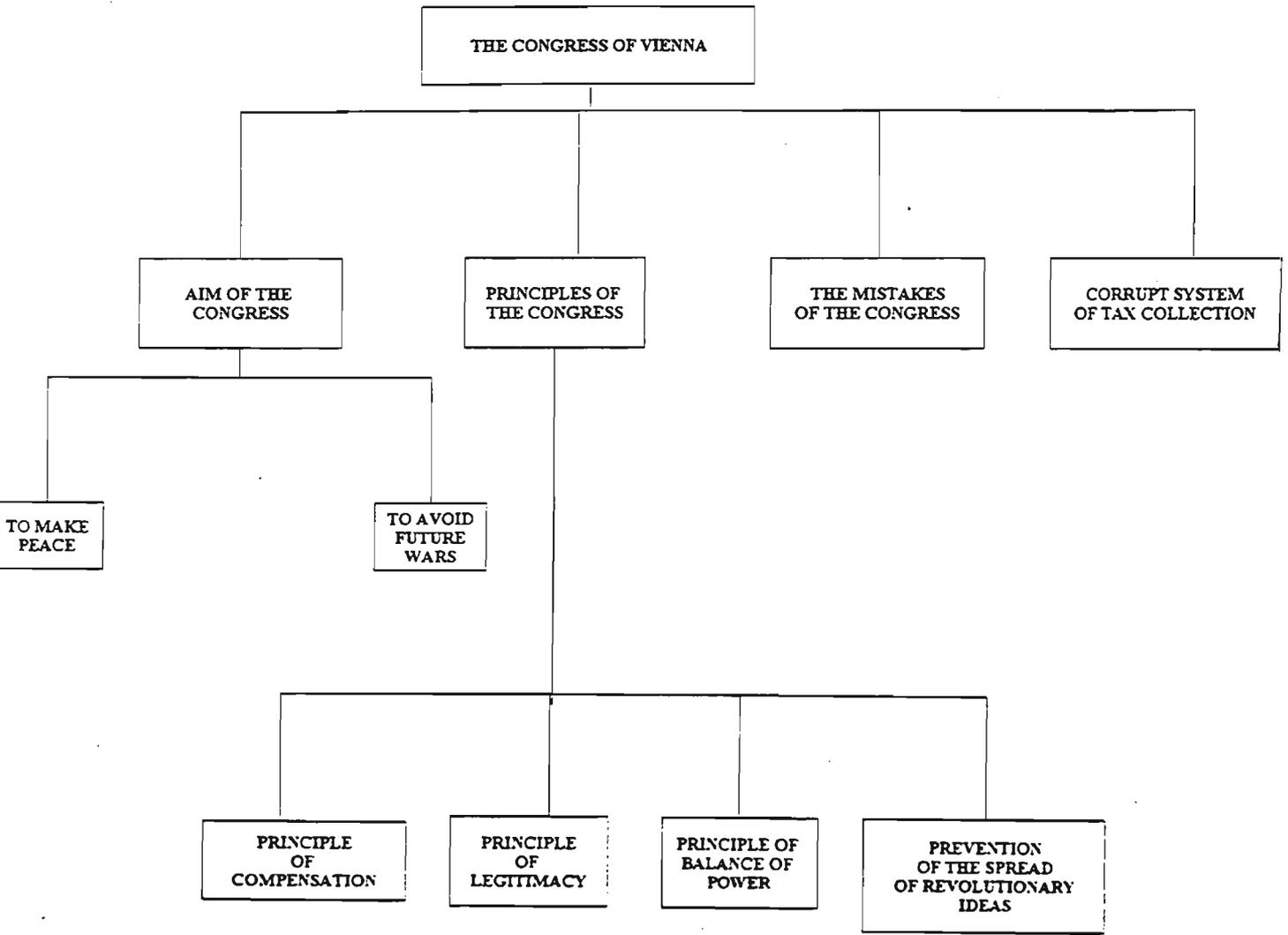
MINDMAP 8  
DO SIMPLE HISTORY



APPENDIX 1

LESSON 4

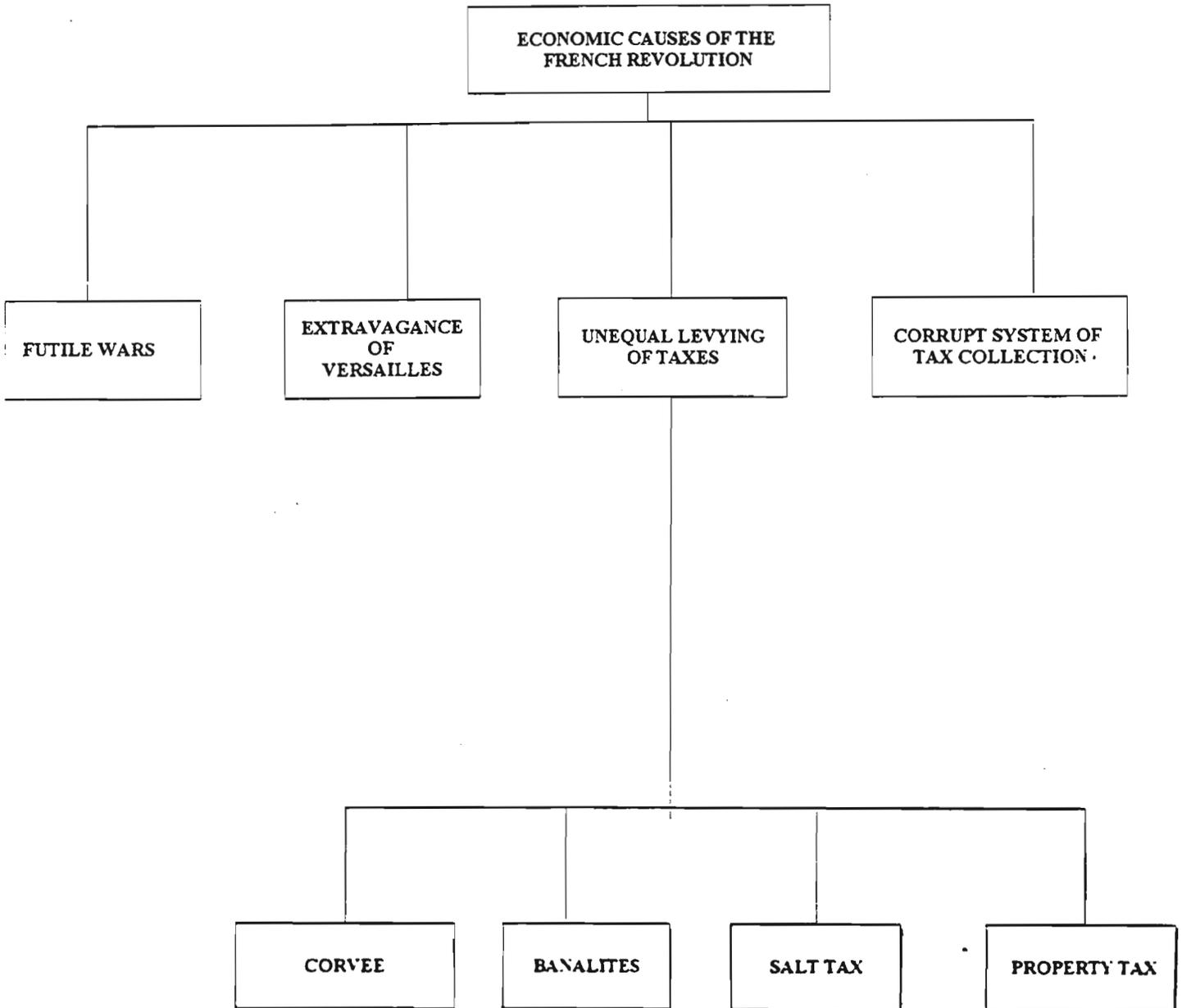
MINDMAP 9  
MODEL/DEMO - COMPLEX HISTORY

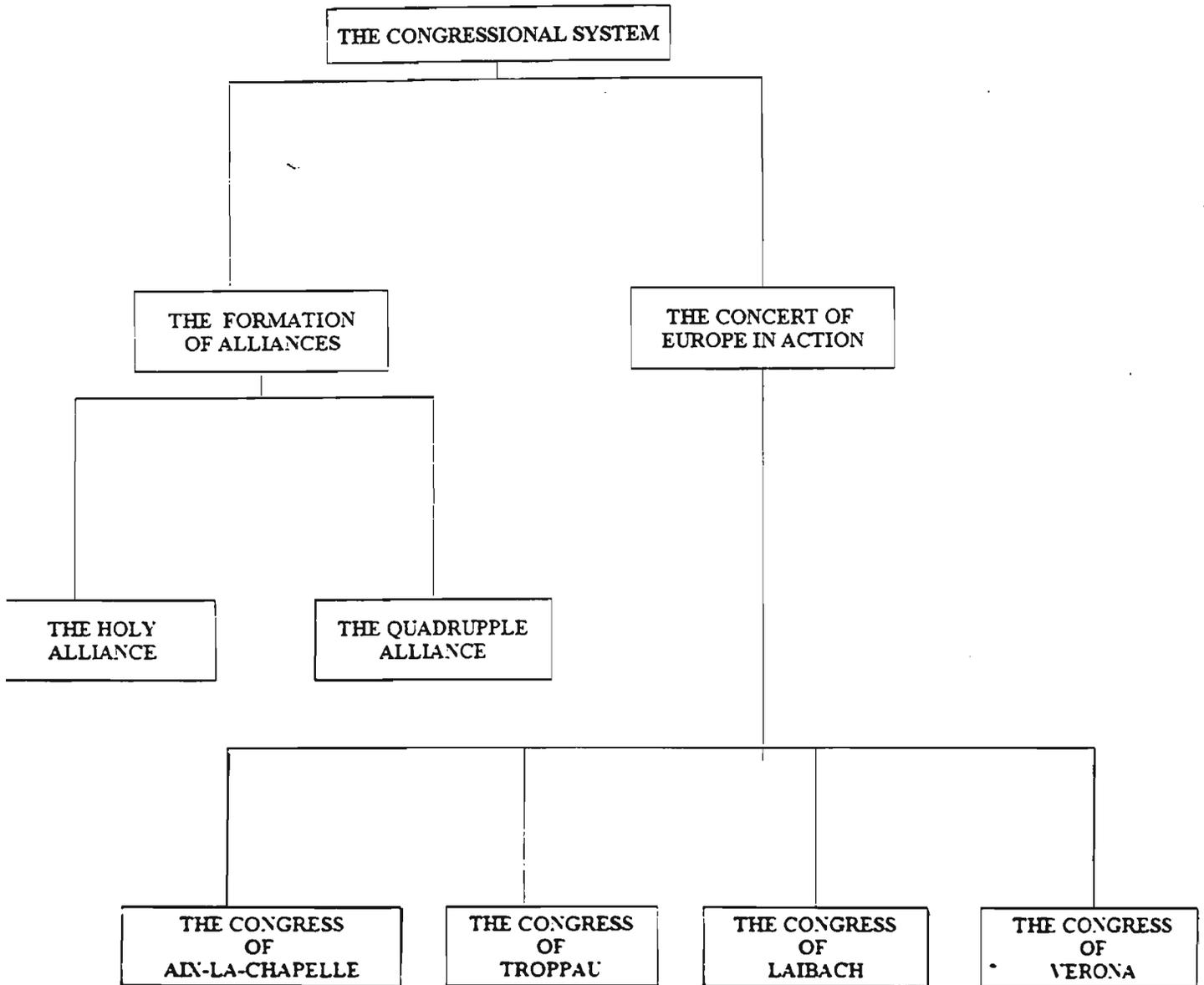


APPENDIX 1

LESSON 4

MINDMAP 10  
MODEL/DEMO - COMPLEX HISTORY

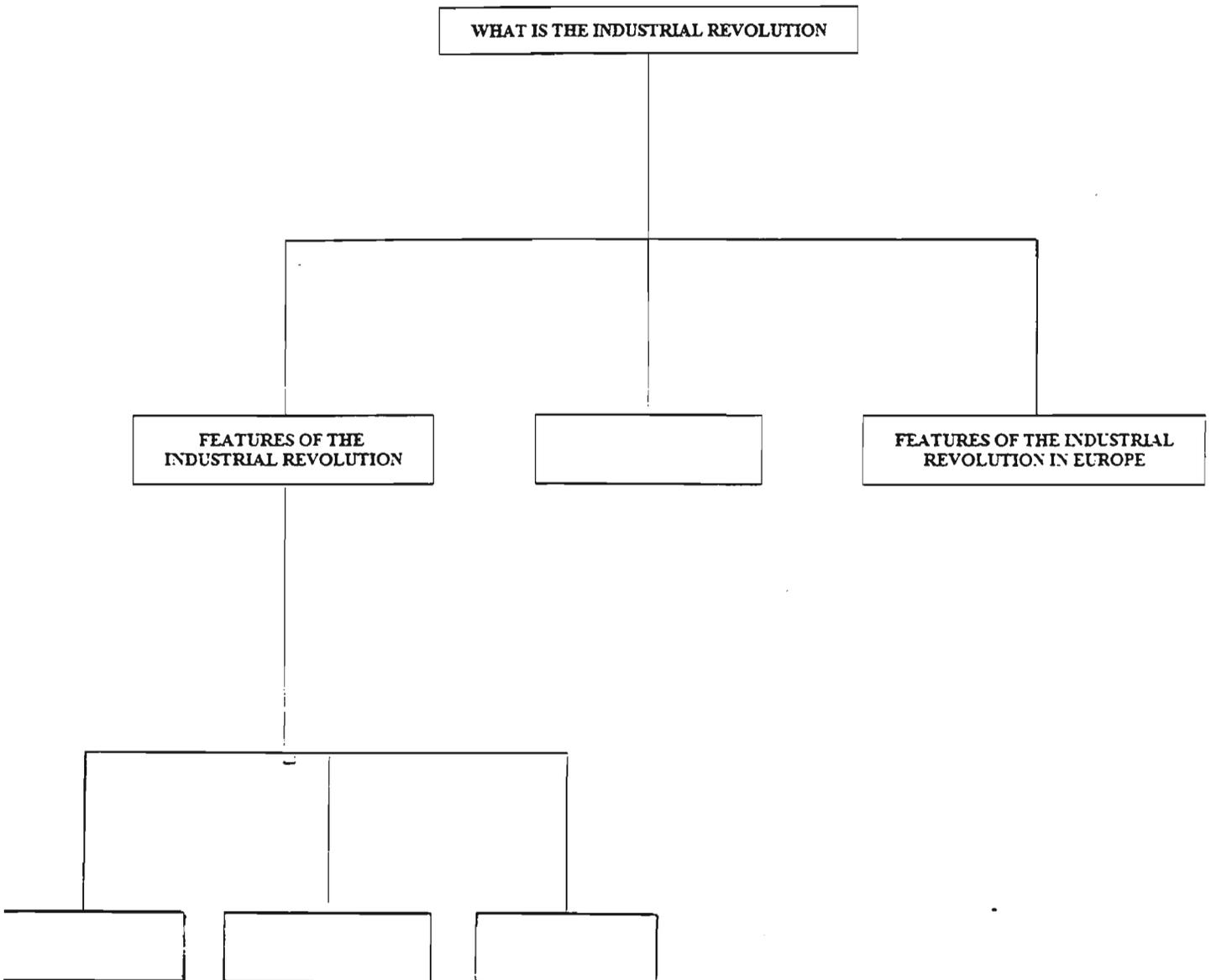


APPENDIX 1LESSON 4MINDMAP 11  
MODEL/DEMO - COMPLEX HISTORY

APPENDIX 1

LESSON 5

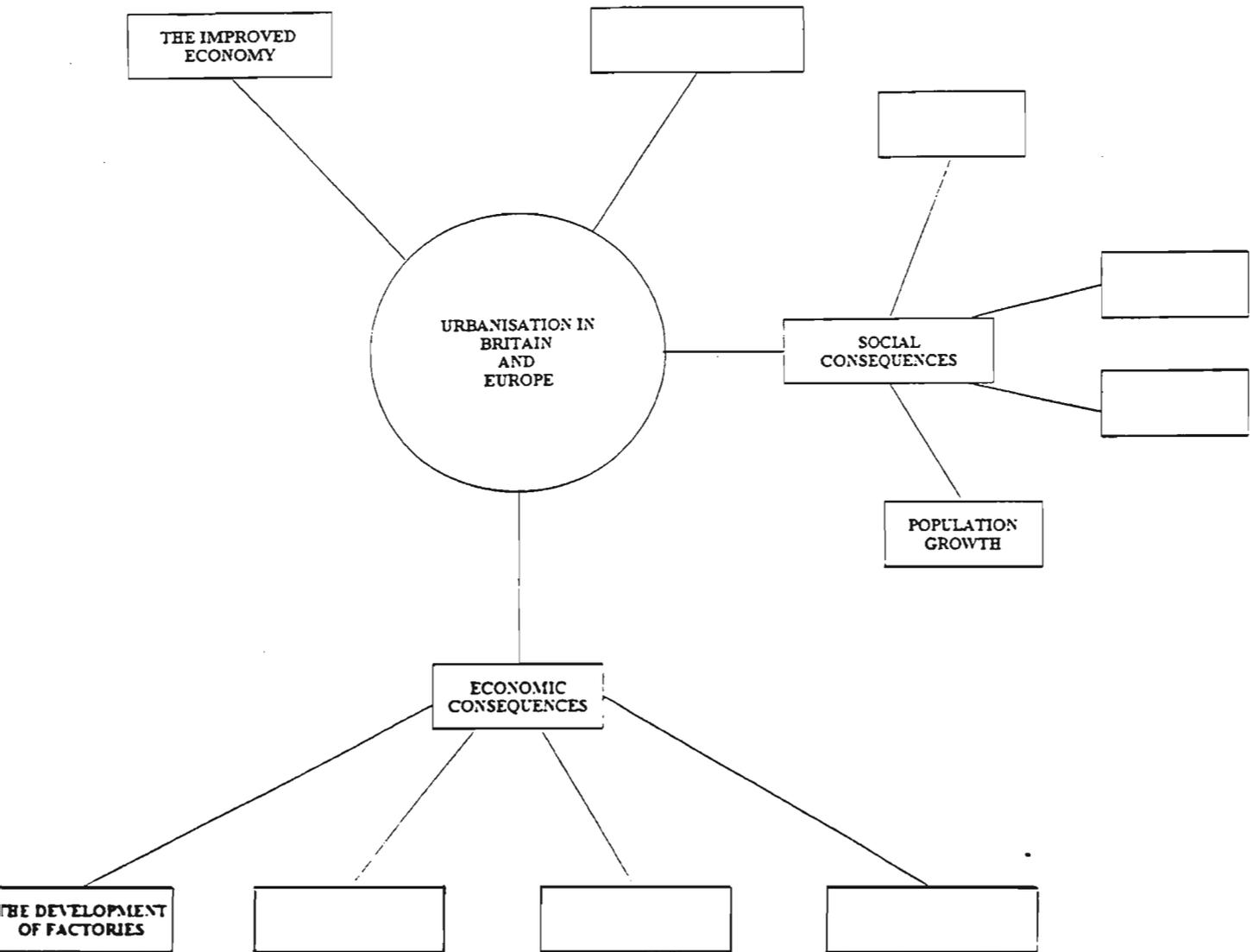
MINDMAP 12  
GUIDE - COMPLEX HISTORY



APPENDIX 1

LESSON 5

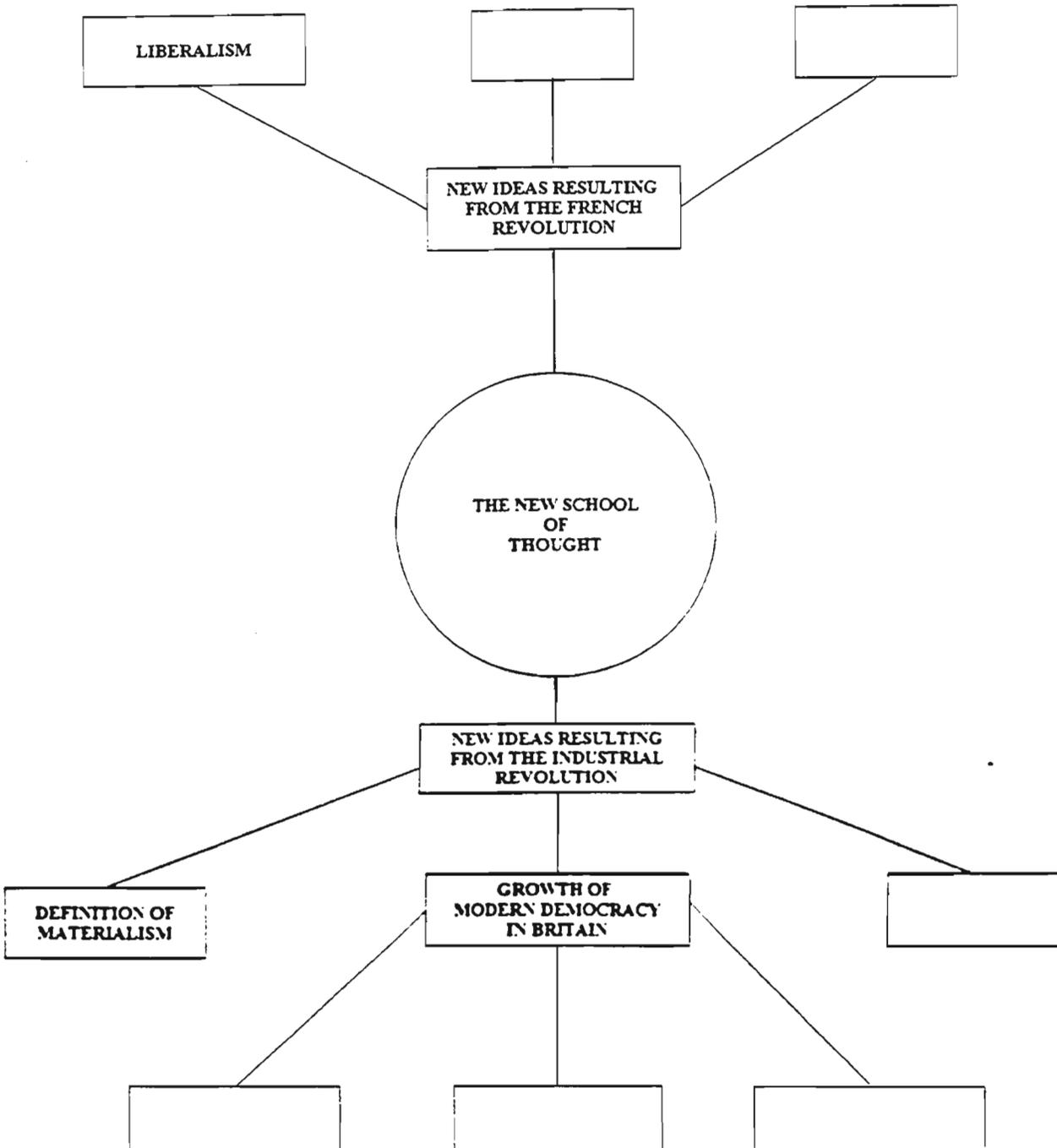
MINDMAP 13  
GUIDE - COMPLEX HISTORY



APPENDIX 1

LESSON 6

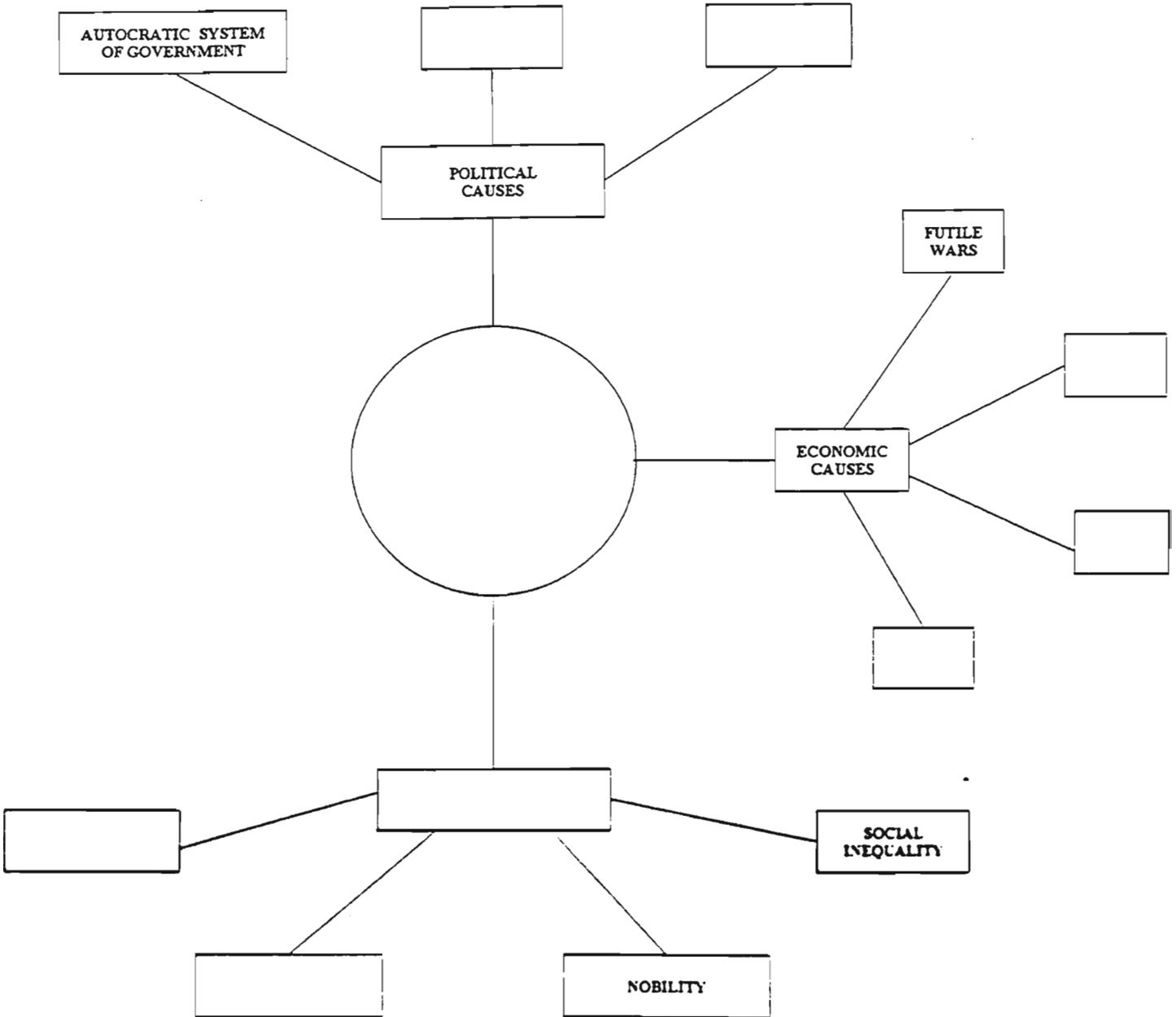
MINDMAP 14  
DO COMPLEX HISTORY



APPENDIX 1

MINDMAP 15  
DO COMPLEX HISTORY

LESSON 6



**NAME :**.....

**STANDARD :**.....

**SECTION A.**

1. Explain what a DICTATOR of a nation is :

.....  
.....  
.....

2. Give examples to show why NAPOLEON could be called a dictator :

.....  
.....  
.....  
.....

3. Name TWO NATIONS WHICH HAVE DICTATORS in the world today :

.....  
.....

4. Name TWO LEADERS IN HISTORY WHO WERE DICTATORS :

(excluding Napoleon)

.....  
.....

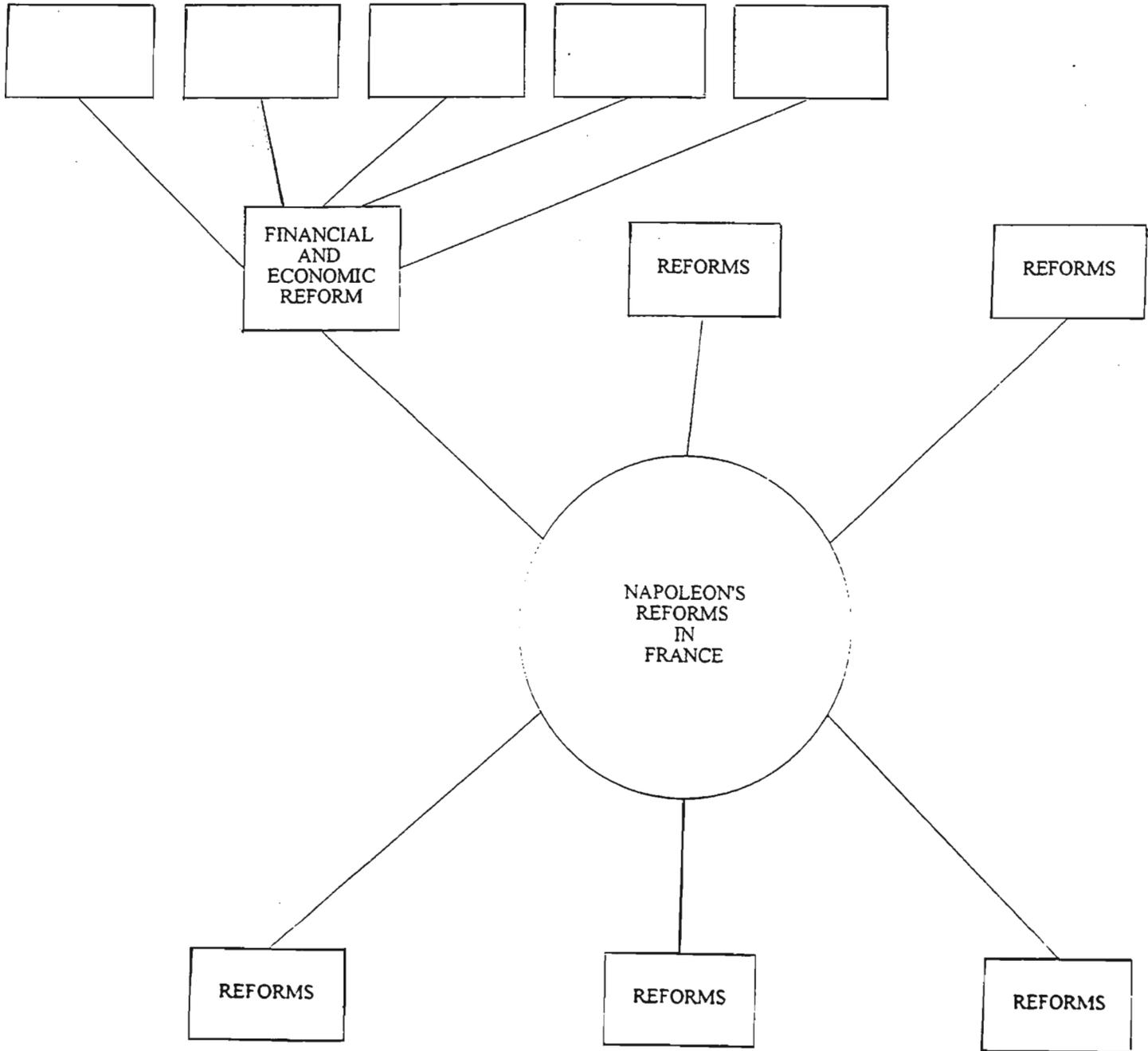
MARK SCHEDULE FOR A

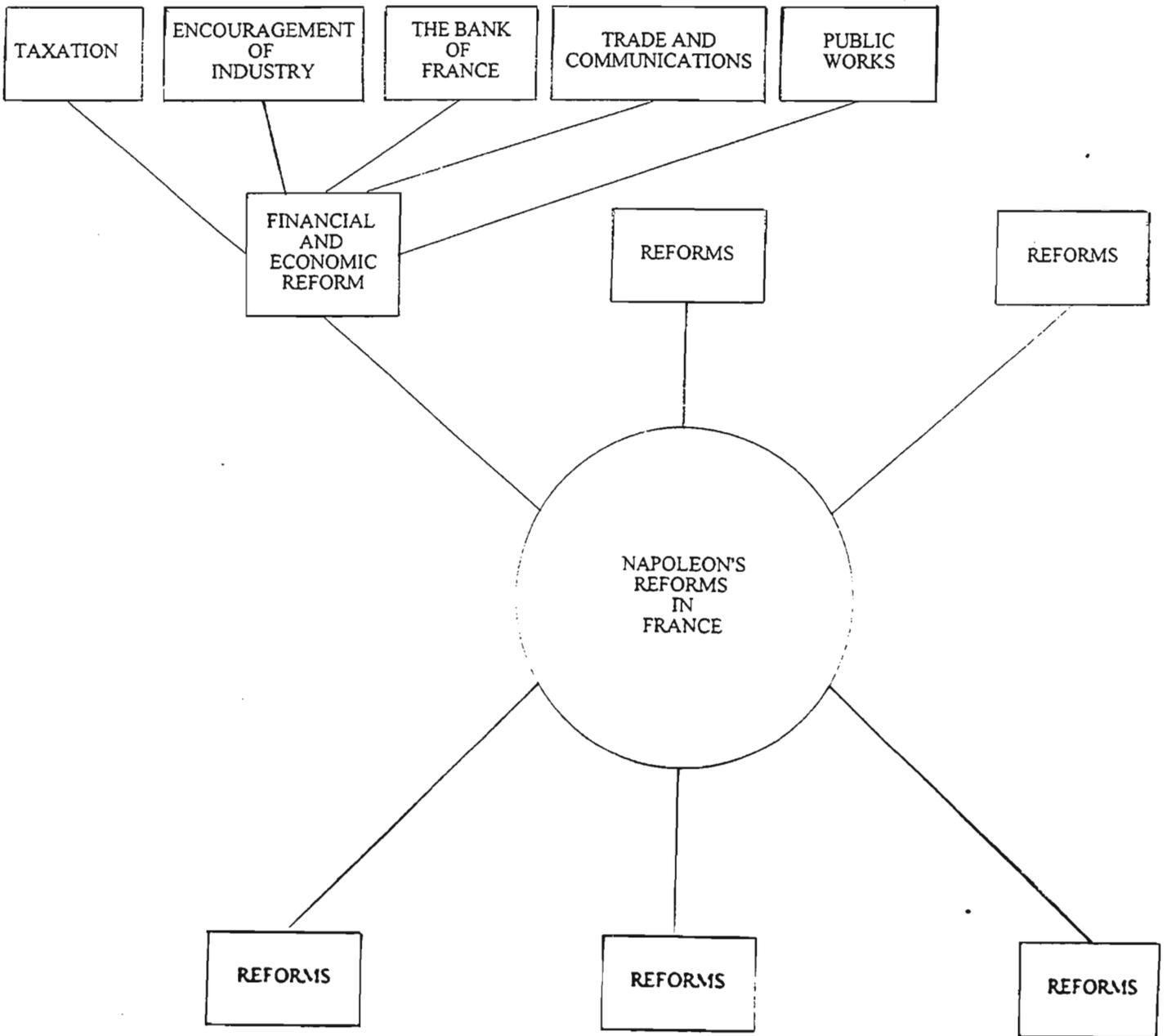
TOTAL 10

- (a) i) it's the government that is elected by the people (2)  
ii) majority rule (1/5)  
iii) government of the people by the people (1)  
iv) it is the government which takes majority decisions in parliament (2)
- (b) i) the principles of the congress e.g. balance of power, legitimacy, compensation and prevention of revolutionary ideas, were used to destroy democracy (2)  
ii) the Congress of Vienna used its principles to bring about the old order (2)
- (c) For example, Britain, U.S.A. (1 mark each)
- (d) Bill Clinton, John Major (2 marks each)

SECTION B

PRE TEST





NAME : .....

STANDARD : .....

SECTION A.

1. Explain what DEMOCRACY means:

.....  
.....  
.....

2. Give examples to show that the CONGRESS OF VIENNA wanted to destroy democracy:

.....  
.....  
.....  
.....

3. Name TWO DEMOCRATIC NATIONS in the world today:

(excluding South Africa):

.....  
.....

4. Name TWO LEADERS OF DEMOCRATIC NATIONS in the world today:

(excluding President Nelson Mandela):

.....  
.....

MARK SCHEDULE FOR A

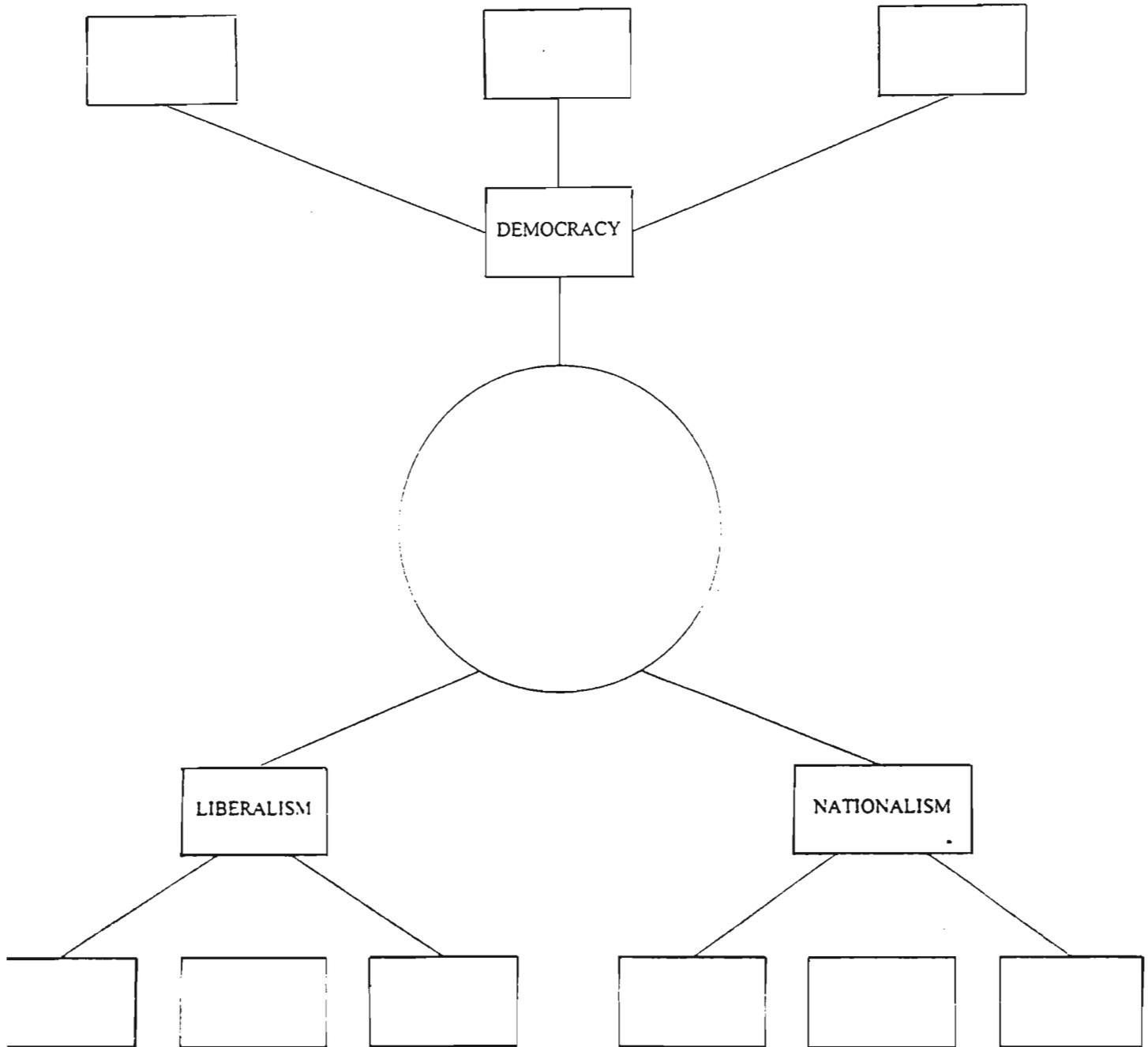
(10)

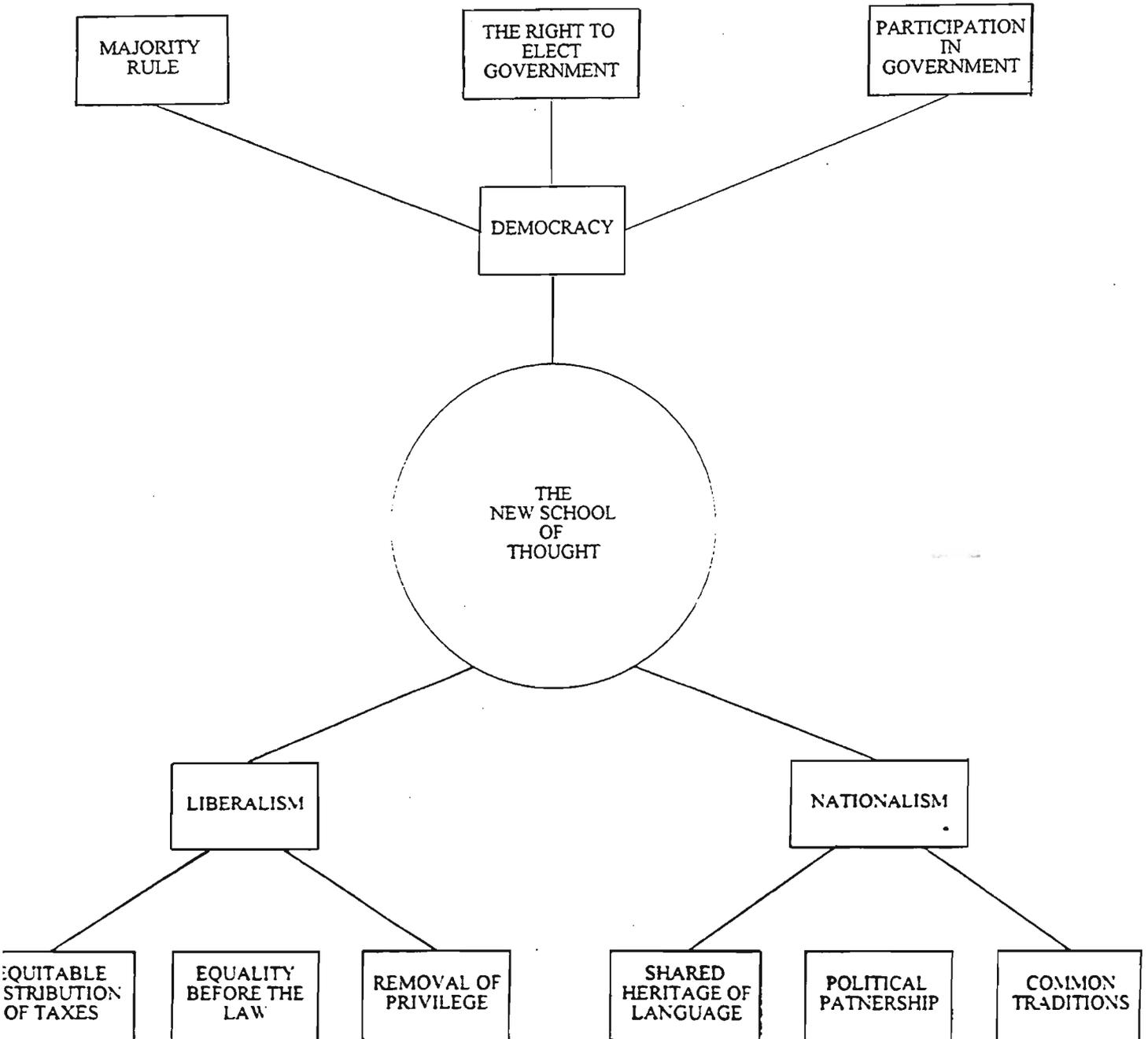
- (a) i) an autocrat , a despot ( 0.5)  
ii) an absolute ruler (1)  
iii) a person who rules alone (2)
- (b)i) He ran a highly centralised form of government (2)  
ii) He had all the power in his own hands (1)  
iii) He controlled executive powers (0.5)
- (c) Nigeria , Cuba , China , North Korea, Swaziland ( 1 mark each )
- (d) For example Louis xvi  
Louis xiv  
All Bourbon kings of France (2)

APPENDIX 2

POST TEST

SECTION B





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