

**APPLICATION OF INFORMATION PROCESSING THEORY IN TEACHING
ENGLISH GRAMMAR TO FACILITATE MEANINGFUL LEARNING: A CASE OF
PRE-SERVICE TEACHERS IN MALAWI**

By

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**A thesis submitted to the University of Zambia in fulfilment of the requirements of the
degree of Doctor of Philosophy in Educational Psychology**

The University of Zambia, Lusaka

August, 2024

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Declaration

I Esther Nanyinza declare that this dissertation entitled '*Application of Information Processing Theory in Teaching English Grammar to Facilitate Meaningful Learning: A Case of Pre-Service Teachers in Malawi*' is my own original work and that apart from the sources of data has never been submitted to any other institution for similar purposes.

Certificate of Approval

This Thesis by Esther Nanyinza has been approved as fulfilling the requirements for the award of Doctor of Philosophy in Educational Psychology by the University of Zambia.

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Abstract

This study aimed at exploring how pre-service teachers applied information processing theory (IPT) strategies in teaching English grammar to facilitate meaningful learning in secondary school students during their teaching practice. In particular, the study explored how pre-service teachers applied information theory strategies of contextualization, rehearsal, elaboration and organization strategies when teaching English grammar to secondary school students during their teaching practice. Information processing theory was the major theoretical framework that the study employed. The study design was a qualitative single-case study which was both descriptive and exploratory. The study was conducted in six Malawian districts including Chitipa, Karonga, Kasungu, Mzuzu, Nkhatabay and Rumphi. Nine (9) public secondary schools were conveniently sampled from these districts. The sample comprised ten pre-service teachers who were purposefully sampled through homogenous sampling. The main criterion for selecting participants was that they were majoring or minoring in English language. To ensure trustworthiness and use triangulation, data were collected through multiple methods including classroom observation, semi-structured interviews and document analysis. The data comprised field notes and audio recordings of interviews. The data analysis was done simultaneously with collection through thematic analysis which was inductive to generate meanings. All steps for thematic analysis were followed. Audio recordings from interviews were transcribed into readable texts to make the data manageable and meaningful themes were assigned to all codes before they were summarized and interpreted. Results from triangulation of data from the three sources showed that pre-service teachers applied various information processing theory strategies when teaching English grammar namely contextualization, rehearsal, elaboration and organization. The study also uncovered challenges of using IPT strategies such as larger class size, inadequate materials, teacher competence, and learner background and time constraints. Finally, a model of information processing theory for teaching English grammar to secondary school students that recommends integration of all strategies was developed. In view of the findings, this study recommends that teacher education institutions should ensure that pre-service teachers apply the different theoretical knowledge through peer teaching before teaching practice in order to gain experience in how to apply theories to actual classroom situations to facilitate meaningful learning in students.

Dedication

This research is dedicated to my children Madiba Bonnie Benjala and Emmanuel Bonnie Benjala.
It is also dedicated to the entire Sinyinza family.

Acknowledgements

I wish to express my sincere gratitude to many people who supported and played various roles towards this work. Special appreciation to my supervisor Dr Ecloss Munsaka for greater support and for teaching me that time is never available but can be created for assisting someone. I would also like to acknowledge my brother Rev. Dr Moffat Sinyinza for the encouragement, throughout my pursuit to further my Education, support on the whole process as well as motivation to push on. Dr Wezzie Chiziwa, Dr Zizwa Msukuma, Mr. Donald Malanga and Harry Kumwenda receive my sincere gratitude for their role in this accomplishment. I further would like to acknowledge the roles played by my friends, relatives and colleagues. My Mumbwe Worshipers family, you made me feel special. Above all, glory be to God for making all things possible.

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List of Abbreviations and Acronyms

AA:	Authentic Assessment
EFL:	English as Foreign Language
ESL:	English as Second Language
IPT:	Information Processing Theory
LTM:	Long-Term Memory
MOE:	Ministry of Education
MoEST:	Ministry of Education, Science and Technology
MANEB:	Malawi National Examinations Board
NESP:	National Education Sector Plan
STM:	Short-Term Memory
WM:	Working Memory

CHAPTER 1: INTRODUCTION

1.1 Chapter Overview

This study aimed to explore how the information processing theory was applied by pre-service teachers at the University of Livingstonia when teaching English grammar during their teaching practice. Theories in education have been found to play a bigger role in actual classroom encounters if teachers make learning meaningful for students. Therefore, it is important to acknowledge the importance of learning theories especially as used by pre-service teachers who are in the process of becoming teachers. On the other hand, the teaching of English as a second or foreign language has never been an easy task (Agudo, 2014; Derakhshan, & Shirmohammadli, 2015; Setiyadi, 2020). Teachers who possess both content knowledge and pedagogical knowledge can be more successful in teaching than those who only possess content knowledge. In view of this, there was need to explore ways of facilitating the teaching of English grammar at secondary school level in Malawi to support meaningful learning in students.

To achieve this, both in-service and pre-service teachers are required to efficiently apply these strategies which are backed by learning theories that have been found to facilitate meaningful learning such as the information processing theory strategies of contextualization, rehearsal, elaboration and organization. This chapter provides the background of the study, and presents the problem statement, objectives of the study, research questions and significance of the study. The chapter further outlines the definitions of key words and details the theoretical framework.

1.2 Background and context of the study

A major concern in education that has been long debated is the problem of the relationship between theory and practice regarding pre-service teachers. Teacher quality, as research has shown, is determined through the capacity to match theory with practice which is important in education (Hussain, & Naveed, 2023). Ching (2011) also noted that there are many predictors of teacher quality including type of qualification, experience and pedagogical knowledge. However, factors such as ability to apply the theoretical knowledge into actual practice have sometimes been overlooked especially during teacher training. Ensuring that pre-service teachers effectively use theoretical knowledge during teaching practice would ascertain teacher preparedness for actual classroom practice.

Thus, awareness by teacher educators of the pedagogical knowledge base of pre-service teachers, theories of teacher development, and how best to prepare them for effective teaching is significant (Azano & Stewart, 2015). Pre-service teachers should be exposed to real classroom teaching and learning experiences. These are important activities for teacher education institutions for them to be able to crop teachers who would efficiently apply learning theories to support meaningful learning in students. The teaching practicum experience allows pre-service teachers to practically use the knowledge from the institution to actual classrooms and to gain confidence in handling learners, instructional materials and classroom management skills (Montebon, 2015).

In addition, Montebon (2015) also argued that when pre-service teachers develop confidence about their classroom practices, they are well prepared for taking on the role of a teacher hence they become effective in-service teachers. There is thus need to explore readiness of pre-service teachers for actual classroom practice through exploring how they apply theories of teaching and learning during teaching practice. Numerous studies have been conducted on the use of theories of learning into actual teaching by teacher educators. Darling-Hammond (2006, p. 8), cited in Higgs, 2013, p. 105), states that; “One of the perennial dilemmas of teacher education is how to integrate theoretically based knowledge that has traditionally been located in the practice of teachers and the realities of classrooms.”

Research has established that pre-service teachers in many teacher education programs face challenges in putting the theories they learn during the time in the teacher education institution into practice when they go into actual classroom practice (Ma, et al. 2022; Resch et al., 2024). One such theory that has been found to be lacking in terms of its application to teaching and learning is the information processing theory and its diverse strategies (Alhussini, (n.d); Driscoll & Burner, 2007). Information processing theory is a cognitive theory that focuses on how information is encoded into memory, stored and retrieved. Among other strategies, contextualization, rehearsal, elaboration and organization are among the information processing theory strategies that teachers may use to facilitate meaningful learning (Ausubel, 1968).

Developed by psychologists including George Miller in the 1950's, the theory compares the human brain to a computer in terms of input of information to it, then to the central processing unit (CPU)

which is likened to our short-term memory then to the hard drive which is our long-term memory which stores the information for later use. Thus, the information processing theory, endeavors to describe how sensory input is perceived, transformed, reduced, elaborated, stored, and retrieved for use when needed. This model proposes that learning characterizes the process of gathering information and organizing it into mental representations (Mota, 2018). In the classroom environment, it is important that learners relate new content to already existing material in long-term memory for meaningful learning to occur.

Other scholars have focused on the application of information processing theory in teaching and learning of English as well as other subjects to secondary school students (Celikoz et al. 2019; Tay, 2013). In addition, a study on the need to employ appropriate strategies in the teaching of English as a second language in Malawi conducted by Sanga (2016) stipulated that using situated cognition theoretical construct as a basis for teaching L2 English, was useful to learners. According to Sanga, studies by the ministry of education on the performance of students in formal examinations indicated that over the last seventeen years or so, the pass rate of the English language in secondary schools has significantly gone down resulting in many students failing to acquire certification. For example, it was noted that teaching of English as a second language was mostly done using strategies that did not make learners active participants in what they learn. These studies in essence advocate for teachers to take deliberate measures and use strategies that could help learners find the material they learn meaningful.

Some studies focus on specific information processing strategies that are helpful in retention and retrieval of information (Chang, 2015; Tay, 2013). These scholars contend that in order for learners to be able to store knowledge in the long-term memory and to retrieve it, teachers are expected to make the teaching and learning activities meaningful. In making the activities meaningful, teachers should identify exactly what key elements the learner is expected to recognize and master, find ways of relating these elements to each other and to existing knowledge, and identify the means through which they can be successfully selected and retrieved in order for them to solve new problems. This study isolated four information processing cognitive strategies that are likely to facilitate meaningful learning during the teaching-learning process of grammar. These are: contextualization, rehearsal, elaboration and organization.

According to Giamellaro (2017), contextualized teaching and learning is a collection of teaching approaches intended to link the learning of simple skills, through focusing the teaching and learning to concrete application to a specific context which is familiar to the student. Reyes et al. (2019) also indicated that contextualization occurs when the materials and procedures during instruction are linked to the experiences and environment of the students. This in essence implies that the use of local familiar materials and information in teaching ensures that students fully understand the concepts because they are made meaningful through the context. It is expected that in many situations, people learn better when they are taught concepts in familiar contexts.

Rehearsal according to Oberauer (2019) is a memory process that involves repetition of information that is being delivered. Rehearsal is important for maintaining information in short-term memory for a longer period of time and transferring it to long-term memory. Another information processing theory strategy of interest is elaboration. Elaboration is a long-term memory process of linking new information to previous knowledge to make recall easy (Loaiza, & Lavilla, 2021; Tian et al., 2020). According to Bolkan (2016), elaboration is a cognitive process whereby information is protracted to make it more outstanding. Chang (2015) in his study on memory strategies used by teachers found that one way of elaborating information in a classroom is to connect mental images with items which are meant to be remembered. Chang, further argues that new materials should be linked to existing materials so that meaningfulness in learning is achieved. These strategies of information processing theory facilitate meaningful learning. In order for the information to be retained and retrieved, meaning should be attached to it through contextualization, rehearsal, elaboration and organization.

Huang et al. (2019) investigated the effectiveness of rote learning and meaningful learning on English vocabulary memorization. Findings revealed that meaningful learning significantly improved students' performance on English vocabulary memorization in similar ways in which rote learning did hence there was no difference. Subsequently, a lesson design where students are expected to use specific strategies, such as questions and discussions to enable the attainment of grammar, are encouraged or important. Therefore, meaningfulness of information should be ensured through presenting lessons in such a way that students can relate the new information to

already known information. These arguments suggest that learning should be structured so that it builds on existing knowledge.

A close look at the background, reveals that there was still a gap regarding how pre-service teachers, who are still undergoing teacher education apply the newly acquired theoretical knowledge of the information processing theory to the teaching of English grammar during their teaching practice. The gap was established through exploring previous studies on how information processing theory strategies are applied for teaching. The background showed that most of the studies that have been conducted so far focused on in-service teachers' practices of making teaching meaningful through the use of theories including the information processing theory strategies. Since it is clear from several studies that teaching should be made meaningful, the current study explored pre-services' preparedness in applying theoretical knowledge to actual classroom. This therefore justified the need for conducting this study to explore how pre-service teachers applied the information processing theory strategies of contextualization, rehearsal, elaboration and organization to the teaching of English grammar during their teaching practice at secondary school level in Malawi.

Among other things, the study results aim at helping the teaching methodology lecturers in the teacher education institutions to improve the way they prepare pre-service teachers for actual classrooms through application of different theories of learning. Teacher education institutions as a whole are also expected to benefit by having their pre-service teachers attain greater knowledge on actual encounter with learners in the classroom and how they would apply theory to facilitate meaningful learning. Against this background, the researcher holds the view that pre-service teachers' application of information processing theory strategies in the teaching of English grammar to secondary school students in Malawi would provide guidance to the ministry of education as a whole on how teaching and learning can be made meaningful and how pre-service teachers should be prepared for actual classroom encounters. Therefore, the study on the application of information processing theory to teach English grammar to secondary school teachers was conducted. In order to conduct this study, the Multi-stage model of information processing theory by Atkinson and Shiffrin (1968) was used.

1.3 Problem Statement

The issue of student teachers' preparedness to apply theory in actual teaching is topical in teacher training institutions in many countries around the world, including Malawi (Chitiyo et al., 2015; Du Plessis, 2023; Goh & Blake, 2015; Paulo, 2014). Despite this being the case, research in the area of pre-service teacher's application of information theory strategies to the teaching of English grammar is particularly new since most studies, as cited above, have concentrated on how in-service teachers teach using information processing theory as a learning theory.

There is need for pre-service teachers to be prepared to apply theory to actual classrooms during their teaching practice in order for them to be equipped to teach. Therefore, a strong background in both theoretical pedagogical knowledge and actual classroom practice is paramount for pre-service teachers. One of the major pedagogical knowledge areas in educational psychology is the information processing theory, as a learning theory. The application of information processing theories and related strategies in teaching and learning has also been extensively researched (Ahour & Berenji, 2015; Prasannakumar, & Saminathan, 2013; Rao, 2016). However, relatively little is known about how pre-service teachers apply cognitive information processing strategies of contextualization, rehearsal, elaboration and organization to the teaching of English grammar.

Existing literature on application of information processing theory and other learning theories has primarily concentrated on how it is applied by in-service teachers in the classroom (Chang 2015; Loc et al., 2019) and how they are used by students as learning strategies. In order to close this gap, this study explored how pre-service teachers applied the information processing theory in the teaching of English grammar to facilitate meaningful learning in secondary school students during their teaching practice.

1.4 Purpose of the study

The purpose of this study was to investigate how the pre-service teachers applied the information processing theory strategies in teaching English grammar to facilitate meaningful learning in secondary school students during their teaching practice

1.5 Research objectives

1.5.1 Main Objective

The main aim of this study was to investigate how pre-service teachers applied the information processing theory to the teaching of English grammar to secondary school learners during their teaching practice. Besides, the study was guided by the following specific objectives:

1. To explore how pre-service teachers apply contextualization strategies in teaching English grammar to forms 3 or 1 students during teaching practice.
2. To explore how pre-service teachers apply rehearsal strategies in teaching English grammar to forms 3 or 1 students during their teaching practice.
3. To determine how pre-service teachers use information processing theory strategies of elaboration in teaching English grammar to forms 3 or 1 students during their teaching practice.
4. To find out how pre-service teachers used information processing theory strategies of organization in teaching English grammar to forms 3 or 1 students during their teaching practice.
5. To identify the challenges that pre-service teachers faced in the application of the information processing theory strategies of contextualization, rehearsal, elaboration and organization in teaching English grammar to forms 3 or 1 students during their teaching practice.
6. To develop a model, based on information processing theory strategies, for teaching English grammar to secondary school students.

1.6 Research questions

1.6.1 Main research question

How do pre-service teachers apply the information processing theory strategies to the teaching of English grammar to secondary school learners during their teaching practice?

1.6.2 Specific research questions

The study was guided by the following research questions:

1. How do pre-service teachers apply the information processing theory strategies of contextualization when teaching English grammar to forms 3 or 1 students during their teaching practice?
2. How do pre-service teachers apply information processing theory strategies of rehearsal when teaching English grammar to forms 3 or 1 students during teaching practice?
3. In what way do pre-service teachers use information processing theory strategies of elaboration when teaching English grammar to forms 3 or 1 students during teaching practice?
4. In what way do pre-service teachers use information processing theory strategies of organization when teaching English grammar to forms 3 or 1 students during teaching practice?
5. What challenges do pre-service teachers face in the application of the information processing theory strategies in teaching English grammar to forms 3 or 1 students during teaching practice?
6. What model, based on information processing theory can secondary school teachers use when teaching English grammar to secondary school students during their teaching practice?

1.7 Significance of the study

This study is significant for several reasons. Since not much is known about how pre-service teachers apply information processing theory strategies to teaching English grammar to secondary school students, the results of the study inform teacher education institutions to improve their preparation for pre-service teachers' application of pedagogical knowledge taught in the course of the training. In particular, methodology lecturers of teacher education institutions are expected to benefit as the study has unveiled areas for improvement in pre-service teachers in teaching their major and minor subjects including English. The results provide an insight on how to develop practical methods of instruction to enable pre-service teachers to efficiently use theoretical knowledge to teacher educators.

Through these results, the Department of Teacher Development (DTED) of the ministry of education is expected to realize the importance of supporting and monitoring secondary school

teacher training with necessary resources for more practical experiences during teaching practice. In addition, the study adds to the scarce as well as the existing literature in the area of how pre-service teachers apply the information processing theory strategies of contextualization, rehearsal, elaboration and organization to the teaching of English grammar at secondary school level. The knowledge of different grammar teaching strategies further support both in-service and pre-service teachers in developing positive attitudes toward integration of diverse approaches in traditional teaching contexts hence enabling meaningful learning.

Furthermore, the study findings through the information processing model developed inform secondary school curricular designers and textbook authors to introduce different teaching and learning strategies within the teachers' guides and other teaching-learning materials to ensure that meaningful learning of English grammar is facilitated in students. Moreover, this study provides assistance to future researchers to explore more on the relationship between theory and practice in teacher education and how the information processing theory improves achievement in English grammar.

Finally, the information processing theory strategies that were explored in this study could support in-service teachers and teacher educators who would wish to apply the strategies in their own classroom settings. Having been exposed to how pre-service teachers use the IPT strategies, in-service teachers and teacher educators in teacher training institutions can adjust their methodology curriculum to respond to the needs of pre-service teachers in relation to application of theoretical knowledge to actual classrooms during teaching curriculum. It is anticipated that applying the information processing theory strategies enriches the teaching of English grammar to secondary school learners since the strategies are known to ensure meaningful learning as they connect new information to pre-existing knowledge in memory.

1.8 Scope of the study

This research was confined to how pre-service teachers applied the information processing theory strategies of contextualization, rehearsal, elaboration and organization to teaching English grammar during teaching practice. The target population was 130 pre-service teachers of the University of Livingstonia. From the population, only those who were taking English language as their teaching

subject and undergoing teaching practice were included. The study was conducted in nine secondary schools spread across six districts of Malawi. The period for conducting this study was four years from 2021 to 2024.

1.9 Theoretical Framework

According to Grant and Osanloo (2014) the theoretical framework consists of the carefully chosen theories that bind the researcher's thinking concerning how he or she understands and plans to study one's topic and its relevant concepts. It is the "blueprint" that serves as a guide, upon which the study is built. The current study drew its theoretical framework from the information processing theory. The rationale for using this theory was that it facilitates meaningful learning through linking new information to prior knowledge which is activated during the teaching and learning process. Below is the detailed explanation of the information processing theory.

1.9.1 Information Processing Theory (IPT)

The origins of the information processing theory point to George A. Miller (1956) who is known to be the founder of cognitive psychology. Miller proposed that learning is an internal process which involves mental processes. According to Çeliköz et al. (2019), information processing is one of the cognitive approaches to learning that explains how human beings acquire information, process, store, and retrieve it from memory through encoding. Schunk (2012, p.187), states that "encoding is the process of integrating new information processed in the working memory with what is already known to facilitate storage in the long-term memory. It is a control function that occurs for new information to be acquired and stored in long term memory. Similarly, Santrock (2018) argued that through the process of encoding, information is retained in memory. Schneider (2015) further contends that for information to be encoded, attention is the key aspect that facilitates it. Once the attention is captured, encoding is simplified through processes such as, rehearsal, deep processing, contextualization, elaboration, and organization among others. These cognitive IPT encoding strategies can be used in order to facilitate meaningful learning and effectively store information in the long-term memory.

The focus of information processing theories is on how people pay attention to environmental proceedings, translate information to be learned and relate it to pre-existing information already

in memory then store new knowledge in memory, and eventually retrieve it as needed (Loc et al., 2019). Hence information processing models propose that information is remembered best when it is stored in a way that is linked to previous knowledge. One key aspect of information processing theory which has direct applicability to this study is how meaningful learning occurs. Researchers who advocate for the use of information processing theory agree that people choose and pay attention to certain features of the environment. They later convert and rehearse the information, relate it to previously learned information to make it meaningful (Brown et al., 2014; Doyle, 2023; Kwangmuang et al., 2021; Schunk, 2012).

Therefore, IPT strategies of contextualization, rehearsal, elaboration and organization when well applied enable meaningful learning of new information. According to Schunk (2014), there are several models of the information processing theory one of which is the multi-stage or three-stage model proposed by Atkinson and Shiffrin (1968). This study adopted the multi-store model by Atkinson and Shiffrin. The process includes attending to key points of the material presented, mentally organizing it into comprehensible cognitive structures, and assimilating it with related existing knowledge. Meaningful learning is reflected in the ability of the learner to apply what was taught to new situations (Sailin & Mahmor, 2018). Herewith are explanations of different IPT models.

1.9.1.1 Multi-Stage Model (Atkinson and Shiffrin, 1968)

The Multi-Stage model also known as a three-store model of the information processing originally proposed and developed by Atkinson and Shiffrin (1968) is useful for explaining how information obtained through our sense organs is perceived and later encoded in memory. This model assumed that information which came in from the environment, is processed by a sequence of three stages which include sensory memory systems which is a part of the process of perception, after which it is transferred into short-term memory and finally to the long-term memory (Öhman, 2021). Each of these three stores is different from the other in terms of duration, capacity and processes on which it relies for handling and dealing with the information which flows through the system.

1.9.1.2 Sensory Memory (SM)

Sensory memory also known as the sensory register (visual and verbal), is the first stage of the model that receives unlimited amount of information. Al-Qahtani (2018) states that the name

sensory memory is linked to the function that this memory type has, the senses. The information in the sensory memory is obtained through the senses. The SM has very unlimited capacity and duration. According to Watson and Zhao (2021), humans receive information through their senses including sounds through hearing, images and text through sight, temperature, and affection through touch, and stenches through smell.

Three types of sensory memory can be isolated. These are iconic memory, echoic memory, and haptic memory. Iconic memory holds information that is collected through sight, echoic memory retains information gathered through audio stimuli and lastly haptic memory retains information assimilated through touch (Al-Qahtani, 2018; Bromley, 2017). Thus information in the sensory memory disappears if there is no attention for perception to take place since we face a wide range of information and we are forced to select information that is useful at the particular time. Poulos & Kandaraki (n.d.) argue that attention is information because it chooses the information which becomes available to memory. It is not possible to make material meaningful through organization, elaboration, and rehearsal if we fail to recognize it from sensory register. Information is held briefly for three or five seconds in SM which is long enough for individuals to move it to the short-term memory once attention is certain.

1.9.1.3 Short-Term Memory (STM)

Next in the sequence is the short-term memory (STM) also known as the working memory (WM). Short-term memory is a working memory (WM) and matches approximately to consciousness, or what one is aware of at a given moment. According to Camos, (2015), WM is the mental structure responsible for storage and handling information over the short term. It is in the STM where the mind uses the information to respond to different situations in the surrounding (Baddeley, 2019). It carries all information that is in the attention of the individual and receives sensory information processed from sensory memory store as well as information in long-term memory (Cowan et al., 2020; Hasson et al., 2015). In addition, the STM has the characteristic of linking and integrating information from sensory memory and long term memory on the condition that the information is successfully connected to the previous knowledge.

According to Miller, (1956) a cognitive psychologist and the pioneer of information processing theory, the STM can only hold 7 (plus or minus 2) units of information at a time. A unit in this context is a meaningful item such as a letter, word, number, or common expression (Schunk, 2014). In order for units of information to be retained, they must be rehearsed. It is while, information is in STM when it is linked to knowledge in long-term memory (LTM), stimulated and placed in WM to be assimilated with the new information. This implies that STM permits the learner to hold and to comprehend reduced quantities of information. Working memory is particularly important to an individual's ability to learn new content (López et al., 2018).

Manoochehri (2021) contends that with the amount of information it receives from SM and LTM, the capacity of short-term memory can be improved through chunking the information into manageable units. This can also be done through repeating the information until it is moved to LTM. Without rehearsal, information is lost after a few seconds. The information in the STM stored for only 15–20 seconds before some is transferred to the long-term memory after chunking or rehearsal (Cowan, 2019; Miller, 1956; Norris & Kalm, 2021). For learning to occur, the most important change of the information takes place after leaving the STM and enters the LTM. At this point, cognitive processes such as rehearsal, contextualization, elaboration and organization are essential for effective storage to long term memory.

1.9.1.4 Long -Term Memory (LTM)

Atkinson and Shiffrin (1968), cited in Loc et al. (2019) argue that the LTM is where information is organized and a reasonably stored permanently based on meaning and importance attached to the information. According to Hultberg, (2018), the capacity of LTM is thought to be unlimited since it can store information from the past and retrieve it when needed. The long-term memory can be divided into two types, declarative and procedural memory (Atkinson, & Shiffrin, 1971; Cowan, 2019).

Morgan et al. (2014) state that declarative memory encompasses the memory of facts linked to the individual. Camina and Guell (2017) also indicates that declarative memory is also divided into episodic and semantic memory. While episodic memory stores individual or personal experiences or real events that have happened in a person's life, semantic memory stores information about facts

or obtained throughout the life (Hamrick, 2015). The second type of LTM is procedural memory which is a type of implicit long-term memory which involves knowledge of how to do things specifically, motor skills (Çeliköz et al., 2019; Harman, 2020). Procedural guides what we do every day comprising all unconscious memories, in addition to skills we develop with practice (Bianco, et al., 2020). Procedural memories work at an unconscious level and not declarative in nature. The major function of LTM is to organize information in order for it to be meaningfully recognized and retrieved (Loc et al., 2019).

In spite of differences in theoretical perspectives, researchers agree that information remains in LTM for a long time (Cowan, 2019; Loc et al., 2019). There is no need to repeat the items to keep it in memory for longer periods. Given the appropriate cues, the learner will remember and apply knowledge to other learning situations. In order for information to permanently stored in LTM, it has to be successfully organized and stored (Unsworth, 2019). According Rumelhart and Ortony (2017), knowledge in LTM is stored in related categories of schemas. Therefore, teachers are expected to use strategies that will activate prior knowledge before introducing new lesson for meaningful learning to occur (Gupta, 2019; Reardon & Derner, 2023). This study adopted the multi-stage model to explore how student teachers apply the four main strategies that facilitate meaningful learning and enable transfer of information from STM to LTM. Thus Woolfolk, (2016) and Santrock, (2018) agree that some of the cognitive processes through which new information can be meaningfully learned and in the long-term memory include contextualization, rehearsal, elaboration and organization respectively.

1.9.2 Principles of the Information Processing Theories

Regardless of the differences on a number of ideas among information processing theories, a great number cognitive psychologists largely agree on some basic principles of the theory (Lachman et al., 2015; Lee and Kim, 2014; Schunk, 2016; Wickens & Carswell, 2021). These principles are explained below:

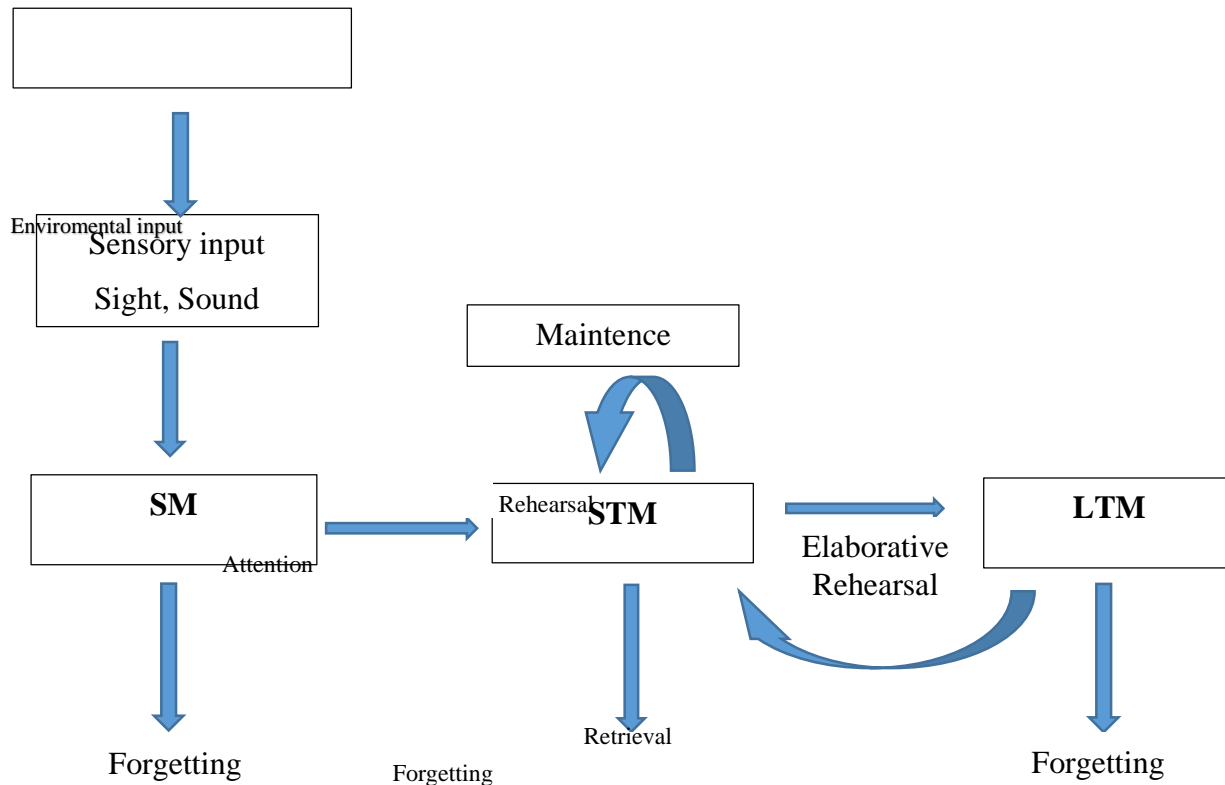
Firstly, the capacity of memory is limited. Scholars argue that how much information can be encoded into memory, stored and retrieved at a time, and the rate at which new information is coded are limited (Barber, 2015; Tangen, & Borders, 2017; Wickens & Carswell, 2021). This

means only a limited amount of information can be processed at a time. Secondly, there are control processes to the flow of information. Researchers agree that there is a control system that deals with various stimuli from the environment (Atkinson & Shiffrin, 1971). How these control processes operate is yet to be settled by scholars.

The third key assumption of the IPT is that human beings actively process and seek for information. As learning takes place, individuals do not wait for the arrival of the information. They instead search for connections between new information and previously learned information (Hamilton, Hockey, & Rejman, 2022). In so doing, they focus on information which is applicable to their previous experiences using cognitive processes. The last principle is that previous knowledge interacts with new information for meaningful learning to occur. This means that prior knowledge has an effect of learning of new information (Schunk, 2016). These are general principles of information processing theories.

Atkinson and Shiffrin (1968) demonstrated through the three-stage information processing theory model have demonstrated that it can be applied to teaching-learning process to facilitate meaningful. According to Ausubel (1963), meaningful learning is a process of linking and connecting new information to previous information in a hierarchical order. Therefore, contextualization, rehearsal, elaboration and organization strategies of the information processing that relate to learning could be used to present lessons to enhance meaningful learning. Lim, (2012), also contends that the multi-stage information processing model provides a helpful basis for looking at memory. Gilakjani and Sabouri, (2016) further argue that both in-service and pre-service teachers with a greater understanding of the theory and its principles can select learning strategies in order to facilitate meaningful learning. (Cañas & Novak, 2014; Gilakjani, & Sabouri, 2016). Below is the diagrammatic representation of the multi-store model of the information processing theory adapted from simply psychology, (2020).

Figure 1 shows Multi-stage Information Processing Model by Atkinson and Shiffrin (1968)



Source: Adapted from Simply Psychology, 2020

According to Mota (2018), the way in which our brains code and store information from the environmental stimuli is deeply influenced by our existing knowledge. Hence, using this model as its theoretical framework, the study concluded that initial information in short-term memory can be remembered through rehearsal while contextualization, elaboration, and organization enable meaningful learning and transfer of information from STM to LTM and aid retrieval. Therefore, in-service and pre-service are expected to have the knowledge of these IPT strategies and should incorporate them in teaching to facilitate meaningful learning.

1.10 Operational definitions

The different concepts used in this study must be defined before proceeding with any further discussion. Defining these key concepts is very critical to cultivate a better understanding of the subject matter. The concepts to be defined are as follows:

1.10 .1 Contextualization

Contextualization covers a variety of strategies that connect teaching and learning to students' everyday experiences.

1.10.4 Elaboration

Elaboration strategies are ways of linking new information to pre-existing knowledge. For the purpose of this study, elaboration means how learners make connections between new information and previous knowledge to facilitate retention and retrieval.

1.10.5 Organization

Organization is a strategy that aids retention that involves grouping or categorizing information into similar bits for easy recall.

1.10.6 Form 3

Malawi operates on an 8- 4 - 4 education systems: Primary School runs for 8 years, secondary school runs for 4 years and finally, University bachelor's degree runs for 4 years. The grades are called forms. Therefore, form 3 in this study refers to the eleventh grade of the whole education system.

1.11 Ethical Considerations

1.11.1 Informed consent and voluntary participation

Firstly, informed consent was sought from the participants before data collection. The steps to ensuring informed consent included first the prospective participants were individually approached and details of the research process were explained. They were later given time to decide whether to participate or not. Then agreement to participate was obtained after they had full knowledge of the research process. The prospective participants were provided a written consent informed consent which they signed. The researcher also explained that participations was voluntary and prospective participants were given a chance to ask questions where they were not clear before signing the consent forms. Furthermore, the researcher explained to the prospective participants that they were at liberty to refuse or withdraw from the study at any point if they chose to even after informed consent was signed.

1.11.2 Anonymity and confidentiality

To ensure anonymity and confidentiality, names and identities of participants were not revealed during data collection, analysis and reporting of the findings of the study. Instead of names, numbers and letters were assigned to each participant and school. Further to this, privacy of the interview environment was carefully managed as the rooms where interviews were conducted were private and only occupied by the researcher and the participant.

1.11.3 Protecting participants from harm

The researcher made it a priority to protect the participants from any physical and psychological harm, danger, or discomfort that may have arisen due to the research procedures. This principle is also known as beneficence or doing well and preventing harm to others. Protection was done through minimizing risks by obtaining informed consent and by following all ethical guidelines.

1.11.4 Deception

To ensure that the participants were not deceived at any point, the researcher gave detailed explanation of the research process. At each point where there were changes in the procedures, participants were fully informed with justification.

1.11.5 Ethical clearance

To ascertain that all ethics had been adhered to, the research proposal was submitted for ethical clearance to the University of Livingstonia Research and Ethics Committee (UNILIA-REC) based in Malawi. In addition, permission to collect data in secondary schools was sort from the Ministry of Education through the Education Division Manager (North) who approved and issued the letter of permission to collect data.

CHAPTER TWO: LITERATURE REVIEW

2.1 Chapter overview

This chapter reviews literature relating to how pre-service teachers apply the information processing theory strategies to teach English grammar to facilitate meaningful learning in secondary school students during their teaching practice. The chapter begins with sections on meaningful learning, teacher education and teaching of English in Malawi in Malawi. Further, the chapter presents a review of previous studies based on the research questions beginning with application of contextualization strategies to teaching, application of rehearsal strategies to teaching, application of elaboration and application of organization strategies to teaching. Last but not least, previous research findings on challenges of using information processing theory strategies to teaching are presented. Finally, a section on teaching model is presented. It is believed using these IPT strategies during the teaching-learning process can facilitate meaningful learning in students.

2.2 Meaningful Learning

Key strategies in teaching and learning are those that facilitate meaningful learning because they help students to create their own knowledge and transfer it to other contexts. According to Getha-Eby et al. (2014), meaningful learning theory by Ausubel 1963 originates from the cognitive constructivist paradigm. The meaningful learning theory proposes that prior knowledge is the most important factor that influences learning. Therefore, meaningful learning occurs when students are able to link new information to their preexisting knowledge which results in new concepts becoming clearer and precise.

Ausubel (1968), cited in Bryce and Blown (2023) postulates that the most significant source of learning is what the learner already knows and that prior knowledge is the center of all learning. This suggests that meaningful learning arises when students are able to assimilate new material into existing knowledge in long term memory. Meaningful learning is linked to cognitive constructivist paradigm because in the process of making connections between new and previous learning. In the process, new understanding as well as meanings are constructed. For meaningful learning to occur in Ausubel views, students should be able relate new information to preexisting knowledge (Jhonson, 2019). Thus Ausubel's theory argues that for new concepts to be learned, it

has to be integrated with other ideas. This leads to longer retention of information and changes in individuals' mental processes. Finally, new relationships are created between concepts.

The role of the teacher is to facilitate the learning through provision of a supportive environment. This can be done through the use of strategies that facilitate connections between new and previous knowledge enabling meaningful learning. Information learned meaningfully is ordinarily retained longer, facilitates transfer of learning and can be used in new contexts (Novak, 2010; Vallori, 2014). In addition, Sharan (2018) argues that meaningful learning is not only grounded on the knowledge which teachers transfer, but it also encourages the construction of new knowledge from learners' everyday experiences. Thus, holding pre-service teachers accountable for the correct execution of teaching and learning activities in the classroom is an important function of teacher education programs because it merits significant classroom practices.

2.3 Teacher Education in Malawi

Secondary school teacher education in Malawi is offered in various public and private universities and colleges. At university level, pre-service teachers undergo a four-year training in both subject content knowledge (SCK) and pedagogical knowledge (PK) (İdil & Narlı, 2022; Nzilano, 2013; Wu, 2021). This means that pre-service teachers are equipped with pedagogical content knowledge (PCK) during their 4-year education degree programme. Besides the subject content knowledge and methodology, the teacher education curriculum also includes education foundation courses and teaching practicum undertaken for at least 12 weeks in various secondary schools across the country. Teaching practice is aimed at enabling pre-service teachers to put the theoretical knowledge of both methodology and subject content knowledge into actual classroom setting.

Literature has identified gaps in the relationship between theory and practice in teacher education as pre-service teachers experience flows in applying what they learn in the institutions (Hussain, & Naveed, 2023; Sathasivam et al., 2024). Nzilano (2013) states that putting theoretical knowledge into actual practice becomes problematic as pre-service teachers generally learn contrary to how they are expected to teach in actual school classroom settings. This creates a mismatch and a divide between theory and practice (Mkandawire et al., 2016; Mtika, 2008).

2.4 The Teaching of English in Malawi

In Malawi, English is a second as well as the official language used to transact business in government, education, commerce, industry and the legal system. English promotes unity and facilitates communication within Malawi's multilingual society, as well as with other countries. For this reason, it is taught as a second language in all secondary schools in the country. According to Kamtukule (2019) and Mchombo (2017), English in Malawi is a medium of instruction at all levels of education beginning from grade one to tertiary level. Harushimanaa and Hara (2022) argue that this English instruction policy was put in place in 2014 with the rationale that ability in English at early grades would enable learners to grasp concepts in other subjects that are taught including Mathematics.

English is also taught as compulsory subject from grade one to tertiary level of the education system in the country (Kavute & Hara, 2021). Despite the policy of English as medium of instruction, the current practice in lower primary school is that teachers use Chichewa to teach all subjects apart from English. This is augmented by curriculum documents from grade 1-4 which are all in Chichewa. Hence there is need for a clear policy direction to ensure that implementation is consistent across all levels of education. However, English has been taken as the measure for certification during national examination (Sanga, 2011). This means that no certificate is awarded unless someone passes English. Due to the importance attached to English, primary and secondary school teaching and learning timetables allocate English more time per week.

The secondary school English syllabus consists of two components namely, language and literature. The language component encompasses elements such as reading, writing, speaking, listening, critical thinking and reasoning and, structure and language use in which grammar is taught. According to Malawi institute of Education (MIE, 2013), senior secondary school students need to develop competency in English because ability in English is critical for understanding other education materials, employment opportunities, as well as to experiencing other cultures around the world. For students to successfully communicate in English, secondary they need to practice the language skills as they are integrated with grammar and literature because it is a skills subject. Lin, et al. (2020) argue that grammar is critical for effective teaching and learning of English because it plays an essential role in the development of social skills in any context. The English curriculum

emphasizes learner-centred teaching and learning strategies as well as continuous assessment (MIE, 2013).

Though the secondary school English curriculum encourages integration through active methods, Tchesa (2020) indicates that the teaching of English grammar in Malawian schools is generally teacher centred. Reading and listening comprehension, note taking, composition writing and literature lessons are generally taught independently from grammar. Tchesa contends that during English lessons, teachers initially present grammar rules then explanations are provided as to how each rule applies in a sentence. Thereafter, learners can be given tasks to determine if the sentences are grammatical correct. However, more learner centred strategies are advocated in recent curriculum reviews.

2.5 Application of contextualization strategies to teaching English grammar

Contextualization is the concept of relating subject content to meaningful situations that are relevant and linked to students' everyday life. Several researchers have provided a variety of definitions of contextualization. According to Wyatt (2015), contextualization is the process of connecting students' experiences to new learning by constructing meaning and relevance with the context of learning. In addition, Khare (2018) proposes, that contextualized teaching refers to teaching the content to students in a context that is establishing the ideas in meaningful ways in which students find easy to understand new content.

In light of the above definitions, contextualization could be understood in the following ways; firstly, it involves taking into consideration students' experiences when planning and delivering a new lesson. Secondly, that student's backgrounds provide prior knowledge which is significant for understanding new information. Lastly, that students should be given opportunities to learn using their surrounding for meaningful learning has to occur. In language teaching, contextualization is defined as engaging the language items in a meaningful and significant context (Chen et al., 2021; Sato & McDonough, 2019). In doing so, it helps the learners to acquire new skills, abilities, and knowledge in a meaningful manner. The basic principle of contextualization strategy is that learners come to the learning situation with information of different experiences that are relevant and can be used in the process of teaching and learning of new concepts. Therefore, it is essential for

teachers to know their students' background which can consequently be used to plan instruction of new lessons (Du Plessis, 2020; Silseth & Erstad, 2018).

Existing research globally and in Malawi has generated significant conclusions about how contextualization largely facilitates meaningful learning of new content (Reyes et al., 2019; Sharma & Poona, 2016). For instance, Sharma and Pooja (2016) stipulated that contextualized teaching is in line with constructivism, where students construct their own understanding on new knowledge from prior knowledge experiences. This view is supported by various scholars who also agree that contextualization of teaching and learning assists students in constructing meaning learning (Bello, 2023; Ratnawati, & Romansyah, 2022).

Margana (n.d) in a study on teaching English to young learners using contextualized instruction in Indonesia revealed that, contextualized instruction of English is an important way to create English aptitude because it allows students to be deeply involved in the learning of the content which relates to their everyday life. This leads to meaningful learning in students since they use their experiences to create meaning of the new information. The study was centred on how in-service teachers use of contextualization strategies. Similarly, Margana (2021) argues that English language and grammar instruction should be dominantly contextualized in order to create students' English aptitude because it connects to their real-life contexts. Consequently, English teachers are encouraged to use contextualized tasks when teaching in order to facilitate students to attain the target language successfully. This can be done through activating learners' previous knowledge to simplify new English materials presented, enabling learners to attain a vibrant and whole representation of how grammar and structure function in contexts hence achieving meaningful learning.

From a cognitive standpoint, contextualization, is thought to stimulate transfer of learning and to improve the retention of information (Rivière et al., 2019). Contextualization is also known to speed up information processing in short-term memory and retention of information in long-term memory. Thus, it is imperative that the teaching and learning strategies that in-service as well as pre-service teachers use should include contextualization strategies to facilitate transfer of learning which necessitates meaningful learning.

Additionally, research has unveiled various contextualized strategies that teachers can use in the teaching and learning process to promote meaningful learning. Some of the most common ones include; use of authentic materials, use of authentic assessment, integration of literature to teach English grammar and cooperative learning (Biswas and Anis, 2017; Gilmore, 2007; Margana (n.d); Onchera & Kulo, 2014; Reyes et al., 2019; Rohayati, 2013; Seyyedrezaie & Barani, 2018). The first contextualization strategy to be reviewed is integration of literature.

2.5.1 Integration of literature

On integration of literature, a study by Onchera and Kulo (2014) indicate that the literature genres at the exposure of English teachers for integration include short stories, plays, poetry, songs and novels. Other scholars argue that sources such as movies, magazines, journals, newspapers or any literary work can be used to enhance the teaching of grammar in meaningful (Mestari & Malabar, 2016; Rao, 2019; Sentürk, & Kahraman, 2020; Weber, 2018). According to Scholar (2022), literary texts are effective authentic materials which teachers can use to teach English grammar. Scholar explored the use of literary texts in a grammar class as well as how literary texts are selected in Nigeria. The study concluded that one of the literary genres, a short story is a useful authentic material for language teachers to employ because they provide various grammar rules, syntax and phonology in addition to influencing the students' creativity.

These findings suggest that integration of literature in teaching English grammar influences meaningful learning in students because it links the content to their everyday experiences. The concentrated of the study was on how in-service teachers used a variety of literary texts to teach English grammar. Biswas and Anis (2017) also explored the effectiveness of contextualization of teaching grammar through short stories in EFL classes in India. Results indicated that one way in which grammar rules can be contextualized is through short stories especially if students are involved and are taught in an interesting manner. The study focused on in-service teachers' use of short stories. In order for meaningful learning to occur, teachers need to apply contextualized resources that are known to enrich learning.

Results of another study in Turkey again by Atmaca and Günday (2016) on the use of literary text to teach grammar in foreign language classroom show that literary works can provide information in a meaningful way and enable the learning of grammatical structures. This makes the literary texts suitable for teaching grammar since it requires that more instances of its use be available for students. The study had its focus on how literary texts are used by in-service teachers and students. In addition, a study by Erdem (2016) in Sweden on literature in English language teaching revealed that using literature facilitates the learning of other language skills including grammar since it spreads the knowledge through its rich vocabulary. Teachers should use literary works such as poetry, novels, stories, or plays when teaching because they enhance understanding through imaginations enabling learners to have a sense of real-life experiences. The attention of the study was on how literature is used by experienced teachers in the classroom.

Additionally in Vietnam, Nguyen (2021) investigated how stories are used by teachers in teaching grammar as well as teachers' beliefs towards using stories in teaching grammar. The study also explored opinions of students towards the use of short stories. Findings showed that both teachers and students perceived use of stories as an effective strategy for teaching grammar. Since grammar of a language assists people to communicate, teaching should be done in context and it should not be taught in isolation in order to fulfil its communicative purpose.

A study in South African schools on teaching grammar through literature by Weber (2018) reiterates that literature texts motivate students in the language classroom because the text provide authentic environments and touches their emotions. Using authentic literary texts links the learner to their 'real-world' contexts hence, promoting meaningful learning. Therefore to avoid teaching grammar in isolation, teachers should integrate literature texts of various kinds. Most of these studies concentrated on how literary texts are used by in-service teachers.

Furthermore, Kachitsa (2023) in his study on integration of grammar with literacy skills in the teaching of English in community day secondary schools in Malawi found that English teachers have inadequate knowledge on how to integrate literature in teaching English grammar. The study focused on how in-service teachers integrate literature to teaching English language. Integration as a method to English grammar teaching emphasizes that teachers need to teach grammar together

with other language skills and literature in order for students to cultivate command in English. Other scholars in Malawi also agree with the use on different contextualized strategies to teaching English language and grammar (Kapito, 2021; Manda, 2023; Sanga, 2016). These studies in Malawi also focused on the use of the contextualized strategies by in-teachers. In light of the findings of the cited studies, when exposed to literary texts such as short stories, learning of grammar becomes meaningful for students since it gives them an opportunity to link the lesson to real-life experiences.

2.5.2 Authentic Materials

Use of authentic materials to teach English grammar is another contextualization strategy. Numerous scholars have defined authentic materials in different ways. Kilickaya (2004), as cited in Mestari and Malabar (2016) defines authentic materials as real language exposure and use in context. The teaching of grammar has long been regarded as a contextualized process because it requires authentic activities which are based on real-life situations in order to make learning meaningful for students (Vygotsky, 1978, cited in Erbil, 2020).

Authentic materials can help teachers achieve this target. There are numerous sources of authentic materials which are more economical locally available. Rao (2019) indicates that teachers of English can easily access authentic materials and use them to teach English grammar. These may include newspapers, storybooks, charts, textbooks, magazines, journals, photos, audio cassettes, television programmes, movies, songs, internet, realia and so on (Benavent & Peñamaríad, 2011; Sentürk & Kahraman, 2020; Yang, 2020).

The use of authentic materials to teach grammar has been widely researched. Research by Akbari and Razavi (2016), on use of authentic material in the English language classroom in Iran showed that the attitude of English teachers towards the use of authentic materials in the classroom provides significant advantages and motivates students. The study had its focus on how in-service teachers and students used authentic materials. Nădrag and Buzarna-Tihenea (2017) contend that presently, it is important to expose students to authentic learning situations through the use of authentic materials because connected to students' actual experiences.

In a study on how teachers can improve language teaching through the use of authentic materials in class in Romania by Nădrag and Buzarna-Tihenea (2017), findings show that authentic materials and media enable can students to develop connection between the classroom language and the world outside. Then concentration of the study was on the use of authentic materials by practicing teachers. In his study which explored the benefits of authentic materials in the ESL classroom in Thailand, McCoy (2016) showed that authentic texts present examples of use of grammar such as passive and active voice which help students to learn to construct meaningful sentences. Thus when used appropriately, authentic materials give students an opportunity to learn English language in more natural and authentic contexts. The study focused on benefits of using authentic materials by students. There is scarcity of literature in Malawi that focus of how pre-service teachers use authentic materials to teach English grammar despite the existence of a plethora of literature. The next section presents previous studies on usage of authentic assessment.

2.5.3 Authentic assessment

In addition to use of authentic materials to contextualize the teaching of grammar, using authentic assessment (AA) also provides meaningful context for learning. Assessment is central to education as it gives feedback to teachers on students' learning thus it is part and parcel of the teaching and learning process. In Malawi, assessment of students in secondary school curriculum is linked to the teaching and learning methods as well as teaching and learning resources. The curriculum requires teachers to use continuous assessment which is a type of authentic assessment (MIE, 2013). Authentic assessment is encouraged because it measures students' skills, attitudes, motivation and achievement in relation to students' everyday experiences.

There are numerous definitions of authentic assessment advanced by different researchers. However, there's no agreement on what really constitute authentic assessment. Koh (2017) defines authentic assessments (AA) as being characterized by open-ended tasks that require students to construct extended responses, to perform an act, or to produce a product in a real-world context. Thus authentic assessment is a measure of students' intellectual achievement and understanding of what they are expected to actually demonstrate through their creativity and critical thinking. Some examples of AA including projects, portfolios, writing an article for newsletter or newspaper, role plays, debates, and oral presentations others. The purpose of authentic assessment is to enable

students to apply and integrate what happens in the classroom to the real world events (Villarroel et al., 2017).

Using AA contributes to meaningful learning since it allows students to engage in problem solving of real-life situations because when something is authentic it has representation of everyday experiences of individuals. Unlike traditional assessment which focusses on written tests or oral examination of knowledge, the goal of authentic assessment is to bring about meaningful learning in real contexts through activities in which students actively participate to construct their own knowledge (Ozan, 2019). Many scholars agree that authentic assessment replicates real-world standards and challenges to classroom activities. For instance, Mueller (2016) indicated that authentic assessment also known as performance assessment is grounded on the premise that it is essential for students to be taught and to learn how to execute the meaningful tasks they will likely encounter in other situations away from school. Authentic assessment leads to meaningful learning because it requires students to demonstrate understanding of the content in a real world view that links knowledge to their everyday life (Brown, 2019; Frey, Schmitt, & Allen, 2019; Villarroel et al., 2017). How pre-service teachers apply authentic assessment to teach English grammar in secondary school in Malawi remains a gap that this study sought to fill.

Authentic assessment can be distinguished from traditional assessment which emphasizes more of rote memorization (Norova, 2020). According to Norova, traditional assessment refers to conservative methods of testing which commonly include standardized tests, pen and paper exercises, multiple-choice, true or false or matching type test items as well as cloze tests. Such types of traditional assessment as quizzes and pencil-and-paper tests when used alone are not likely to arouse students' interest, nor do they motivate them to learn. Cook (2021) agrees with Norova in a study which concluded that traditional testing is not meaningful for learners to show understanding and comprehension, rather, authentic assessments needs to be used.

There are various forms of authentic assessment mentioned in literature. These include; performance assessment, portfolios, and students-self assessment. According to Koh (2017), examples of authentic assessment may also include debates, role plays, drama, dance performance, projects, portfolio, writing an article for newsletter and oral presentations. In view of these

examples, it can be inferred that AA activities in English grammar classrooms could include any active participatory methods such as writing essays, and compositions as well as sentence construction. Authentic assessment thus has the urge to motivate students because the tasks are perceived to be relevant to their everyday life and completing them is meaningful to students.

Research on the application of various forms of AA methods in teaching English as a second language or foreign language as well as grammar and other language skills has been conducted globally (Rukmini & Saputri, 2017; Villarroel et al., 2021). Most studies however focus on how in-service teachers use authentic assessment in teaching and learning. One study by Rukmini, and Saputri (2017) in Indonesia which aimed at describing how authentic assessment is used to measure students' English productive skills revealed that teachers used authentic assessments types such as portfolio, projects and performance assessment though it is not well conducted. Teachers use authentic assessment even if it is not well used owing to some challenges. The focus was on in-service teachers' use of authentic assessment. Villarroel et al. (2021) in Chile explored how teachers constructed written tests to make the items authentic. Findings revealed that teachers constructed test items which were testing higher cognitive abilities and covered real-life contexts. The study concentrated on in-service teachers' use of authentic assessment to construct test items in general. Using authentic assessment encourages critical thinking because it tests students' ability to critically demonstrate their knowledge.

Use of authentic assessment ensure that students' interest in learning language skills are encouraged. This is confirmed by Moria et al. (2017) who investigated how teachers' use of authentic assessment influences learning and writing skills creativity among students. Results show that authentic assessment inspires students' interest and encourages critical thinking in writing skills among students. The study concentrated on how authentic assessment is used to assess writing skills. Ulker and Yildiz (2021) also examined how frequent teachers used authentic assessment in English classes. The study findings showed that most teachers were still using traditional assessment methods even if they recognized the importance authentic assessment. Concentration was also on teachers' overall use of authentic assessment.

Authentic assessment helps teachers to mold students to acquire 21st century competencies such as creative thinking, critical thinking, collaboration, communication, as well as decision making (Koh, 2014). These skills support students to learning meaningfully and are valuable for academic success. A study by Huang and Jiang (2021) investigated Chinese secondary school English teachers' perception and practice of authentic assessment. The results revealed that though participants acknowledged the significance of authentic assessment, only a few had tried to use authentic activities. The study involved in-service teachers. There is need for teacher education programs to include authentic assessment practices to guide influence pre-service teachers' actual classroom practice.

Nyimbili (2016) explored teachers' use of learner-centred methods in teaching of English language in the secondary schools in Zambia. Results indicated that teachers used teaching, learning and assessment methods such as field trips, projects, debate role play and drama as classroom activities to teaching English language. The study focused on assessment methods for English language. This shows that a contextualization strategies can be used as authentic assessment activities in the process of teaching and learning. For instance, projects, field trips and group work can serve as authentic techniques of teaching and learning language. Kavute and Hara (2021) in their study analyzed errors in essays written by Malawian secondary school students who were learning English as a second language. Findings showed that students errors in essay assessment are mostly subject-verb agreement, tense, spelling, articles, nouns, capitalization and fragment among other grammatical errors. This study was centred on students who were learning English. This shows that teachers use authentic assessment to detect errors in grammar.

Furthermore, Chiziwa and Kunkwenzu (2021) investigated continuous assessment (CA) practices by social studies teachers in primary schools in Malawi. Findings showed that teachers dominantly used assessment practices which did not support higher order thinking in learner. The implication here is that assessment practices were not authentic because authentic assessment facilitates higher order thinking as well as creativity in students. The focus of the study was on assessment social studies at primary schools. Such type of assessment facilitate meaningful learning since learners would apply what they know to solve new problems in the real-life contexts.

Even though continuous assessment in Malawi secondary school curriculum is a component of teaching and learning, teachers continue to use non-authentic assessment practices. A study by Kadzitcho and Chilunga (2018), examined how comparable content validity of teacher made tests are with the syllabus alignment, representativeness of the content and cognitive level of the tests. Findings showed that most tests made by teachers centred on lower order thinking and less on higher order thinking. In the next section, I present past studies on cooperative learning another contextualization strategy.

2.5.4 Cooperative learning

Another contextualization strategy that literature unveils is cooperative learning. Scholars have defined cooperative learning in many ways. Slavin (2011) as cited in Tran et al., (2019) defines cooperative learning, as an instructional method where teachers organize students in small groups in which they work together to support one another to learn tasks. According to Gillies (2016), cooperative learning involves students working together in groups to achieve common goals or tasks which would be difficult for them to accomplish alone. Thus cooperative learning (CL) is a method of teaching and learning in which students interact in teamwork to support one another. Students work together as a group sharing ideas, and they benefit more and learn meaningfully as they share everyday experiences which relate to the new task.

Research reveals several types of cooperative learning activities that teachers can utilize during the teaching-learning process. These include group work, pair work, demonstration, role play, student team's achievement division (STAD), Think Pair Share (TPS), picture and picture and Jigsaw (Bosch et al., 2019; Chrisyarani & Setiawan, 2021). According to Sharan (2015), the basic characteristics or principles of cooperative learning include positive interdependence, individual accountability, and face-to-face interaction, interpersonal and small group skills. Among these principles of cooperative learning, two stand out which make cooperative learning different from other group work. These are positive interdependence and individual accountability (Anderson 2019; Renandya, & Jacobs, 2017; Sharan, 2018).

Renandya and Jacobs (2017) posit that positive interdependence among others entails that in order to succeed in completing tasks, there should be active participation from each group member.

Positive interdependence can be encouraged using pair work. This in turn encourages positive interaction and cooperation with peers hence learning becomes more enjoyable and meaningful. In addition, Anderson (2019) argues that these two principles emphasize collaboration among students. The other principle of individual accountability means everyone in the group should work towards achievement of goals by contributing towards the goal of the group.

Recent studies indicate that cooperative learning facilitates meaningful learning of language skills such as reading, writing, listening and speaking as well as grammar (Duxbury & Ling, 2016; Renandya & Jacobs, 2017). In their study on teachers' implementation of cooperative learning in Indonesia, Renandya and Jacobs, (2017) concluded that participants in groups aim at benefiting individually as well as for other group members. Additionally, when working in groups, students participate actively without fear of being laughed at or ridiculed and they are encouraged to find meaningful solutions to problems at hand. The study centred on group work activities used by in-service teachers. Furthermore, cooperative learning helps students to work as a team and support each other (Cloud, 2014). Such activities in turn influences meaningful learning since each student sees the relevance of learning different topics. Much attention by these studies was on how cooperative learning activities are implemented in the classroom by in-service teachers.

Another study conducted in by Suarez Flórez and Basto Basto, (2017) explored how pre-service teachers mostly used English teaching strategies and classroom management practices. Results showed that pre-service teachers mostly used task-based language learning and cooperative learning strategies to teach English. The study by Suarez Flórez, and Basto Basto, is more related to the current study since is explored strategies used by pre-service teachers. However, the focus is on the teaching of English in general as opposed to the teaching of English grammar.

Using cooperative learning strategies in teaching and learning contributes to increase in students' cognitive skills, self-confidence, team work, social skills and problem solving as they use language in meaningful ways. In turn, they are intrinsically motivated (Korkmaz, 2012). Despite the positive outcomes on the use of cooperative learning, some studies indicate that teachers rarely use this learner- centred activities. Abramczyk and Jurkowski (2020) in their study on whether the effectiveness of cooperative learning is reflected in teachers' teaching practices concluded that

teachers rarely used cooperative learning activities in the classroom. Concentration of the study was on use of cooperative learning by practicing teachers.

In Malawi, Chiyembekezo et al., (2019) investigated the use of role play, one of the cooperative learning activities to teach speaking skills in English language. The findings indicate that the ‘role-play’ method is effective in teaching speaking skills to L2 students in Malawi. Role play enabled students to increase their fluency, pronunciation and use of gestures. This also influences proficiency and confidence in grammar because students are encouraged to use English language. Using role play also facilitates meaningful learning of English language since students use their everyday experiences to express themselves and demonstrate learning. The study concentrated on in-service teachers’ use of role play as cooperative learning strategy to teach speaking skills.

Another study in Malawi by Tibategeza and Zimba (2020) explored the communicative approach strategies which are mostly contextualized used by secondary school teachers in teaching English as well as challenges which the teachers faced when using the strategies. Results showed that a majority of teachers used strategies such as debates, group discussions, pair work and drama in teaching English language. Attention of the study was on how cooperative learning strategies are used to teach English language. Teacher preparation should therefore highly integrate contextualized grammar instruction in real-world knowledge base and instructional strategies (Kumwamba, 2023; Moyo & Namphande, 2022).

Context where learning takes place, the materials and assessment methods used to teach cannot be separated from the context in which it is learned or applied. For this reason, in order to facilitate meaningful learning of English grammar among secondary school students, teachers need to take into consideration a variety students’ experiences that could enrich learning. The teaching and learning of English grammar from contextualized content is critical for meaningful learning. Much as there are numerous studies on the use of contextualization strategies, not much is known about how pre-service teachers use contextualization strategies to teach English grammar to secondary school learners during their teaching practice in Malawi. Available literature mainly focused on how in-service teachers used contextualization across a variety of subjects and how they are used

by students for learning. The next section outlines related past literature on another cognitive information processing strategies which is rehearsal.

2.6 Application of Rehearsal strategies to teach English grammar

According to Keskin (2019), rehearsal is a cognitive strategy which encompasses learning by reiterating or repeating and reciting information to remember it when required. Santrock (2018, p.261) defines rehearsal as “the conscious repetition of information over time to increase the length of time information stays in memory”. From information processing theory perspective, rehearsal is one way to facilitate easy processing of information in short-term memory and later retain it once it is considered to be meaningful (Biyikli & Dogan, 2015). Rehearsal can therefore be understood as a strategy that facilitates learning of new information through repeating it and connecting it to previous information before retaining it to long-term memory. Ahour and Berenji (2015) state that the most frequently used method for retaining information in long term memory is rehearsal since it allows learners to memorize information through repeating. Use of rehearsal strategies in teaching and learning is effective for meaningful learning since repeating information activates prior knowledge.

Research isolates three types of rehearsal that contribute to maintaining information in short-term memory and facilitate deep learning respectively. These are articulatory rehearsal, attention-based refreshing and elaborative rehearsal (Bartsch et al., 2018; Barrouillet & Camos, 2015; Tan & Ward, 2008). Articulatory rehearsal, also known as maintenance rehearsal relies on verbally repeating of information that needs to be remembered information and maintaining it longer in short-term memory (Camos, 2015; Rose et al., 2014). On the contrary, attention-based refreshing is where there is deliberate activation of information through paying attention to it.

Mızrak and Oberauer (2021) mention that elaborative rehearsal, the third type is where information is deepened by connecting and integrating it to similar information in long-term memory. Unlike maintenance rehearsal, elaborative rehearsal facilitates meaningful learning (Gunstone, 2015; Rausch & McKenna, 2021). Elaborative rehearsal is an active learning process that is useful for linking new information to information that one already knows thereby enabling meaningful learning. Research on the role of rehearsal in learning indicate that it facilitates retention of

information in working memory (Camos, 2015; Gallagher & Rucińska, 2021; Mızrak & Oberauer, 2021). Considering the view of the information processing theory, STM cannot accommodate all the information in SM due to its limited capacity (Oberauer et al., 2016). Eggen and Kauchak, (1997), cited in Rausch and McKenna (2021), argue that the STM may retain the information by rehearsing it or by transferring it to LTM through linking it to previously stored information.

Some cognitive rehearsal strategies include activities such as visualization, highlighting, note taking, probing questions, reciting new content, saying of words aloud, mnemonics and underlining texts as one reads (Chang, 2015; Weinstein & Underwood, 2014; Varasteh et al., 2016). These rehearsal strategies are believed to support students attention and select key information and thereafter keep it active in memory before storage hence they are helpful for tasks to which learners are required to recall the information. Thus rehearsal strategies are generally not expected to be very effective in facilitating students to connect new material into previously learned information in LTM though when effectively employed can facilitate meaningful learning and retention.

Other rehearsal strategies such as asking open ended questions, visualization and summarizing can help learners to attach meaning to what has been learned by connecting it to what they already know (Rausch & McKenna, 2021). Chang (2015) moreover investigated the types of memory strategies teachers use to present their lessons. Findings revealed that rehearsal was the most frequently used strategy by teachers followed by mental imagery, elaboration, mnemonics, and organization. The study also found that teachers used rehearsal and elaboration strategies regardless of their teaching experiences, while organization was used by teachers with less than five years of teaching experiences.

Similarly, Idris et al., (2022) point out that cognitive learning strategies such as rehearsal facilitates linking new information with existing knowledge. Thus, the study recommends that students' awareness of rehearsal as an important second language learning strategy should be raised. When information is rehearsed over and over, the length of time it stays in memory is prolonged enabling connections with of previous knowledge that leads to meaningful learning (Sousa, 2017). The literature below presents details of past studies on some rehearsal strategies beginning with visualization.

2.6.1 Visualization

As mentioned earlier, one of the rehearsal strategies that could be used for teaching and learning is visualization. Visualization is a method of constructing images, charts, or simulations in order to communicate a message. It was first coined by Carl Gustav Jung a Swiss Psychologist who defined it as a technique which is the ability of an individual to think in images. According to Golubeva et al, (2021), visualization is a representation of a physical feature or an information map. The process of visualization can also be realized when an individual pictures an object or event that is familiar to real life.

Studies have indicated that visualizing information can help can help learners to acquire and recall information in a quicker and easier manner (Kim et al., 2017; Ware, 2019). Visualization is not just constructing mental images, it means graphical representation of concepts thereby influencing understanding of complex information. Özkan et al., (2018) contend that teachers including those in pre-service, have vast forms of visualization that they can use. These include images, drawings, slideshows, graphics, photos, illustrations, charts, maps, and videos. Other techniques for visualization include, advance organizers in form of questions, chalk board, audio and video presentations (Fidanboylu, 2014; Klerkx et al., 2014).

Numerous studies regarding the use of visualization in teaching and learning have been conducted. In a study on current problems and resolutions of teaching English grammar, Djurayeva et al., (2020) concluded that the goal of teaching grammar is to enable students to construct language so that they use it for listening, speaking, reading and writing. This means that teachers should provide opportunities to students to use grammar content meaningfully through visual aids that relate to their experiences. In another study, Hovorun et al., (2021) examined the effectiveness of audiovisual resources for teaching English grammar. Results show that, visualizing the lesson increases the students' level of English grammar mastery. A similar study in Ukraine by Bilotserkovets and Fomenko (2022) which explored the use of audiovisual mobile devices to teach English grammar concluded that application of mobile visual tools enabled efficiency in mastering English grammar. These studies largely focused on effectiveness of mobile visual devices used by students. Visualizing grammar thus helps students to learn grammar in a way that makes it simplified because they actually see grammar in use.

Visualized approaches increase interaction, critical thinking and inculcates analytical problems skills in students. Such skills enable meaningful learning since students engage their own thought processes thereby constructing their own meaning. Results from a study by Shatri and Buza (2017) showed the positive effects that are brought about when visualization is used in teaching and enables students to develop critical thinking. The study also revealed that visualization of lesson in general enables students to be motivated to learn and to be more cooperative. According to Mamaliga (2020), some of the advantages of visualizing the teaching of English are that they can attract and maintain students' interest in learning grammar, help students to understand grammar rules and assist them to relate the content to their everyday life leading to meaningful learning. Mamaliga further states that using visual resources such as of realia and pictures help to make grammar teaching and learning more meaningful and realistic. Visual materials can also be used as authentic materials due to the realistic environment they create in classroom teaching and learning. The studies focused on visualization by students and in-service teachers.

It is well established that using authentic materials in teaching grammar arouses students' interest, motivates them and facilitates meaningful learning (Huda, 2017; Onchera, & Kulo, 2014). A study in India by Macwan (2015) explored the use of visual aids as authentic material in English classrooms. The findings confirmed that using visual aids such projectors, pictures and videos to teach English supports understanding of abstract concepts of language skills such as reading and grammar. The above reviewed studies center on the use of these visualization materials in teaching by teachers. Furthermore, studies confirm that the use of using visual techniques supports learners in acquiring new grammar content raises their interest and improves their critical thinking (Klasone, 2013). Therefore, in order to facilitate meaningful learning of English grammar, teachers including pre-service ones should use different ways of visualization such as photographs, drawings, illustrations, graphics, diagrams or images. Looking at these studies, it can be deduced that visualization of lessons through different materials serves as authentic materials which make learning of grammar meaningful. The main focus of these studies however is on teachers who are already in-service and students apply them to teaching.

In Malawi, Kawonga (2023) explored the use of technologies and media to teaching English in secondary school. The study results showed teachers frequently used resources such as textbooks, chalkboard and charts which were readily available in the school. Other studies in Malawi are those which concentrated on different learner-centred approaches to the teaching of English to secondary school students (Mbale, 2020; Ngwira, 2023; Tchesa, 2020). There still remains a gap regarding the use of visualization to teach English grammar by pre-service teachers hence the current study. In the next section, I present use of probing questions which is also a rehearsal strategy.

2.6.2 Probing Questions

Another rehearsal strategy that literature confirms is use of probing questions (Fitriati, et al., 2017). Scholars agree that the teacher has a role in facilitating classroom discussions because teacher questioning are an indispensable element of classroom collaboration (MacFarlane, 2015; Wahyudin, 2017; Sukmadewi, 2014). Recent research also argue that in order to facilitate meaningful learning, students have to actively link new information to their experiences and construct their own meanings (Mystakidis, 2021; Rannikmäe et al., 2020). This can be made possible if teachers ask questions that can stimulate their thinking. Such type of questions are termed probing questions. Questions are one of the used teaching and learning technique in most secondary school classrooms.

An extensive body of literature regarding types of questions used by teachers during the teaching-learning process exists. In a study aimed at exploring English language teachers' questioning skills to enhance students learning of language, Fitriati et al., (2017) in Java concluded that teachers used very few probing questions because they thought students found them difficult to respond to since they needed deeper thinking and longer responses. This entails that teachers would rather use questions which did not need students to explain such as short answer questions. The study's focus was questioning skills in teaching English language in general and not grammar. Similarly, Nashruddin and Ningtyas (2020) investigated questioning strategies that teachers used in the classroom. Findings of the study revealed that teachers frequently asked open and closed ended questions. Very few evaluation questions were used. The focus of the study was also on general classroom questioning techniques used by in-service teachers.

Through probing questions, teachers can create more meaningful learning environments among students during the teaching-learning process. In a study aimed at exploring 5 teachers' strategies for teaching English grammar, Souisa and Yanuaris (2020) found that teachers applied varied grammar strategies including questions. The study further indicated that teachers used both deductive and inductive approaches and that grammar teaching is not just to help students remember but help student comprehend how to use it in everyday interactions. Astrid et al. (2019) in their study aimed at finding out questions which teachers used most in the EFL classroom and the types of questions that encouraged students to speak more. The study concluded that teachers mostly used lower order questions as compared to higher order questions. Even though not frequently used, higher order question encouraged students to relate the content to their real-life experiences. The study focused on questions used by teachers during EFL speaking classroom.

Teachers sometimes ask questions according to Bloom's taxonomy in order to assess and facilitate meaningful learning among students. In a study by Bibi et al. (2020) questions according to Benjamin Bloom are categorized in six groups including knowledge, comprehension, application, analysis, synthesis and evaluation. The findings revealed that teachers' mostly asked questions which focused on the lower levels of Blooms taxonomy which are mainly knowledge and comprehension types and they rarely asked questions from the higher level of analysis, synthesis and evaluation. Similar to previous studies, this study centred on in-service teachers' types on questions.

Furthermore, Fadilah and Zaini (2020) conducted a study aimed at finding out type of questions teachers used most and which type of questions improved students' speaking skills in the classroom in Indonesia. The research revealed that the type of questions which teachers used encouraged students to speak and attracted their attention. The questions also encouraged students to develop critical thinking skills. Other researchers also agree that questions are of great importance for both teachers and students because they facilitate higher levels of thinking and learning leading to meaningful learning (Almeida, 2020; Al-Zahrani, & Al-Bargi, 2017; Astrid et al., 2019; Yang, 2017).

Probing further encourages verbal interaction between the teacher and students as well as among students in the classroom hence facilitating meaningful learning of grammar (Suryana et al., 2021). The types of questions teachers ask stimulate and activate students' reasoning skills. This intellectual activity by students helps them to learn new content meaningfully and supports retention. Teachers use probing questions to get students to express their ideas during the teaching-learning process and they assist to capture students' attention during the lesson.

Another study, Nasir (2021) investigated the questioning strategies used by teachers in teaching English and students' responses. Results show that teachers used a variety of questions including probing questions in the teaching of English. Other studies have investigated the questioning techniques that teachers use to teach English including grammar (Adi, 2022; Irawati et al., 2021; Lenggono, 2019; Wardah, 2020). Findings of these studies showed that teachers applied a variety of questions such as applied, procedural and convergent as well as probing questions in the class. Thus, probing questions facilitate learning because students actively participate, construct their own which helps them to link their experiences. These studies also focused on how in-service teachers employ probing questions in the English classroom.

Findings of a study by Sukmadewi, (2014) on how teachers design and use questions that help students make connections between new information previous knowledge shows that teachers used probing question to enable students to use their previous experiences to construct new ideas. Sukmadewi also concluded that an effective teacher has good questioning skills and support learners in finding links between new information and prior knowledge. Probing question facilitate meaningful learning because as the teachers asks students to explain ideas, they are encouraged think deeply. More attention of the study was how in-service teachers use questions.

In Malawi, Manda (2023) explored how teachers implemented learning strategies that enriched active learning of secondary school English grammar by students. The study results show that teachers used a variety of methods including questioning. Questioning was found to be an effective technique because it accorded students an opportunity to practice language in classroom, hence connecting to their real life situations. There's scarcity of literature in Malawi regarding the use of probing questions as one of the rehearsal strategies by pre-service teachers to teach English

grammar. The next section outlines previous studies on another rehearsal studies known as repetition.

2.6.3 Repetition

Repetition is another rehearsal strategy that can be used in the teaching and learning process. It is an instance where a word, phrase or sentence is repeated in order to clarify, emphasize, or highlight deeper meanings of the content being taught (Qizi Muxamatjonova, (n.d)). Glatch (2021) adds that repetition is situation when a word or phrase is reiterated to emphasize or clarify instruction thereby leading to deeper meaning. Scholars have established that repetition of content during the teaching and learning process strengthens new memories (Martinez & Rourke, 2020). Firman et al. (2020) argue that if learning is to be meaningful, the content should be repeated as often as possible. Repeating instruction enables students to connect new information to what they previously knew making learning more meaningful and easy to retrieve.

There are several studies on the use of repetition in teaching and learning. For example, Alyami et al. (2019), in their study of examining the memory strategies used by students to learn English in Saudi Arabian secondary schools. Results showed that informaths which is often repeated becomes stronger and easy to link to previous knowledge. When there is no emphasis through repetition on what is being taught, information becomes weaker and difficult for students to make meaningful links. Studies generally confirm that repetition of instruction facilitates meaningful learning because it provides students an opportunity to recall and relate already familiar information in memory to new information (Fukuta, 2016; Kheirzadeh, & Malakootikhah, 2023). This study focused on how students used repetition to learn English.

Repetition can influence effective learning of grammar since once information is repeated, it is easily retained and activated when needed. Kumayas (2022) in his study which examined the value of using repetition in teaching simple present tense to university student in Indonesia. Findings revealed that use of repetition was an effective method for teaching English grammar. The study concentrated on how repetition is used by lecturers. A study in Japan aimed at exploring how repetition by teachers is implemented and to find out the causes of teachers' repetition in the EFL classroom (Kaffa, 2017). Findings revealed that English teachers applied three aspects of repetition

during teaching English and that they used repetition to give instructions to students since some did not understand the lesson which had difficult grammatical expressions. The study was dedicated to in-service teachers' use of repetition during the English classroom.

Maulina and Rusli (2019), explored how pre-service teachers in Indonesia implementing microteaching activity in class and find out problems they faced during microteaching to improve the competence in teaching English for later use. Results showed that pre-service teachers used strategies such as repetition, memorization, games, and word pair among others to teach English grammar. Though the participants of the study were pre-service teachers, the concentration was on the strategies used during microteaching as opposed to actual teaching practice. More scholars further emphasize that rehearsal strategies facilitate linking new information with existing knowledge (Ahour & Berenji, 2015; Idris, Zakaria et al., 2022; Sousa 2017).

Furthermore, a study which aimed at finding out which English vocabulary strategy between loci and rehearsal leads to better retention of words in Iran, Ahour and Berenji (2015), concluded that repetition was more useful for encoding information to long term memory. Once information encoded to long term memory, it serves as a foundation for learning new content. The study focussed on how repetition was used by in-service teachers. The studies so far have concentrated on how the strategies are used by students for learning and how they are used by in-service teachers to present lessons. There's scarcity of literature in Malawi on how repetition and rehearsal strategies in general are used by pre-service teachers to teach English grammar to facilitate meaningful learning among secondary school students during their teaching practice. Another rehearsal strategy presented in the next section is note taking.

2.6.4 Note taking

Khosravi and Taheri (2018), define as a complex skill where students need to understand the spoken or written context, select and record key information. According to Salame and Thompson (2020), note-taking encompasses listening, processing of information, and writing. Note-taking comprises intellectual processes that emphasize the development of some cognitive abilities such as of copying texts, incidental and intentional learning, reading sentences, creating texts. Rusdiansyah (2019) argues that note taking is how an individual writes down bits of information in an orderly

manner. These definitions imply that note-taking is a cognitive activity which requires active engagement by students in order for meaningful learning to be achieved. In formal classroom learning, note-taking is an important activity that students engage in which helps them deeply to absorb the concepts hence facilitating learning.

Encouraging students to take notes during the teaching-learning process influences learning because students are actively engaged as they employ note-taking (Rusdiansyah, 2019; Stacy & Cain, 2015). In a study on the effectiveness of using note-taking in teaching reading comprehension, Rusdiansyah, concluded that encouraging students' note taking increases students' reading comprehension. The study focuses on how in-service teachers use note-taking strategy. Note-taking is an important skill for language learners for various reasons. Şanverdi (2021), cited in Ekinci, & Ekinci (2022), emphasized that students whose note-taking technique has been effectively mastered perform better in class work, and in recalling previous knowledge.

It is important to encourage students to take notes during the lesson because it helps them to understand information learnt and assists them to identify and summarize the important points of the lesson. Chang and Ku (2015), investigated the effects of note-taking instructional strategy on performance in reading comprehension of elementary students in Taiwan. Results showed that encouraging students to use note-taking techniques improved their performance in note taking and reading comprehension.

Supakorn et al. (2018) explored the strategies for learning grammar used by high school students as well as finding out differences between Chinese and Thai students. Findings revealed that students generally preferred cognitive strategies such as note taking among others. The study was focused on how note-taking is used by students. Note-taking is also important in learning grammar writing accuracy as well as vocabulary. Khosravi and Taheri (2018), investigated the effects of note-taking, summarizing, and outlining on grammatical and lexical writing accuracy of upper elementary EFL Iranian students. Results showed that note-taking and summarizing influence grammatical accuracy and lexical writing respectively. The study paid attention to how students use note-taking to learn grammar.

When students are encouraged to take notes during the lesson, they effectively master English grammar. A study to find out grammar mastery by using strategies to master English grammar in Indonesia revealed that note-taking is one of the strategies that leads to meaningful learning through mastery of grammar on present perfect tense (Wijayanti, 2017). The study concentrated on how students use note-taking to learn grammar. Encouraging students to take notes during the lesson helps them to learn more meaningfully through paying attention and invoking other reasoning processes such as translating, synthesizing, coding, and integrating material with real-life experiences (Ekinici & Ekinici, 2022).

Several scholars also agree that note-taking to a large extent depends on working memory, reduces cognitive load in short-term memory, and contributes to rebuilding of long-term memory in addition to facilitating retention of information (Roy et al., 2016; Siegel, 2016). A study by Bergil (2020) which aimed at finding out how the students of English language carried out their note-taking practices in the classroom concluded that cognitive abilities such as note-taking should be encouraged among students at all levels of education. Through note-taking, students learn intentionally as they engage various mental abilities which facilitate meaningful learning including listening, composing sentences, reading, revising as well as planning. Little is known on how pre-service teachers use note-taking strategies to teach English grammar during their teaching practice globally and in Malawi. The next section presents use of mnemonics, a rehearsal strategy.

2.6.5 Mnemonics

Use of mnemonics strategy to teach English grammar is another rehearsal strategy. Mnemonics strategies, are techniques which support learning of information through relating the new content to previous knowledge thus facilitating meaningful learning and storage (Farrokh et al., 2021; Kakharov & Azizov, 2022; Ożańska-Ponikwia, 2015). Kakharov and Azizov (2022), define a mnemonic as a teaching and learning approach intended to help improve memory of important information in students. Mnemonics are a memory system that assists people to recall what they have learned. This strategy links newly learned information to prior knowledge using visual and audio cues or either of the two.

Thompson (2014), classified mnemonic devices in several diverse groupings which can lead to active learner participation and draw attention during the teaching learning process. According to Thomson, mnemonics can be classified into physical response, visual, verbal, linguistic and spatial methods. A distinction can further be made between organizational mnemonics which provide a network for disorderly materials, such and encoding mnemonics that involve organizing information into a format more meaningful and easy to remember. Under these broader categories, distinctions can be made among various types of mnemonics. These may include Acronyms, Rhymes, Loci method, first letter, Ppeg word, imagery, keyword, poems and songs among others (Di Carlo, 2017; Zimmermann & Reed, 2019).

Mnemonics may be developed by teachers or the teachers may allow students develop them and have the character to serve as devices for visualization, repetition and association of any information (Cheriti et al., 2023; Elsisi, 2023; Putnam, 2015). According to Kakharov and Azizov (2022), simple types of mnemonic strategies involve using of key words, rhyming words, or acronyms. Many researchers support the use of mnemonics in teaching. Others argue that mnemonics should be used by combining them with other learning techniques and treating them as aids to retrieval instead of using them as a main teaching and learning strategy (Poluboyarova, 2021).

There are numerous studies on the use of mnemonics for teaching and learning globally. The use of keyword mnemonics can facilitate learning of language skill including vocabulary and grammar. Parima et al. (2018) investigated how use of key word mnemonic in teaching vocabulary to improve understanding and learning of the content for secondary school students in Iran. Results show that mnemonic strategies improved learning for students and that use of keyword mnemonics for teaching assisted teachers to meaningfully deliver the lesson. Concentration of the study was how in-service teachers used mnemonics for teaching vocabulary. Similarly, mnemonics have been found to facilitate vocabulary learning by Khatoun (2022) who investigated the role of in-service teachers' use of keyword mnemonic method of vocabulary teaching in improving secondary level learner's English vocabulary. Findings showed that the use of keyword mnemonic technique has significant role in improving the English vocabulary secondary school learners.

Farrokh et al. (2021) explored the impact of visual mnemonic technique on English vocabulary learning. Farrokh, et al. found that using mnemonic techniques aims at making students to meaningfully learn, remember and retain the information in long-term memory. According to Kuder (2017), employing mnemonics in teaching connects new information to previous knowledge by using visual or acoustic cues. In general, this implies that when mnemonics are used for teaching, they evoke memory of past information. Both studies focus on in-service teachers' use of mnemonics to teach vocabulary. In another study, Cheriti et al. (2023) explored the attitudes of EFL teachers toward the use of mnemonics in teaching phrasal verbs, one of the grammar aspect in Algeria. The finding showed that incorporating mnemonic strategies would make teaching and learning of phrasal verbs easier, more effective and motivates students to learn. The focus of the study was on in-service use of mnemonics to teach English grammar. In Ghana, a study by Wilson (2016) explored the strategies used by in-service teachers to reduce reading difficulties among students, the study concluded that keyword mnemonics were widely used for vocabulary and comprehension among students. Mnemonic strategies are widely used to teach vocabulary as seen from several studies (Wang, 2020; Wei, 2015).

Moreover, Radionova et al. (2021), investigated the effects of mnemonics strategies on English and German lexical and grammatical teaching among secondary school students in Russia. The findings revealed that mnemonic strategies are effective for studying by students and can be used for learning English and German grammar. In a study which explored the effectiveness of use of mnemonic methods to teach English lessons, Rahmanova, (n.d) concluded that the use of mnemonics in teaching and learning facilitates recall, stimulates cognitive activity and generally rises levels of intellectual development of students. The studies focused on how mnemonics are used by in-service teachers as teaching strategies and how students use them as learning strategies. There is hardly literature existing in Malawi on how pre-service teachers use mnemonic devices to teach English grammar in secondary school. This gap necessitated the need for this study to explore how pre-service teachers apply rehearsal strategies to teach English grammar during their teaching practice. The next section presents past studies on elaboration strategies.

2.7 Application of Elaboration in teaching English grammar

Elaboration is one of the IPT strategies that aid transfer of information from short-term memory to long-term memory in the process of encoding. The elaboration strategies help learners to link new information with previous knowledge based on the principle that preexisting information influences meaningful learning of new content (Akpan et al., 2019). Elaboration improves the relationship between information that is to be learned and connected to information already stored in the long-term memory.

Elaboration can be used as a teaching approach by teachers and a learning strategy by students. Through the use of elaboration strategies, the teaching and learning process allows learners to be active participants and teachers' role is that of a facilitator. This in turn facilitates meaningful learning through activating prior knowledge and linking it to new information (Bartsch, & Oberauer, 2021; Reigeluth, 2018). Existence of literature on the application of elaboration strategies for teaching and learning cannot be ignored especially that which concern how in-service teachers and students use them (Bartsch, 2022; Loaiza & Lavilla, 2021; Oberauer & Greve, 2022).

Several studies also indicate that elaboration strategies influence learning because they reduce the cognitive load in short-term memory (Ashcraft & Radvansky, 2016; Broadbent, 2017; Markant et al., 2016; Shing & Brod, 2016; Sun et al., 2015). Generally, elaboration strategies are used as memory retrieval strategy by both in-service teachers and student-teachers. A study in United States of America by Chang (2015), which examined how teachers use memory strategies to present their lessons concluded that teachers use elaboration strategies not as frequent as rehearsal, followed by mental imagery and organization. The study was focused on how elaboration strategies were used as memory strategies to teach Mathematics.

In addition, elaboration strategies are found to influence understanding in reading comprehension. Setiasih (2015) explored how teachers applied cognitive strategies of elaboration, chunking and mapping strategies when teaching reading comprehension. Results showed that elaboration, chunking, concept mapping, and summarizing approaches simplify students' reading comprehension in Indonesian. The focus of the study was on in-service teachers' use of the strategies to teaching reading comprehension.

Scholars have identified a variety of elaboration strategies that can be used in actual classroom teaching. These include linking new and prior knowledge to real-life experiences (Hattan & Alexander 2020; Pires et al., 2020; Shing & Brod, 2016), construction of sentence with words (Afifah 2022; Akramov & Hasanov, 2022; Baronia, 2020; Chambers & Yunus, 2017; Samieva, 2020; Tuyboeva, 2022; Weber, 2018), paraphrasing and summarizing (Davis-Duerr, 2016; Papoyan, 2021; Reigeluth, 2018; Santacruz & Ortega 2018; Setiasih, 2015), questioning (Astrid et al., 2019; Fadilah and Zainil; 2020; Husni, 2020; Rahman & Mahmud, 2020), among others. Details of studies on these elaboration strategies are presented below starting construction of sentences with words.

2.7.1 Construction of sentences with words

Sentences are a combination of words which enable understanding. In order for a sentence to be easy to understand, it has to follow structured grammar rules. Mrikoh et al. (2019), define a sentence as a collection of words that individuals use to communicate ideas in speaking or writing. Thus, a sentence comprises a group of ideas that are bound together to state idea or an event. This definition implies that the sentence has a grammatically complete agreement. According to Kumayas (2022), for a group of words to be called a sentence, the listener has to perfectly understand it without problems. This can be possible if the grammar of the sentence is correct. Therefore, encouraging students to construct their own sentences with words is one way in which grammar can be taught and learnt meaningfully because grammar is a set of rules that direct the construction of sentences in a language including English.

In the teaching of English grammar, the structure of a sentence shows how words, phrases, and clauses are arranged (Roberts, 2016). Allowing students to construct their own sentences, ensures meaningful learning since they connect new concepts to their everyday experiences. Sentence construction exposes grammatical errors that students make during the writing exercise. In a study by Afifah (2022), on errors in sentence construction in Indonesia, results indicated that students' capability to construct grammatically correct sentences is not only reflected in the speaking skill, their writing ability also matters. Since grammar is the study of words functioning collectively to produce meaningful sentences, it is paramount for students of English to be given tasks to construct

their own sentences in order for them to be able to confidently express their ideas through writing. A study by Syafiqah Yacob and Md Yunus, (2019) in Malaysia which explored the use of language games in teaching and learning grammar, concluded that using games contextualizes the learning since students are allowed to construct sentences since games are beneficial for ESL the students. The concentration of the study was on how in-service teachers encouraged sentence construction through games.

Refat et al. (2020) argue that meaningful learning of grammar can be demonstrated when students construct their own sentences. In order to construct meaningful sentences, students are required to use the English language efficiently. Some scholars argue that grammar is the main aspect of a language which influences the accuracy of writing, reading, and speaking. For instance, Normawati (2023) investigated how EFL students recognized grammar in writing and speaking. Result indicate that students valued grammar as important in writing and constructing meaningful sentences. This simply shows that any written exercises require competence in grammar in order to convey meaning. The main focus for the study was students' perceptions of grammar in writing.

Finding of a study by Baronía (2020) in Philippines, which aimed at improving the grammatical competence of students using sentence construction methods, showed that students' sentence construction greatly improved after being exposed to the integration method. Using sentence construction makes learning of grammar more contextual and more meaningful to students which is beneficial to learning. The study's emphasis was on students. Another study in Indonesia by Fitri (2017), which aimed at explaining the extent to which students' comprehension of sentence patterns could improve their understanding of English sentences, also concluded that sentence construction helped students to identify key patterns of a sentence which are grammar areas. Doing so would also enable students to understand the different types of sentences in English thereby helping them to learn grammar meaningfully. The study focused on how students used sentence construction to learning grammar.

Similarly in Indonesia, Gay et al. (2018) investigated how English grammar teaching and learning activities were conducted by using genre-based methods in constructing sentences. Findings indicated that use of genre-based method to teaching English grammar improves students' ability

in constructing sentences. These studies show that English grammar can be taught meaningfully when students are encouraged to construct their own sentences using words. However, both studies in Indonesia focused on in-service teachers and students use of sentence construction to learn English grammar.

Research also indicate that teaching grammar through constructing sentences enables meaningful learning because students are motivated to link the learning to their everyday situations (Samieva, 2020; Tuyboeva, 2022; Umami, 2015). Samieva (2020) in his study focused on teaching of English grammar to Uzbek students through sentence construction. Results showed that use of sentence construction helped to overcome complications of teaching English grammar. Encouraging students to construct their own sentences makes grammar rules easier to understand since they are given an opportunity to use the grammar structure in their own contexts. Additionally, when students are allowed to use knowledge of what they learn in sentences, it facilitates them to build confidence in other language skills such as writing and speaking. In Ghana, Quansah and Tetteh (2017) analyzed the extent to which learners in the Junior High School used adverbs and adverbial clauses in constructing their sentences. Findings show that teachers and factors relating to language learning materials have substantial roles in the learning of second language. Teachers have a role to encourage learners to use grammar content in sentences.

When students are given opportunities to construct their own sentences, they develop accuracy in grammar which is a practice of identifying errors. In turn, this builds confidence in students in the use language. Such can be built in students through contextualizing the teaching grammar while construing their own sentences. A similar study in Sudan focused on the problems that secondary school students faced in writing English sentences (Eissa & Hassan, 2013; Hassan, 2019). Among other findings, the study concluded that teachers rarely encouraged students to construct their own sentences in order to develop their writing skills and that they did not teach sentence structures. The focus was on students' challenges in sentence construction to develop writing skill.

Furthermore, Mwelwa and Mwanza (2020) in a study in Zambia which analyzed teaching strategies used by teachers to develop English grammar communicative competence in students, concluded that teachers used strategies such as sentence construction, group discussions, oral presentation,

brainstorming as well as storytelling. These findings suggest that encouraging students to construct their own sentences would facilitate the learning of English grammar among students. When students use grammar through constructing sentences, they learn best the function of each grammar aspect in a sentence and it helps them to use what they learn in other contexts. These studies however focussed on how in-service teachers employed the strategies to teach English grammar to secondary school students. Despite the presence of many studies cited, there is still scanty literature in Malawi on how both in-service and pre-service teachers teach English grammar through encouraging students to construct their own sentences with words. Therefore there was need for this study to be carried out to fill the gap. The next section presents previous research on activation of prior knowledge during the teaching and learning of English grammar.

2.7.2 Activation of Prior Knowledge

Another elaboration strategy that literature unveils is activation of prior knowledge. According to Hattan and Alexander (2020), prior knowledge is the knowledge which the learner previously stored in long term memory before new learning is provided. In other words, it is the information that is brought by a student to a new learning context. Students bring with them to the learning situation knowledge about specific topics based on their past experiences or learning which is helpful for learning new concepts. The concept of prior knowledge emanates from the ideas of Ausubel (1968). Ausubel proposed that prior knowledge was central to learning as it brings about meaningful learning which ensues when students integrate new information with previous knowledge.

Several scholars argue that in order for prior knowledge to have any meaningful impact on learning, it has to be first activated and integrated with new information (Beker et al., 2017; Brod, 2021; Hattan et al., 2024; Simonsmeier et al., 2022). What the learner already knows is known to be the most important factor that facilitates learning according cognitive psychologist Ausubel. Teachers should therefore use strategies that activate the learners' prior knowledge of grammar in order to facilitate meaningful learning. On the other hand, prior knowledge can also obstruct learning, when the information to be learned is uneven with the assumptions of the student. However, researchers generally agree that more effective learning in students is simplified when they attach the new content to their previous information storage, make links and in the process build new knowledge from previous ideas (Simons Meier et al., 2022; Villarreal & Ardaiz, 2017).

For Prior knowledge to influence learning, it needs to be activated. This means that learning cannot be meaningful without activating the prior knowledge and linking it to new information. In a study which explored the relationship between prior knowledge and learning in students, Simonsmeier, et al. (2022), concluded that prior knowledge can only influence learning when it is activated. Prior knowledge is unlikely to impact learning of any content including English grammar when it is stored in long term memory hence the need for it to be activated. In reality, activation of prior knowledge plays a major role in the learning process of any content including English grammar. Teachers can employ different activities to activate students' prior knowledge including asking questions about previous lessons during the introduction of a new topic, repeating, giving cues for students to retrieve previous learning, giving exercises as well as using class discussion among others (Hattan et al., 2024; Kostons & van der Werf, 2015).

There are several studies concerning the activating prior knowledge in teaching English grammar to secondary school students. Villarreal and Ardaiz (2017) explored the effects of activating prior knowledge on the learning of grammar and vocabulary comparing on secondary school students in Spain. The study findings revealed that activating prior knowledge has advantages on learning grammar. The focus of the study was on in-service teachers. The effectiveness of connecting new lessons to what students already know cannot be overemphasized as doing so enables students to learn from what they are familiar with. A study in Saudi Arabia by Adhesion (2017) examined the pre-service and in-service teachers' strategies used to activate prior knowledge, challenges faced when stimulating students' prior knowledge and perceptions about the role of prior knowledge in reading comprehension. The results showed that prior knowledge had a very important role in reading comprehension and that teachers used strategies such as asking questions during lesson introduction and at the end of the lesson, and brainstorming as mostly used strategies. The study focused on pre-service teachers' activation of prior knowledge when teaching reading comprehension.

Hohensee (2016), also explored the extent to which in-service teachers had the knowledge of how prior knowledge is related to new learning in mid-Atlantic. The findings revealed that teachers were aware about students' connections between prior knowledge as well as when new learning was applied to students' prior knowledge. These results suggest that teachers understand how prior

knowledge affects learning of new information. The study concentrates on in-service teachers. In addition, Witherby and Carpenter (2021) explored how prior knowledge relates to learning of new content in the United States of America. The results showed that there was a positive relationship between prior knowledge and new learning. Prior knowledge also expedites the processing of new information and its subsequent storage. Attention of the study was on effects on prior knowledge on students.

Another study in USA by Hattan and Alexander (2020), also examined how frequent secondary school teachers activated students' prior knowledge during the lesson introduction. Findings show that teachers rarely provoked students to stimulate their prior knowledge the lesson. However, the study also revealed teachers asked questions about previous lessons or about students' personal experiences and general knowledge often. The study was focused on in-service teachers. In most cases, teachers find it is easy to ask questions about the previous lessons when introducing new lesson and to assess previously taught content and about students' experiences.

In Nigeria, Anyadiegwu (2016) examined the effectiveness of teachers' activation of prior knowledge as a strategy as a medium of instruction classes in teaching and learning of reading comprehension classes. The findings revealed that activating prior knowledge helps students to understand texts better during reading comprehension lessons. The study concentrated on the teaching of reading comprehension by in-service teachers. Regardless of the presence of numerous studies relating to role of activating prior knowledge in learning, few studies globally and in Malawi have focused on how pre-service teachers activate their students' prior knowledge to teach English grammar at secondary school level during their teaching practice hence there was need for this study to be conducted. The next section presents related studies on paraphrasing and summarizing strategies which are also Elaboration strategies.

2.7.3 Paraphrasing and summarizing

Paraphrasing and summarizing are other strategies based on elaboration that teachers use to facilitate meaningful learning. The terms paraphrasing and summarizing relate to one another though they possess slight differences. According to Davis-Duerr (2016), paraphrasing is using one's own words to present an idea or a concept. It is restating the original text without altering the

meaning. Summarizing on the other hand according to Davis-Duerr, involves paraphrasing and organizing of important concepts in a lesson. Similarly, Papoyan (2021) argues that paraphrasing is the process of restating information in a somewhat diverse way while maintaining the original meaning of a text. Both paraphrasing and summarizing simplify difficult material thereby enabling understanding. Paraphrasing and summarizing are advantageous because they permit individuals to express other peoples' ideas in own words without disarranging or quoting the texts directly. Paraphrasing can be useful when complex material requires to be simplified (Nourane & Besma, 2020).

Research in the area of use of paraphrasing and summarizing in teaching and learning has been widely explored (Biyikli & Doğan, 2015; Cho & Brutt-Griffler, 2015; Choy & Lee, 2012; Nourane & Besma, 2020). Paraphrasing and summarizing of original context of a lesson simplifies the lessons which may have been difficult for learners. According Biyikli and Doğan (2015), from their study which aimed at determining the differences among groups that summarized lessons, using concept-map, questions, and groups that did not use any strategies in Turkey, summarizing and paraphrasing helped to consolidate ideas making the text easy to understand. Paraphrasing and summarizing of any lessons help students to facilitate learning of writing skills as well as their critical thinking skills because it demands them to use both cognitive and metacognitive processes. The study focused on how students used the strategies in writing classes.

Another study by Nourane and Besma (2020) which aimed at facilitating students' and teachers' understanding of paraphrasing and summarizing techniques in Algeria. Results revealed that students lacked understanding of steps for paraphrasing and summarizing information though they paraphrased information every day without realizing it. The strategies of summarizing and paraphrasing can be unconscious as seen from the study results. The study concentrated on the use of paraphrasing and summarizing during writing lessons by in-service teachers and students.

In a more recent study which aimed at identifying techniques used to paraphrase and challenges which students encountered, Aprianto et al. (2024) found that students had challenges in how best to arrange ideas, grammar rules as well as vocabulary in paraphrasing. Mouri (2020) in Algeria, explored raising teachers' responsiveness towards the importance of summarizing lessons in

helping learners to utilize the rules of grammar correctly. Findings showed that there were recurring grammar errors in students' writing including verb-tense agreement, misuse of articles and irregular tenses. Once grammar rules are used in summaries or in paraphrasing original texts, they are linked to vocabulary which the students already know hence learning becomes meaningful. The focus of the studies above was on in-service teachers' and students' use of summarizing.

Once mastered, paraphrasing facilitates critical thinking in both the teacher and the learner during the teaching-learning process. Paraphrasing and summarizing lessons are important skills because they enable the learner to easily learn the difficult concepts of a topic. During the process of paraphrasing as well as summarizing content, teachers and students are compelled to relate new content to previously learnt or everyday experiences. This therefore influences meaningful learning. Most of the studies cited above examined the challenges that students face to paraphrase and summarize texts and lessons, how the strategies are used by students. These studies pay less attention to how the strategies are employed by pre-service teachers to teach English grammar during their teaching practice globally and in Malawi. In the next section, review of related research on question and answer technique, another strategy for elaboration.

2.7.4. Question and answer

Question and answer strategy is another elaboration strategy that literature has exposed. Question and answer is one of the frequently used teaching strategies by teachers to teach a variety of secondary school subjects including English language. When well employed, questions facilitate active participation as well as meaningful learning since students are required to recall previous information and link it to the new content in the process of answering questions. It promotes interaction between the teacher and the students and among students themselves (Fitriati et al., 2017). According to Fatmawati et al. (2020), asking and responding to questions is one of the of the co-joint practices that teachers use to assess understanding of language lessons.

Several studies have been conducted on the importance of questions in the teaching and learning process (Astrid et al., 2019; Fadilah & Zainil 2020; Fatmawati et al., 2020; Husni, 2020; Rahman & Mahmud, 2020). English teachers use question and answer in teaching all the language skills including grammar and vocabulary. A study by Fatmawati et al. (2020), which aimed at identifying

and investigating questioning strategies used by teachers in the English classroom concluded that questioning encourages students' interaction critical thinking and learning. It is also apparent that the aim of asking questions is to certify that students have understood what the teacher have taught them and to facilitate learning through active involvement. The study focused on use of questioning and answer by in-service teachers during EFL classes.

Astrid et al. (2019) explored the questioning strategies employed by English teachers in Indonesia. Findings in addition to others showed that teachers used three types of questions for a variety of reasons. The first reason was to check and evaluate students' understanding, secondly to attract the attention of students, to encourage higher order thinking as well as to keep students actively involved in the learning process. Questions are important because they allow students to be involved in their own learning. When teachers ask questions, students' attention is drawn as they are kept alert to respond to the questions.

In addition, a study by Fadilah and Zainil, (2020) aimed at finding the type of questions mostly asked by teachers to encourage speaking skills among students in the English language classroom. Results showed that students' spoke longer when stimulus questions were used and questions facilitated students to connect the lesson to their real-life surroundings. As the connections are made, learning of the new material becomes meaningful. Teacher questions influence meaningful learning because when responding, students have to activate previous knowledge. Arini and Wahyudin (2022) also explored how students perceived use of questioning technique in speaking skill at tertiary level. The study findings revealed that students perceived question and answer to improve their fluency and classroom participation. They also perceived questioning as improving their confidence in using spoken language. According to Fatmawati et al. (2020), when teachers ask question, students are motivated, they revise the lesson, assess understanding and encourage students to pay attention to the lesson. English language teachers are expected to be experts in questioning skills for higher order cognition to be promoted because they too have to engage in cognition which they expect their students to acquire. Thus question and answer strategy is important because it has the potential promote meaningful learning and critical thinking.

A study by Olagbaju (2020) in the Gambia examined how teachers' questioning behavior and subject mastery are related to students' achievement in English grammar. Findings revealed that teachers' questioning behaviour and subject mastery contributed to students' achievement in English grammar. This can be attributed to the fact that through question, prior knowledge is activated and linked to new learning facilitating meaningful learning of the new information. The study's attention was on use of question and answer strategy by in-service teachers to teach English grammar. Teachers' questions serve to motivate students to learn and are a means of rehearsal for the content. Through question and answer approach, teachers evaluate students' understanding of the content and revise the material.

Furthermore, the learning process becomes practical when questions are used by both the teacher and the students. According to Shanmugavelu et al. (2020), when teachers ask questions, they engage students in thinking about the content of a lesson and immediately get feedback for them to assess and determine the effectiveness of their teaching. Moreover, Shanmugavelu, et al. argue that it is also important for teachers and students to ask and respond to questions because it motivates students and promotes critical thinking as well as improve the teaching and learning process in the classroom.

In summary Keskin (2019), affirms that elaboration is a cognitive strategy that can be done through activities such as construction of sentences with words, prior knowledge activation, using practical examples, asking and responding to questions and finally paraphrasing and summarizing among others as new information is being related to prior knowledge. The review demonstrates that these elaboration strategies all work together for the purpose of facilitating meaningful learning. It enables students to understand what they learn, isolate important ideas from others, and record the information in their own words. There is however scarcity of literature on the use of elaboration strategies to teach English grammar to secondary school students during their teaching practice globally in Malawi. Having discussed elaboration strategies above, the next section focuses on the last IPT strategy of organization.

2. 8 Application of organization in teaching English grammar

Organization is another IPT strategy which the study sought to explore. According to Olson (2015), organization strategy in learning is a process of ordering and presenting information clearly to increase students' understanding of the content and retain to LTM. Another definition by Guo (2018) is that organization is a method of categorizing new information to be remembered in line with the existing knowledge and forming a particular structural pattern. Additionally, Santrock (2018) defines organization as the function of arranging or grouping information into mental categories. The above definitions show that organization involves ordering or categorizing information into logical structures.

In the teaching-learning process, organization takes place in such a way that once teachers present the information, students have the obligation to find suitable structures of organizing it that they find suitable for learning. This in turn generates meaningful learning of the novel information. Cultura (2017), contends that organization is a cognitive strategy where teachers and students arrange content into meaningful categories. The organization of content to be learned can be done by both teachers and students to facilitate meaningful learning. Mulligan et al. (2022) argues that information presented in an organized manner such as categories and sorting into lists, or if students organize the content themselves, becomes easier for them to learn and retain.

Some of the common organization strategies that research confirms include chunking, concept mapping, mind mapping, creating hierarchies, use of advance organizers, creating tables, outlining, re-grouping, classifying and connecting pieces (Chang, 2015; Feng et al., 2023; Tay 2013). These organization strategies require that teachers or students connect ideas and concepts in a logical manner to enable them to restructure their own schemes. The next section presents related studies on organization strategies beginning with chunking.

2.8.1 *Chunking*

Chunking which is one of organization strategies has been widely researched. George Miller was the first to introduce and described the chunking process (Cultura, 2017; Moran, 2016; Thalmann, et al., 2019; Rabinovich, Varona, Tristan, & Afraimovich, 2014). According to Miller (1956), chunking is the grouping or organizing of numerous amount of environmental stimuli into familiar

concise units. Anggraini (2015), also indicates that chunking is a method of breaking down information into smaller portions to allow the brain to easily process the new information. These definitions imply that chunking is a valuable organization strategy that includes grouping large amounts of information into categories enabling it to be remembered as single components.

The purpose of chunking is to reduce the cognitive load by reducing the amount of content in working memory (WM) at one point to enable encoding of new knowledge (Chekaf et al., 2015; Thalmann et al., 2019). In addition, Lu and Wang (2022) indicated that a chunk is a component of memory organization, designed by bringing a set of already formed chunks together and linking them into a larger unit. Thus, chunking involves being able to orderly build structures leading to a hierarchical organization of memory. It is often expected to help recall of information in the working memory.

Scholars argue that chunking is one of the teaching strategies that can be used to deliver large amounts of information through categorizing them into smaller divisions to maximize learning (Humphries, & Clark, 2021; Zhang et al., 2021). Through chunking, bulky information is reduced for students to find it manageable and to facilitate meaningful learning. Use of chunking helps both teachers and students to streamline information that might otherwise be too complex to remember since our brains have limited short-term capacity (Di Carlo, 2017; Niu & Osborne, 2019). Shank (2018), indicated that students prefer chunked content because it assists them to visualize the flow of the lesson and organization of their learning. Visualization as already presented facilitates meaningful learning of new material. Once content is broken into logical parts, it is easier to process, learn, and recall.

The chunking strategy can be used for teaching a variety of secondary school subjects including English language skills of reading, writing, speaking, listening as well as grammar and vocabulary. Several studies have focused on the advantages of chunking to teaching and learning of language skills (Anggraini 2015; Monica, 2022; Nia, & Ekaningsih 2020; Shank, 2018; Zafarghandi et al., 2015). A study Rahimkhani, and Hemmati, (2016) investigated the effect of using chunks on explicit teaching of language writing of Iranian English students. The findings showed that chunking has the potential to improve language skill of writing among learners. The study was

based on using chunking for teaching writing skills. Chunks are based in long-term memory, and allow the matching pieces in short-term memory to be reorganized in a more reliable form making it beneficial to learning the new content.

Nia and Ekaningsih, (2020) explored whether use of chunking helps students to develop ability in story retelling of tenth-grade students in Indonesia. Results showed that using chunking in the classroom activities is beneficial to students because it can help them to clearly get hold of verbal information. Chunking is also capable of helping learners to be fluent speakers of English language as well as encourage critical thinking as students plan how they could break up and reorganize the language content learning. The main focus of the study was how chunking was used by students for learning speaking.

In addition, chunking is advantageous to students because it makes difficult topics easier to learn and apply to future learning experiences and facilitates speaking skill, vocabulary and grammar. Monica (2022) explored the impact of using chunking strategy on students' speaking fluency. Findings showed that chunking language topics such as grammar and vocabulary is made easier by dividing the content into smaller sections. The concentration of the study was how chunking improved speaking fluency in students. Zafarghandi et al. (2015) in their study on the use of chunking for Iranian English students concluded that using chunks helps learners expand their fluency in speaking English. This this shows that chunking has benefits for English language learning especially on students whose first language is not English. So far, studies focus on how chunking is used in speaking classes.

Research provides further benefits of chunking to teaching. According to Shank (2018), teachers and students can break up or chunk content according to categories such as comparisons and differences. Content that is logically chunked helps students to process what is presented more efficiently because it appeals to visual memory. Thus chunks helps teachers to present lessons logically and this enables them to maximize the time for teaching. Maharani (2021) explored the perceptions of teachers on improving the teaching of reading comprehension using chunking strategy. The findings indicated that teachers perceived chunking as a solution to teaching reading

comprehension and is suitable for teaching senior high school learners. The study concentrated on how chunking is used to teach reading by teachers.

Chunking is also beneficial to short-term memory. Use of a variety of chunking methods for teaching and learning simplifies the learning process as students learn the material in the way they see suitable for them be accommodated in the limited capacity in short-term memory. In their study, Lah et al. (2014), explored the chunking strategies employed by secondary school students in short-term memory (STM) for learning. Results showed that students applied a variety of chunking strategies including mixed chunking, similar chunking, and characteristic chunking. The focus of the study was on how students used chunking in the classroom. Similar results were revealed in a study by Thalmann et al., (2019) who investigated how chunks of information are used to reduce the load in working memory tasks. These studies concurrently affirm that chunking reduces load in working memory through categorising related information and linking it to pre-existing information making learning meaningful.

The use of chunking strategies not only captures students' attention but also serves an easy mode of revising the previous lessons. Since chunking involves breaking up related items, these items are grouped together with prior knowledge, in the process retrieving and revising the previous material. Teachers' application of chunking strategy facilitates acquisition of English vocabulary and how it can be used in various contexts. Lu and Wang (2022) also examined Chinese L2 learners' processing advantages of chunks over non-chunks for at diverse levels of ability. Results showed that participants in all groups processed chunked information faster and fewer errors occurred as compared to those who used non-chunked information. Much focus of the study was on students' use of chunking. The strategy has the potential to lessen the teachers work as bulks of English language content are compressed making the material manageable in the already stringent teaching allotment in secondary school timetable.

A few studies in Malawi have attempted to explore strategies for teaching English language that point to chunking. Tchesa (2020) for example, explored how declarative and procedural memory systems help the acquisition of the knowledge of grammatical structures of English in the classroom

in Malawi. Among others, results show that procedural memory played did not play a in the learning of grammar. Aside the study by Tchesa, there is scarcity of literature in Malawi. Besides, the reviewed studies mostly focus on how chunking is useful for teaching and learning other language skills such as reading, speaking and vocabulary. In the next section, related studies on concept mapping which is another organization strategy are presented.

2.8.2 Concept Mapping

Another organization strategy that can be used for teaching and learning is concept mapping which is in some ways similar to mind mapping. According to Vallori (2014), the ideas of concept mapping were initially developed by Joseph Novak in 1972 to advance the concepts of meaningful learning based on Ausubel's theory of assimilation. Novak (1993) states that concept maps are graphical representations of ideas that are linked and representing related concepts. Sharma and Sarkar (2022), add that concept mapping is a way of representing the mental information visually. Similarly, Biyikli and Dogan (2015), contend that a concept-map is a visual method that can be used for teaching and learning activities. The definitions suggest that a concept map is a way of visually presenting and representing information which enables students to clearly follow the flow of the lesson and relationship between ideas in the lesson.

Many studies have been conducted that in the area of importance of using concepts mapping influencing meaningful learning during the teaching-learning process (Chu, Wang, & Wang, 2019; Dammani, 2021; Oluikpe, (n.d)). Chu, et al. (2019), examined the benefits of grammar concept mapping on students compared to those using collaborative English gaming approach in Taiwan. Results showed that students who used concept mapping had higher achievement in grammar than those who used the collaborative approach. Thus concept mapping is one effective strategy as illustrated in the study. In addition, concept maps assists students to understand concepts since they provide a structured way of thinking. It helps students' in creative thinking, brain storming as well as problem solving.

Oluikpe, (n.d), explored how effective use of concept mapping is on students' retention in English grammar. He concluded that concept mapping influences English grammar retention among secondary school students in Nigeria. Once retention is enabled, the information is later retrieved and used as prior knowledge thereby facilitating meaningful in students. Use of concept mapping

also encourages higher order cognitive abilities such as critical thinking and metacognition. Barta, et al. (2022) in their study investigated the value of concept mapping as compared to traditional methods for improving critical thinking abilities in students. The study revealed that using concept mapping is more effective to encouraging critical thinking than the traditional methods. Concentration of the study was on using concept maps for critical thinking. Barta et al. further contend that presenting concepts in graphical methods through concept maps contributes to learning ideas and better academic performance in addition to higher order cognitive abilities.

Tseng (2015) agrees with Barta et al. (2020) that the graphic nature of concept mapping enables students to develop critical thinking ability. This simply means students critically analyze the concepts through creating and viewing concepts as visual representations. This is so because when developing concepts maps, students' attention is increased and they are motivated to learn the new grammar content through building connections. Thus utilizing concept maps for learning arouses students' attention as well as motivates them to learn. The focus of the study was on students' achievement. Teachers can support students to develop critical-thinking skills through using concept maps among other tools. Similarly, Wang and Seepho (2017), conducted a study that aimed at exploring students' experiences with the pedagogical contributions of group concept mapping, discussion, and questioning strategies to development of critical thinking skills in Chinese classrooms. Results showed that concept mapping was among the strategies that could influence critical thinking skills among students. Concept mapping therefore is advantageous for supporting several critical thinking skills, including analyzing, interpretation, and synthesis. The study was based on how concept mapping facilitates critical thinking.

Concept mapping is an effective strategy for teaching English grammar because it helps students to organize their knowledge and retain information. Findings of a study by Chu et al. (2019) in Taiwan which explored learning grammar through concept mapping games in elementary school revealed that students using concept mapping approach had higher English grammar achievements as compared to those who did not. This implies that the use of concept mapping approach is beneficial for students' learning of English grammar because it enables them to reduce cognitive load by organizing and classifying concepts. Concept mapping has also been found to influence

meaningful learning of other language skills such as reading, writing and vocabulary (Astiantih & Akan, 2023; Betancur & King, 2014; Liu, 2016; Yang, 2015).

Apart from influencing meaningful learning of language skills and grammar, use of concept maps facilitates creativity, enables students to logically create and organize information in a hierarchy based on level of complexity (Aguiar & Correia, 2017). This further facilitates meaningful learning of concepts which occurs when students assimilate new information into the already existing structures. Cañas and Novak (2014) argue that once students construct concept maps of the new content, meaningful learning is improved. At this point, meaningful learning is defined as the ability of students to make sense of the content learned in-class, and their ability to recall the information which is linked to the new content. Machado and Carvalho (2020), in their study which examined the effects, benefits and challenges of concept mapping activities concluded that concept maps promote meaningful learning and encourage development of critical thinking skills in students. Furthermore, Kay and Kibble (2016) argue that one of the ways in which concept mapping strategy could be used is to let students work alone or in small groups to construct concept maps that illustrate their views of the content.

Thus concept mapping can support meaningful learning when used efficiently which results in adjustment in the knowledge structures of students. There is scarcity of literature on how concept mapping is used by pre-service teachers to teach English grammar. Most studies focus on the use of concept mapping to teach other language skills. Another organization strategy hierarchical teaching or creation of hierarchies.

2.8.3 Hierarchical teaching

Hierarchical teaching is a method of organizing the learning content according to level of difficulty and importance (Kwangmuang et al., 2021). It is a model that involves sequential presentation of information in the teaching-learning process. Ausubel's (1960) theory of learning according to Bryce and Blown (2024) views information as a representative of a unified system where ideas are connected in an orderly hierarchical manner. In so doing, logical rules are followed by the human mind to organize information into categories. Thus in their theory, Ausubel's and Robinson's (1969) assumed that there is a hierarchical arrangement of knowledge.

Orderliness in lesson presentation can be formed in a particular pattern usually from simple to complex content or from lower-order to higher-order content. Lessons which are organized in a hierarchical manner become easier to follow, learn and recall. One way of organizing the classroom teaching and learning is by using the cognitive domain of Bloom's taxonomy. According to Sağkol (2022), Blooms taxonomy of learning is a method of classification of human cognition which include, thinking, learning and understanding. The model classifies the cognitive domain into six levels of difficulty. These levels form a hierarchy which can help teachers to teach their students in a coherent orderly manner from lower level climbing to a higher level of thought.

Based on the cognitive domain, Dehibi et al., (2022) argue that learning should be organized from simple to complex within the six key levels which are divided into two. The lowest three levels are: knowledge, comprehension and application. The highest three levels are: analyzing, evaluating, and creating. The cognitive domain of Bloom's taxonomy plays a significant role in education since it enables teachers to classify students' understanding into different levels thereby enabling long term retention. Therefore, generally, creating a hierarchy simply means to structure content in layers according to the levels of difficulty (Adger, 2013; Wu, 2013). Hierarchical teaching implies that there is order and logical presentation of material beginning with what students already know and much simple material to unknown, new and more complex.

Studies on how teaching and learning is organized through hierarchy creation have been conducted. Chen et al. (2021) in German explored how language is combined into a linear sequences of words forming hierarchical structures influences language comprehension. Results showed that hierarchical relationships among the grammar components such as words and phrases and parts of speech are organized according to their syntactic categories. In other words, the categories determine how the language components can be combined to create hierarchical structures. The study focused on how students create hierarchies in learning.

In another study, Chinofunga et al. (2023) examined perceptions of teachers on how they sequence content in Australian high schools. The findings revealed that teachers sequenced their content through activating prior knowledge hence creating a hierarchy. This means that sequential

development of concepts promotes deeper understanding of the content being presented. In addition, the way teachers sequence content increases their capability to plan the lesson with clear objectives. Thus, sequencing of content helps to create hierarchical lesson organization which enhances teaching and learning. Frank et al. (2012) argue that sentences for instance can be considered as hierarchically organized in terms of words which are grouped into phrases and so on and so forth. Organizing learning in a hierarchical structure is of great significance language learning because it facilitates logical lesson presentation and orderly learning.

Furthermore, scholars confirm that creation of hierarchies in teaching and learning through orderly lesson presentation helps students to organize and learn the information meaningfully. According Nakamura (2014), many school subjects such as English and Mathematics have a hierarchical structure in which information should be presented. Therefore, teaching and learning should be a step by step sequential process from simple lower level content to more complex higher level content in a hierarchical order. Hierarchical teaching influences meaningful learning since it requires teachers to allow students to gradually absorb the information enabling them to make connections with prior knowledge.

Doan et al. (2023) argued that it is important for hierarchical structures and relationships between the new content and already existing content to be created because it facilitates the retrieval of previous knowledge which when linked to new knowledge influencing meaningful learning. Use of organization strategies generally have been found to aid learning and memory. Chang (2015) in his study on memory strategies used by teachers concluded that organization strategy is one of the effective means of improving memory. Thus, pre-service and in-service teachers should use these strategies to help students to understand the significance of organizing the information memories in meaningful ways. Supakorn et al. (2018) explored the grammar learning strategies which Chinese and Thai high school students adopted in learning English grammar. Results showed that in generally, students used a variety of cognitive strategies including organization strategies. The study also concluded that organization through hierarchy creation and chunking are deep learning strategies that facilitate students' mastery of English grammar.

Scholars have argued that students find information which is well organized and arranged easier to link with prior knowledge which facilitates meaningful learning (Cañas & Novak, 2014; Munsaka, 2011; Novak, 2012; Santrock 2018; Schunk, 2012). Organization strategies help students structure their thinking, monitor own progress as well as evaluate their learning outcomes. However, there are very few studies on how pre-service teachers use organization strategies to teach English grammar. In the next section, related studies on challenges of using the information processing theory strategies of rehearsal, contextualization, and elaboration an organization.

2.9 Challenges of using information processing theory strategies

Even though the information processing strategies facilitate meaningful learning, employing them for teaching and learning secondary school subjects has some challenges. Existing literature has identified a number of challenges which both teachers and students face during the teaching-learning process. Some notable challenges include large class sizes, students' background, inadequate authentic materials and time constraints (Copland et al., 2014; Makiwane-Mazinyo, & Pillay, 2017; Shah, 2020). These challenges may however not be specific to the use of IPT cognitive strategies but rather apply to general classroom encounters of pre-service and in-service teachers and students including when teaching and learning English grammar. The next section presents the first challenge which is learner background.

2.9.1 Learner Background

Since secondary school classes may be composed of heterogeneous groups of students, who have different backgrounds relating to mother tongue interference, proficiency and aptitude, teaching such groups causes challenges especially to novice teachers. Several studies have researched on the challenge of learners' background to the use of IPT strategies to teaching and learning of English language. For example, Dhillon and Wanjiru, (2013) in a study that explored the strategies and challenges faced by teachers of English as a second language (ESL) in primary schools in Kenya, results show that mother tongue use during school time by most learners negatively affected the learning of English. Findings also show that learners had difficulties in articulating themselves in English language. The study focused on challenges that teachers faced in teaching English language in general in primary schools.

In South Africa, Makiwane-Mazinyo and Pillay, (2017) investigated challenges that teachers meet when teaching English reading. Results showed that teachers encountered a lot of challenges including mother tongue interference and students' poor proficiency in writing among others. The study focused on challenges in teaching reading by in-service teachers. In addition, Cai, (2021) analyzed the problems in teaching English writing skill and the advantages of chunking in writing in China. Results showed that the teachers experience challenges in teaching such as the negative influence of students' culture, and lack of basic knowledge of English writing by students. This suggests that students' proficiency and home background pose challenges for teachers not to mention novice teachers. The study was focused on challenges of teaching the writing skill. These challenges relate to the fact that students' mother tongue limits them from learning to speak and express themselves in English. A study in Vietnam which explore challenges that EFL secondary school teachers face during the task-based teaching process, Duong and Nguyen (2021), concluded that mother tongue interference and weak English grammatical proficiency, were some of the challenges that teachers faced when using task-based learner centred strategies.

Lack of home support to use English additionally affects the learning of English among students. A study by Zakarneh et al. (2020) investigated challenges that teachers experienced when teaching English language to classes that had slow and fast learners. Findings showed a variety of challenges relating to students' individual differences such as learning difficulties and ability of students to teaching learn. Teachers thus experience problems when planning lessons for mixed ability students. Devi et al. (2015) in their study found that use of cooperative learning is challenging due to poor English proficiency and poor contribution to group work by students among others. There scarcity of literature however on the challenges that pre-service teachers face in teaching English grammar. The next challenge is larger class size.

2.9.2 Large Class size

One of the most common challenges that has been under study by many scholars is class size. Given the nature of IPT strategies which mainly require student active involvement in learning, large classes obviously become problematic for both pre-service and in-service teachers to monitor, assess and implement. In a study by Almuhammad and Al-Ahdal (2021) which investigated the pre-service teachers' implementation of learner-centred approaches to teaching and learning in Saudi

Arabia, results showed that pre-service teachers experienced challenges such as overcrowding, lack of discipline and inadequate time for implementing learner-centred strategies such as groups work and pair work. The study was based on challenges faced by pre-service teachers when teaching in general not specific to the teaching of English grammar.

According to Almuhammad and Al-Ahdal (2021), large class size caused disruptions during lessons which made it difficult for pre-service teachers to monitor the class activities and to evaluate learning. Murphy et al. (2017) contend that teachers may encounter challenges which include large class sizes, student resistance, time and resource limitations. Due to large classes, teachers also find problems to manage authentic assessment activities in the classroom. Duong and Nguyen (2021), also investigated the challenges the secondary school teachers faced during use of contextualized teaching process. Results revealed that in class size was one of the major challenges that teachers faced which may be deterring them from applying some strategies such as authentic assessment. The main concentration of the study was on in-service teachers.

A study in Zambia also found that over enrolment which led to large class size was one of the challenges that teachers faced when using IPT strategies of contextualization and elaboration. Nyimbili (2016) in his study focused on how teachers used learner-centred strategies such as role play, debate, group discussions, pair work, projects and field trips among others to teach English language to secondary school learners. The findings showed that it was challenging to use the strategies due to large groups especially when teaching and learning materials are limited. This implies that teaching resources become inadequate when classes are large causing more problems to use IPT strategies. The study also revealed numerous challenges caused by large classes. These include inadequate teaching and learning materials, over enrollment, and teaching to make children pass examinations. This shows that large classes cause more challenges such as inadequate resources as well as time constraints.

In Malawi, large classes were also found to be one of the challenges experienced by teachers in primary and secondary schools. A number of researchers concluded that due to overloaded classrooms, it was difficult for teachers arrange seating plan for easy interactions among students during interactive methods (Chiphiko, & Shawa, 2014). Tibategeza and Zimba (2020) explored the

communicative approach as well as challenges which teachers encountered when using contextualization strategies in Malawi. Results revealed that teachers faced challenges such as large classes, inadequate time for student engagement in class and insufficient teaching and learning resources. Another challenge presented in the next section is inadequate authentic materials.

2.9.4 Inadequate authentic materials

Materials that are authentic are created to accomplish some purpose in the teaching and learning process. If context of teaching has to be established, teachers should use materials that bring real-life of learners to the learning situation. However, research mentions that in many secondary schools, there are inadequate authentic materials to support the teaching and learning of grammar. In Malawi, Chipiko and Shawa (2014) in a study designed to find out how teachers in primary schools implemented learner-centred methods revealed that teachers face challenges to implement strategies. These challenges included insufficient teaching and learning materials, large class sizes and poor learning facilities.

The study further revealed that due to the challenges outlined above, teachers could not conduct their lessons based on learner-centred strategies. Thus inadequate materials which are authentic poses as a challenge among in-service teachers. Due to inadequate authentic teaching and learning materials, teachers fail to plan for learner-centred strategies. Therefore, they fail to capture students' attention and interest of students because contextualization and rehearsal strategies are not frequently used during classroom instruction. The focus of the study was on primary school teachers challenges. The next section, presents the challenges related to time.

2.9.5 Time constraints

Time allocation to teaching and learning activities is one of the challenges of using some of the IPT strategies because most learner-centred methods require that teachers give time for students to construct their own meaning from their experiences. For example, contextualization and organization strategies which need students to work in groups or build connections may not be completed in the school time table allocations. Besides, due to large class size, teachers have problems monitoring classroom activities of pairs or groups hence they opt for traditional methods. Rukmini and Saputri (2017) in their study which aimed at describing the application of authentic

assessment by teachers to measure English creative skills in Indonesia found that teachers faces problems using authentic assessment due to limited time and complexity in scoring. The study also concluded that time limits were due to large class sizes. The focus of the study was on teaching of English by in-service teachers.

A similar study by Fitriani (2017) which also focused on finding teachers' problems in implementing authentic assessment and how they overcame challenges, the results showed that teachers' problems involved the huge marking loads compared to time and maintaining consistency of marking amongst others. More studies report that generally, external factors that affect teachers' implementation of learner-centred strategies include little time allocation hence teachers are always in haste to cover the entire syllabus, students' motivation and limited textbooks (Nyimbili, 2016; Van Le, 2014). Kanko (2022), reported similar problems of using IPT strategies stating that rehearsing English lessons proves to need more time as compared to what is allocated since teachers rush against time to complete the syllabus within the school term. Additionally, strategies such as chunking need more time for students to master.

Maharani (2021) in study on perceptions of English teachers on using chunking concluded that employing chunking required that more time is allocated to lessons to allow students to understand the way information can be grouped. The study had its attention on challenges faced by in-service teachers when using chunking for teaching. Other research also indicate that accessibility of time, for teachers to allow students to employ cooperative learning strategies is one major challenge that teachers face when teaching English language (Devi et al. 2015; Rukmini, & Saputri, 2017). Implementation of various types of authentic assessments are challenging for English teachers. The challenges include time limitation, and complex scoring procedures. Such a load of challenges experienced by English teachers deter them from employing some of the IPT strategies effectively.

2.10 Chapter summary

To sum up, this review of the related literature has outlined past studies on the use of information processing theory strategies of contextualization, rehearsal, elaboration and organization to teaching English grammar. Therefore, IPT can facilitate meaningful learning among students at secondary school level because they enable easy connection of new learning to existing knowledge

in long-term memory. Contextualization comprises strategies used for helping students to learn in contexts related to their everyday physical and emotional experiences enabling learning to be more meaningful and easy to retain.

Rehearsal involves repetition of information to keep it active in short-term memory thus enabling information to be kept long in memory and retrieval of information when needed to link with working memory. Elaboration encompasses strategies for storage of information through connecting to pre-existing information in long-term memory, while organization entails storing related information in chunks or units (Santrock, 2013; Schunk, 2012; Woolfolk, 2016). More important, is establishing how pre-service teachers use these strategies during their teaching practicum would determine how they would apply them in their actual classroom situations hence narrowing the division between theory and practice in teachers education.

This literature review shows that a majority of studies in the area or of how information processing strategies of contextualization, rehearsal, elaboration and organization focused on how in-service use them for teaching and how students use them as learning strategies. There is scarcity of literature in Malawi regarding how pre-service teachers use these IPT strategies for teaching English grammar during teaching practice. Therefore, the current study explored how pre-service teachers apply the information processing strategies in teaching English grammar to facilitate meaningful learning in secondary school students during their teaching practice.

CHAPTER THREE: METHODOLOGY AND RESEARCH DESIGN

3.1 Chapter overview

This study sought to explore how pre-service teachers apply information processing theory strategies to the teaching of English grammar to facilitate meaningful learning in secondary school students. This chapter provides details of the procedures including research design and methods, research paradigm, data generation and analysis procedures. The chapter ends with trustworthiness of the study.

3.2 Research paradigm

Research paradigm is a set of assumptions of reality and of how knowledge is shaped (Davies & Fisher, 2018). It describes different ways of understanding the world. In other words, a research paradigm is the researcher's perspective or beliefs about the world that further informs the interpretation of the study data. A paradigm consists of four components including ontology (nature of reality), epistemology (nature of knowledge and how it can be acquired), methodology (data generating procedures), and methods (specific means of collecting and analyzing data) (Kivunja, & Kuyini, 2017; Rehman, & Alharthi, 2016). Saunders et al. (2012) in the research onion concept, state that the qualitative approach is inductive, where researchers can collect data and develop or confirm a theory after analyzing the data.

3.2.1 Interpretivism

The current study was guided by an interpretive paradigm. According to Rehman, and Alharthi, (2016, p. 55), "Interpretivists use the inductive approach instead of the deductive approach..." Interpretivists also believe that realities and truth are not discovered but socially constructed by individuals using their experiences (Rehman, & Alharthi, 2016). In addition, the interpretive epistemology is subjective and believes that external reality cannot be accessible directly to observers without being fouled by their concepts, backgrounds and worldviews.

According to Creswell (2012), interpretive researchers endeavor to make interpretations according to their experiences thus bringing personal perceptions in in phenomenon. For reason, interpretive approach was used in this study because it enabled data generation with deep understanding of pre-service teachers' experiences in using IPT strategies. In addition, the use interpretive paradigm was

due to the need to construct and interpret meanings from perceptions, opinions, and beliefs of participants regarding the use of the IPT to the teaching of English grammar. The choice of this paradigm was also necessitated by the researcher's inclination to descriptive and exploratory or explanatory approaches to research.

3.2 Research design

The research design is intended to provide an appropriate background for a study since it is a master plan for conducting a study (Sileyew, 2019). The choice of research design to apply depends largely on the purpose and aims of the research as well as the research paradigm. Taking an interpretivists paradigm, this study adopted a qualitative case study design where data was generated using qualitative procedures. "Case study research is a qualitative approach in which the investigator explores a bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection..." (Creswell, 2013, p. 97). Therefore, a case study inquiry comprises the exploration of one or more cases within restricted structures. Case studies focus on studying individuals or groups or communities over a long period of time in order to understand their experiences. In case studies, the researcher develops an in-depth analysis of the case, often a program, event, activity or process and has little control over real-world contexts at hand (Creswell, 2014).

There are several types of case studies, including single-case studies and multiple-case studies. This study employed a descriptive and explanatory single-case study. Gustafsson (2017) defines single-case study design as an intensive study about a person, a group of people or a unit which is aimed to generalize over several units. The single case study was used because only one group of people as a single case was intended to be to be focused on in order to obtain in-depth information from them. The qualitative single-case was also used because it provided a strong understanding of the case of pre-service teachers. In addition, it facilitated by the need for collect detailed information from the participants' experiences in their real classroom setting in order to have first-hand information (Algozzine & Hancock, 2017; Yin, 2009).

Moreover, the type of questions that were being explored needed deep understanding of the group of pre-service teachers during teaching practice hence the choice of the single case-study design.

In addition, the subject of application of information process to enhance the teaching of English grammar is a contemporary phenomenon seeking to explore belief, perceptions, attitudes, opinions, and reactions that are captured from the participants in their natural setting where there was no control by the researcher. Finally, the researchers' personal experience influenced the choice of the qualitative single cases study design since the researcher was involved in real classroom situations on a daily basis. Therefore, pre-service teachers who were teaching English as their major or minor teaching subject at secondary school during their teaching practice comprised a single-case which represented the larger group of all pre-service teachers.

3.3 Study area

The study was conducted in nine secondary schools conveniently sampled in 6 districts in Malawi including Chitipa, Karonga, Kasungu, Mzuzu, Nkhatabay and Rumphi. The secondary schools in these districts were conveniently sampled because they were key areas where the pre-service teachers were placed for their teaching practice. Besides, the districts were in close proximity to the researcher and easy to access during data collection.

3.4 Study population

A population is the entire group that you want to draw conclusions about. The study population comprised University of Livingstonia pre-service teachers who were undertaking their teaching practicum.

3.5 Study Sample

Vehovar, et al. (2016) argue that a sample is a subgroup of a particular population and that researchers study the parts of the population in order to learn and make generalizations about the whole population. The sample of this study comprised 10 pre-service teachers who were undertaking teaching practice with English as their major or minor teaching subject. Initially, it was intended to recruit 15 participants who took English as a teaching subject. However, during the actual data collection exercise, it was discovered that five of them were not eligible because they did not report for teaching practice for various academic reasons beyond the researcher's control. Only nine secondary schools were conveniently sampled because that is where the pre-service teachers were placed for teaching practice.

3.5.1 Biographic data of participants / sample characteristics/description

Table 1 shows demographic profiles of participants

School	Teacher Name	Sex	Age	Class	Teaching Experience
B	PT1	F	21	F3	2 moths
M	PT2	F	22	F3	2 months
S	PT3	M	31	F3	2 months
E	PT4	F	20	F3	2 months
J	PT5	F	22	F3	2 months
L	PT6	M	23	F3	2 months
N	PT7	F	20	F1	2 months
F	PT8	F	28	F3	2months
M	PT9	F	20	F1	2 months
Z	PT10	F	20	F3	2 Months

Source: *Researcher's field notes*

Table 1 shows demographic data of participants which includes age, sex, class which they were teaching and experience. All the names for schools and participants are pseudonyms for purposes of anonymity. The table presents profiles of participants based on (n=10) participants of which 8 were female representing 80% and 2 were male representing 20%. Ages ranged between 20 and 28.

3.6 Sampling techniques

Sampling is a technique selected by the researcher to employ participants that represent a population (Mujere, 2016; Sharma, 2017; Taherdoost, 2016). In general, sampling methods can be divided into two, probability and non-probability sampling. Probability sampling is where all units of the population have a chance to be included and it is mostly randomized (Jager, et al., 2017; Sharma 2017; Vehovar, et al., 2016). Non-probability sampling on the other does not give chance to all parts of the population to be included in the sample. It is the absence of probability sampling methods (Vehovar, et al., 2016).

Sampling in qualitative research aims at generating descriptive data through interviews and observations as well as field notes (Moser, & Korstjens, 2018). Therefore, non-probability

sampling methods were used to select the sample for this study. Though non-probability sampling has a high risk of bias, it was used because the study required easy access to the participants as well as other conceptual requirements and not necessarily representativeness. The purpose of this sampling plan was to maximize the value of data for theory development by gathering data rich enough to uncover conceptual relationships.

Purposive sampling also known as judgmental sampling is a group of diverse non-probability sampling technique that is used to recruit participants who can provide in-depth and detailed information about phenomena under investigation (Rai, & Thapa, 2015). The technique relies on the researcher's judgment during selection of the particular entities to be included for the study. In purposive sampling, the researcher uses their experience to select a sample that is most useful to the purposes of the particular study. This study employed homogenous purposive sampling and convenience sampling methods. There are many types of purposive sampling. Homogeneous sampling, one type of purposive sampling technique was used to select the participants of the study. This is a type of purposive sampling method which focusses on individuals who share similar characteristics such as age, gender, race experience etc (Etikan, Musa, & Alkassim, 2016; Rai, & Thapa, 2015). The technique was employed to help the researcher to answer the research question through depth of information from the participants' experiences. The participants were purposefully selected under the criteria of being in the final year of their teacher training, teaching English as their teaching subject and undergoing teaching practice. Those not meeting these criterion were excluded from the study.

The secondary schools were selected using convenience sampling. This is a method in which selection of participants is based on the accessibility to the research. The advantage of convenience is that it is simple to implement, cheap and efficient though it lacks clear generalizability. The secondary schools were conveniently selected because the pre-service-teachers were placed there for teaching practice and were easy to reach. The form 3 and form 1 classes used in this study were also thus conveniently selected because they were the classes to which pre-service teachers were assigned to teach and they represented the immediate transitional classes which would provide relevant data considering the principles of the information processing theory.

3.7 Instruments for data collection

The instruments used to generate data for this study included interview schedules, classroom observation schedules, and documentary analysis guides. Using these instruments, data were generated from two major sources. These are primary and secondary sources (Douglas, 2015). The secondary data sources for this study included senior secondary school English syllabus, English textbooks, schemes and records of work produced by participants as well as their lesson plans.

3.7.1 Interview guide/schedule

An interview schedule usually contains well-thought out questions and key words already prepared based on the research questions. Pandey, and Pandey, (2021) postulate that the name schedule is usually used for set of questions, which the interviewer asks during interview with another person. An interview schedule was used because it has a higher percentage of responses and enables the researcher to observe personality factors that could be relevant for the study. When used appropriately, an interview schedules serve as a conversational guide, hence producing a guided conversation (Yin, 2016). An interview schedule also removes doubts because of the face to face interaction between the interviewer and the respondent (Pandey, & Pandey, 2021).

3.7.2 Observational schedule

This study used an observation schedule to make to observe and take notes of the activities that of the participants (Zireva, 2013). An observational guide is an instrument for collecting data through observation. The instrument directs the researcher to pay attention to particular behaviors that are of interest to the research. The instrument was used on the basis of its ability to provide guidance on particular behaviours, emotions and perceptions of the participants.

3.7.3 Document analysis guide

To collect secondary data related to information processing theory strategies, a document analysis guide was used. It was used in order to provide guidance to the purpose of the study and collect relevant data from the documents such as syllabus, text books, schemes and records of work as well as lesson plans.

3.7.4 Piloting

Before the commencing actual data collection for this study, a pilot study was carried out. A pilot or preliminary study is a small scale of a complete study for a particular research instrument (Hazzi & Maldaon, 2015). The pilot study was necessary for this study because there was need to explore the challenges that were related to instruments and recruitment of participants. The pilot study helped to assess the acceptability or not, of the instruments for data collection, in this case the observational schedule and interview guide and document analysis guide. According to Saunders et al. (2016), piloting is commonly associated with the testing of data collection instruments in order to develop and refine them. In qualitative research, the purpose of piloting is to refine the research design and methods, which includes instruments as well as research questions (Creswell, 2013). Piloting helped in refining the instruments. Thus the questions which were found to be repetitive and unclear were rephrased after the pilot enabling clarity in the actual data collection.

3.8. Procedure for data collection

As already stated, interview schedules, classroom observation schedules, and documentary analysis guides comprised the instruments for generating the data. The interview schedule was used to collect data through semi-structured interviews, classroom observation schedule was used to collect data from classroom observation, while the document analysis guide was used to collect data from text books, lesson plans and schemes of work. These instruments were employed because they gave the researcher an opportunity to get detailed responses and enabled for probing where there was need for precision as well as triangulation.

3.8.1 Semi-structured interview

Taherdoost (2021) indicates that an interview is a data collection method through verbal format or through conversation between the researcher and a research participant. An interview can be conducted face-face or through technology such as telephones or video conferences. Types of interviews include structured, semi-structured or unstructured (Kabir, 2016; Taherdoost, 2021). This study used semi-structured interviews to collect data from the participants. Semi-structured interviews is a qualitative data collection strategy in which the researcher asks participants a series of prearranged but open ended questions (Wishkoski, 2020). According to Magaldi and Berler (2020), semi-structured interviews are exploratory in nature.

This study used semi-structured interviews because they are more flexible, and the researcher had more control over the outline of the interview than in unstructured interviews ((Ahlin, 2019; Bearman, 2019; Mwita, 2022; Wishkoski, 2020). In addition, semi-structured interviews were used because they enabled the researcher to ask more probing questions in addition to the predetermined questions. Interviews further enabled participants to discuss their interpretations of their real-life experiences, and to express how they regarded situations from their own point of view. This was an advantage for this study because it provided rich information. Through semi-structured interviews, detailed field notes were produced and the interview was recorded using an audio recorder. The pre-service teachers were interviewed after they were observed in their classrooms in order to capture their attitudes, beliefs and feelings towards the application of IPT strategies.

3.8.2 Observation

Another qualitative method for data collection which was employed in this study was observation. According to Mwita (2022, p. 533), “observations involve data collection by using sense organs”. It involves watching individuals in their natural environment or in a naturally occurring situation. During observation, the researcher gathers data through listening, seeing, tasting, smelling or touching. Observation aims to establish people’s thoughts and actions by watching them in their natural settings (Muzari, Shava, & Shonhiwa, 2022; Pandey, & Pandey, 2021). The researcher usually records what is being observed what is happening by taking notes. Observation was used because it has the advantage of providing reliable and it also enables the researcher to collect first hand data though it is time consuming (Pandey, & Pandey, 2021). In qualitative research, two types of observations exist. These are participant and non-participant (Busetto, et al. 2020).

Non-participant observer was used to collect data in form of field notes (Ciesielska, Boström, & Öhlander, 2018). According to Busetto, et al. (2020), the observer in non-participant observations looks in from the outside, meaning that the observer is present but not trying to affect the situation by their presence. Non-participant classroom observation was used because it enabled the researcher to pay attention to the activities of the participants and have ample time to take notes of the behavior of the participants as they took place. However, through the observation, private information may be recorded which may not be reported by the observer. Therefore, key areas of

the information processing theory strategies of contextualization, rehearsal, elaboration and organization, were directly observed and noted as lessons were being presented.

3.8.3 Document analysis

The last strategy that was employed to collect data was document analysis. According to Muzari et al. (2022), document analysis is also known as content analysis. It is a method of carefully and thoroughly analyzing the contents of already written documents. During the process, the researcher reviews the written materials. The documents that are analyzed comprise secondary data. The researcher in this study reviewed curriculum documents for teaching including English syllabus, English text books, schemes and records of work prepared by the participant pre-service teachers and lesson plans. From these documents, the researcher was interested in searching for information that showed how the IPT strategies of contextualization, rehearsal, elaboration and organization are planned and used.

The advantages of using document analysis are that it is cheap, provides a good source of background information, provides a behind the scenes look at a program that may not be directly observable and may bring out issues that may not have been noted by other means (Cardno, 2018). Another advantage of conducting a document analysis is that it reduces ethical concerns related to qualitative studies (Morgan, 2022). A major disadvantage for document analysis is that information may be inapplicable, disorganized, unavailable, or out of date and sometimes biased because of selective existence of information. The researcher also has no opportunity to probe for more information from the authors. However, the researcher overcame these challenges through ensuring that the books and the other documents which were provided by the pre-service teachers were authentic as the table below shows.

Table 2 shows the list of documents analyzed

Document description	Authors
Senior secondary school English Syllabus	Malawi Institute of Education (MIE), (2013), Ministry of Education, Science and Technology, Lilongwe.
Schemes and records of work	Pre-service Teachers
Secondary school English Text book	Kadyoma F. (2017) Excel and Succeed Senior Secondary English Students Book 3, Nairobi, Longman
Lesson Plans	Pre-service teachers

Source: Researcher's field notes

3.8.4 Triangulation

As already alluded to, the three types of data collection described above enabled for triangulation. “Triangulation refers to the use of more than one data collection method in a study to offer insights from multiple data collection methods...” (Mwita, 2022, p. 535). When a researcher uses multiple data collection methods or sources in order to get a broad understanding of phenomena, it entails triangulation. Thus the multiple data collection techniques used in this study enabled the researcher to collection comprehensive data and to compare if all methods generated similar data. This in turn ensured trustworthiness of the results. The table below summarizes the data generation methods.

Table 3 shows data collection procedures

S#	Method for collecting Data	Type of data	Instrument	Capturing Methods
1	Semi-Structured Interviews	Primary	Interview schedule	Audio recording and field notes
2	Classroom Observation	Primary	Classroom Observation Schedule	Field notes
3	Document Analysis	Secondary	English Syllabus, Schemes and records of work, Lesson plans	Field notes

Source: Researcher's field notes

Table 3 shows the three methods, instruments of data collection and types of data collected. According to the table, there was triangulation of data collection which increased trustworthiness and credibility of data and results.

3.9 Data analysis

Thematic analysis was used to analyze that data. Data analysis in qualitative research is the process of assigning meaning to the collected information and determining the conclusion, significance, and implications of the findings (Mezmir, 2020). The meanings are assigned in form of themes which happened simultaneous to data collection. Thus qualitative data analysis aims at exploring and describing phenomena in order to generate meaningful concepts. In this study, data analysis occurred alongside data collection. According Creswell, (2009), qualitative analysis is not orderly and is often done concurrent with data collection. The following order was followed analyze the data as it was being collected:

3.9.1 Familiarizing and organizing

The researcher read all data from observations, interviews and documents analysis, listened to audio recording, transcribed them, and repeatedly listened and read the transcripts in order to get familiar with the data. This was conducted within the first stage of data analysis to ensure that the data were organized for easy storage and retrieval. Transcribing the audio recording of the data enabled the researcher to arrange the data into format easy to read for smooth interpretation. Thus all data were converted into text format. Further, the words were transcribed directly to avoid potential bias in selection or interpretation that may occur with summarizing. Non-verbal information like gestures and laughter which were recorded through field notes provided and added meaning to the transcript.

As the researcher was undertaking the process of familiarization with the data, memos were written to capture thoughts of the researcher as they were occurring. Different files containing the data were created and organized in a variety of ways, first by each mode of data collection i.e. Classroom observation, by interview, by document analysis, by participants and by location of data collection. All transcripts were printed photocopied to enable the researcher to work from the copies. However, backup copies of the original data were well stored in flash drive kept safe from access but by the researcher. The software program MAXQDA 2022 version was used to organize

and manage the vast amounts of data. Through this process, all types of data were reduced and organized in order to discover patterns.

3.9.2 Coding and reducing

According to Yin (2009), data coding is an orderly way of reducing enormous data to smaller components such that it may be easier for easy analysis. The coding of qualitative data simply means categorizing and assigning properties and patterns to the collected data. The whole process of coding and reducing the data involved reading and rereading all the data and sorting them to look for components of meaning like words, phrases, sentences, and events that seemed to appear repeatedly but gave the impression of being important. All interview transcripts, field notes, audio recordings as well as documents were coded (Saldaña, 2021). After assigning codes to the data, the researcher built patterns to gain in-depth insight into the data. This was done in order to make informed decisions on the meanings and themes that would be settled for from the data.

Three types of coding were employed during the analysis process. These are open coding which was conducted in the initial stage. This enabled the researcher to organize the raw data in order to make sense of it. Secondly, axial coding was used to connect the categories generated during the open coding. Later, selective coding was employed to connect the categories for a deeper understanding of the data (Saunders, Lewis, & Thornhill 2012). During initial coding, as many codes as possible were used but later they were reduced. This initial coding led to the development of categories. A computer software MAXQDA 2022 version was used to generate codes in addition to the manual coding.

3.9.3 Thematic analysis

Clarke, Braun, and Hayfield, (2015) posits that thematic analysis is a process of finding, analyzing and interpreting qualitative data to identify patterns of meaning or themes. Once familiarization with the data and development of codes was conducted, next step involved identification of themes. Thus themes, patterns and relationships from the codes were identified from all forms of data including observational, interview as well as document analysis. Themes are patterns that cut across numerous features of the data. Lastly conclusions were made based on the themes.

During classroom observation, the researcher took notes and made memos depending on the key aspects of the lesson that related to the information processing theory. These notes were later reduced and key themes were generated. Similarly, important documents, which pre-service teachers used to teach English grammar such as English textbooks, schemes and records of work and lesson plans were analyzed for main features that are related to the information processing theory. From document analysis, classroom observation and interviews, the categories and themes, triangulation analysis was conducted to consolidate the major themes.

3.9.4 Interpreting and representing

After all data were analyzed and themes developed, the researcher began the stage of interpretation to extract meaning and insights from the data. Pandey, and Pandey, (2021) point out that interpretation is the exposition meaning of the material obtainable in relation to the purpose of the particular study. Interpreting involves reflecting about the overall words and actions of the participants and extracting important understandings from them. Creswell (2007) states that interpretation is about bringing out the meaning, telling the story, providing an explanation, and developing probable explanations. This is a type of analysis where the researchers uses descriptions with texts (Calzon, 2023). Thus the researcher isolated the major findings in terms of major and minor themes conclusions were made.

3.10 Trustworthiness

Pilot and Beck, (2014) cited in Connelly, (2016, p. 435) state that “trustworthiness or rigor of a study refers to the degree of confidence in data, interpretation, and methods used to ensure the quality of a study”. Trustworthiness of a qualitative study thus is the degree of certainty in data interpretation and the methods used to ensure quality. Several criteria of trustworthiness exist. To ensure trustworthiness, the researcher used all laid down procedures according to Lincoln and Guba (1985) cited in Korstjens, and Moser, (2018) which included credibility, transferability, dependability and confirmability respectively.

To ensure credibility or confidence of truth of the study, the researcher used all standard qualitative procedures laid down for data collection and analysis as described in previous sections and provided justification for such actions. In addition, triangulations helped to ensure credibility of the data and

findings (Hadi, & José Closs, 2016). Furthermore, there was prolonged engagement with the participants during data collection which added to the credibility of the study. This was done through spending more time in the field of the collecting data and observing what participants were doing as well interacting with them. Another criteria for trustworthiness that was taken into consideration was transferability.

Transferability according to Connelly (2016), is the extent to which the study findings are useful or applicable to other contexts. This was done through detailed of the research process to enable the interested parties to make conclusions on possible transfer (Hadi, & José Closs, 2016; Noble, & Smith, 2015). The last criteria for trustworthiness considered in this study was confirmability. This is the degree to which results of the study could be repeated (Stahl, & King, 2020). Through field notes and reflective journals, the study met the criteria of confirmability. These ensured an audit trail since the researcher kept all memoirs of the field during data collection. In addition, the data was checked multiple times to confirm its consistency through the collection and analysis processes.

CHAPTER FOUR: PRESENTATION OF FINDINGS

4.1. Chapter Overview

This chapter presents the findings of the study on the application of information processing theory in teaching English grammar to facilitate meaningful learning by pre-service teachers during teaching practice. The data analysis was conducted according to the objectives of the study hence the chapter presents responses from participants on how they applied IPT strategies of contextualization, rehearsal, elaboration and organization in teaching secondary school English grammar. The following were the objectives of the study: To explore how pre-service teachers apply contextualization strategies in teaching English grammar to form 3 or 1 students during teaching practice; To explore how pre-service teachers apply rehearsal strategies in teaching English grammar to form 3 or 1 students during their teaching practice; to determine how pre-service teachers use information processing theory strategies of elaboration in teaching English grammar to form 3 or 1 students during their teaching practice; to find out how pre-service teachers used information processing theory strategies of organization in teaching English grammar to form 3 or 1 students during their teaching practice.

In the fifth objective, the researcher aimed at identifying the challenges that pre-service teachers face in the application of the information processing theory strategies of contextualization, rehearsal, elaboration and organization in teaching English grammar to form 3 or 1 students. Lastly, the researcher aimed to develop a model, based on information processing theory strategies, for teaching English grammar to secondary school students. The next section provides details of the participants.

4.2. Demographic characteristics of participants and schools

The study sampled 10 pre-service teachers who were doing their teaching practicum during the time of data collection. The participants were spread across 9 secondary schools in Chitipa, Karonga, Kasungu, Mzuzu, Nkhatabay, Mzimba and Rumphi, districts. The participants are named PT1 to PT10 according to the total number. The nine schools are referred to as B, E, F, J, L, M, N, S, and Z.

4.3. Findings

The findings in this study are presented using the verbatim direct quotes from these participants according to their experiences. To complement the findings from interviews, tables that provide results from classroom observation and document analysis are also presented. Themes generated from analysis of semi-structured interviews, classroom observations and document analysis are all complementing one another in response to the research questions. As already indicated above, the study sought to respond to questions relating to the application of four information processing theory cognitive strategies of contextualization, rehearsal, elaboration and organization by pre-service teachers in teaching English grammar during their teaching practice. Major themes were predetermined according to the research question while minor themes were generated from each of the major themes after the data analysis as shown in the table below.

Table 4 shows major and minor themes concerning the information processing theory strategies used by pre-service teachers

Contextualization	Rehearsal	Elaboration	Organization
Integration of literature to teach grammar	Repetition	Constructing sentences with words	Creation of hierarchies
Cooperative learning	Mnemonics	Prior knowledge captivation	Chunking
Authentic assessment	Visualization/ Mental Images	Paraphrasing and summarizing	Concept mapping
Authentic materials	Probing questions	Practical examples	
	Note taking	Question and answer	

Source: *Researcher's field notes*

Table 4 shows that pre-service teachers applied a number of information theory strategies. Hence major and minor themes are as shown in the table. The next section presents findings on how pre-service teachers applied contextualization.

4.3 Application of Contextualization in teaching English grammar

The study uncovered a number of contextualized activities that pre-service teachers used when teaching English grammar. Out of the numerous strategies, four strategies that were commonly used by most pre-service teachers in teaching English grammar were isolated. They include: *integration of literature to teach grammar; cooperative learning; authentic assessment and use of authentic materials*. The first contextualized strategy presented is the integration of literature to teach grammar.

4.3.1. Integration of literature to teaching grammar

Pre-service teachers during interviews revealed that they used literature books and other texts to teach grammar. Responding to the question; *why do you use the literature texts in the teaching of grammar?* A participant labeled PT 10 said, *“It makes them relate well with what they are learning hence making connections between previous and new information. I use passages from different texts including literature book and others.”*

Another participant making a similar comment said;

Yes, especially parts of speech. I can have a passage from a literature book and ask them to find parts of speech. They read the passage and ask them to identify parts of speech. Then I ask learners why that is an adverb or adjective. I also use newspaper passages or even passages from a magazine. Then based on the passage, I ask them to identify the part of speech. (PT8, Semi-structured interviews, 25/4/22, 13:04pm)

Likewise, a participant PT5 pointed out that,

It can be effective because from the literature text itself, may be from the book like the “Familiar Stranger” some stories have certain vocabularies which according to students, are difficult, so it might be good for the teacher to use the short stories the teacher to teach grammar because the more they provide contexts that are familiar to students, the more they can understand the vocabulary and the story. The more they are used in context, the more they understand. (PT 5: Semi-structured interview; 27/4/22, 14:02 pm)

Participant PT4 seemed to make the point clearer by saying;

I use literature texts when the story involve some figurative words. Where people just add some parts of speech such as adverbs, adjectives, so students identify them using the story. I use stories to teach students to identify how adjectives are used to describe people in a sentence. (PT4 - Semi-structured interview, 4/5/22, 10:01am).

Participant, PT10 added by saying “*I read the passage and ask students to read. Ask students to read and underline the particular part of speech.*”

Using literature also provokes learners’ interest and draws learners’ attention as participant PT9 indicated:

There are some interesting stories in literature books. I come with a story which they read and I ask them to identify prepositions, conjunctions, etc. Literature texts and books contain the grammar content which learners find interesting hence they pay attention. (PT9, semi-structures interviews, 28/4/22, 9:35AM).

Agreeing with this, participant PT3 verbalized that “*It brings entertainment and arouses motivation and attention to learn*”. The participants all agreed that they use literature texts in teaching grammar as participant PT7 additionally indicated that:

I used poem to identify verbs- Pasted poem on chalk board, and then, firstly I asked them to identify difficult words in the poem. Then they were able to give parts of speech of those particular words. The poem was organizing content from simple to complex. I ask students to Identify difficult words, explain parts of speech of particular words. Then later, students used words in sentences. I used a poem because in English we have to integrate because they are learning grammar and literature. It’s not allowed to teach grammar in isolation. Integration is important. (PT7, semi-structures interviews, 28/4/22, 12:31PM).

Clarifying further, PT 5 pointed out that;

Yes, I introduced the story entitled “Sudden Death” I asked the learners to predict the content then match it with what they predicted, then they identify linking words from the texts. These linking words are conjunctions. I use literature stories because grammar is supposed to be taught in context not in isolation. (PT5, semi-structured interviews, 28/4/22, 9:35AM)

During classroom observation, participants did not not integrate any literature text to teach grammar. Rather than integration, participants mostly used prescribed grammar textbooks instead of other materials.

In the next section, I present another contextualization strategy which participants’ used namely, cooperative learning.

4.3.2. Cooperative Learning

The study also found that pre-service teachers used cooperative learning to teach English grammar. This is an approach that organized teaching using small groups in which students work together. Participants responded to the question *what activities do you use when teaching grammar?* The majority stated that they used group work and pair work. Participant PT10 stated that *“Yes group work is encouraged especially that the teaching period is limited to 35 minutes. I divide the class of 36 into 3 groups. Though time is not sufficient where group work is encouraged.”* Yet, other participants cited activities such as brainstorming, class discussions, role play and debate. Participant PT4 indicated by saying *“The use of group work helps learners to work as a team. It helps them to tolerate each other’s views. Through team work, they motivates each other.”* Additionally agreement with the two participants, PT 8 said *“It’s very useful because during group and discussions, some learners are able to correct themselves. During group work, they also easily correct each other without shame”*. On a slightly different note, some participant indicated that they used pair work more than group work. One participants indicated this.

On pair work, before I tell them what they will do an exercise in pairs. I give them instructions first and then tell them that they will do the exercise in pairs and later report

hence they are encouraged to participate so that they don't get embarrassed. (PT5-semi-structured interview, 27/4/22, 9:44am).

Participants PT2 also articulated that *“I ask students to identify grammar aspects in pairs then ask them to present, then sorting out common answers.”* Equally, PT10 was of the view she used pair work because group work was difficult because of the large size of the class.

It becomes difficult to use group work because the class is large and it helps avoid social loafing among student. So I mostly use pair work. Instruction and ask students to work in pairs and making sure that each pair reports...the activities that I use include group work. Sometimes I also use role plays, dialogue and pair work. (PT10), Semi-structured interview, 29 /4/22, 14:33PM).

Additionally, participant PT4 said he rarely used and pair work. Participant PT4, male said *“I rarely use pair work because classes are too huge and pair work is difficult to monitor, I rather use group work and class discussions.”*

These interview findings correspond to the classroom observation as the table 5 below shows.

Table 5 shows use of cooperative learning

Strategy	Activities/evidence of the strategy	Remarks
Contextualization Are the pair and group work activities among learners encouraged?	<i>PT9: Pre-service teacher used whole class discussion through asking students questions which students brainstorm and discuss</i>	<i>Students brainstormed and discussed and the class was lively.</i>
	<i>PT5: The pre-service teacher used pair work and gave exercise for students to work on in pairs.</i>	<i>Student pairs report to whole class their responses to the exercise.</i>
	<i>PT2: Group work is used. After a group activity, teacher says they are going to learn about types of adverbs.</i>	<i>Students participated actively in groups to identify the types of adverbs and later report to the whole class.</i>

Source: Reseracher's field notes

The table shows that pre-service teachers mostly use cooperative learning activities of group work and pair work when teaching grammar. The next section, presents findings on use of authentic assessment which is another contextualization strategy.

4.3.3. Authentic assessment

The findings of this study show that participant rarely used authentic assessment activities during the teaching and learning of grammar classroom and after the lesson.

Participants responded to the question; *what assessment methods do you use to ensure that the grammar aspect you have taught has been effectively learnt and can be used by your learners?*

One participant verbalized that;

I use class exercises to test if students were able to follow the lesson. Weekly and monthly tests are used to find out the progress of students in terms of the grammar aspect taught and projects are used for practical use of language.
(PT4, Semi-structured interviews, 4/5/22, 10:01AM).

The excerpt indicates that the participant mostly used traditional exercises and used authentic assessment in form of projects. Agreeing with PT4, other participants had this to say, PT8 said *“Aaa I mostly use tests at the end of the term.”* Another participant PT 2 added that *“I use continuous assessment methods like written tests and oral tests using different topics in class where students debate on the particular topic.”*

Similarly, a participant PT 5 expressed similar views saying *“I use exercises and give compositions as home work.”* Further to this, one more participant PT 3 said *“I usually give exercises and tests through the multiple choice questions.”* Instead of just acquiring the knowledge, students need to learn and consequently exhibit the aptitude to apply the knowledge authentic contexts.

Similarly, participant T9 said *“Aaa I mostly use tests at the end of the term.”* Additionally, PT 4 emphasized on the types of assessment he used:

A good example of how I assess learners to find out if they have knowledge of grammar is through using Cloze Procedure Passages (CPP). This strategy is useful for especially for classes where students

are asked to fill the blank spaces with appropriate words to check their understanding, interpret and use the target language correctly. (PT 4, Semi-structured interviews, 26/4/22, 10:01AM).

Consolidation previous assertions from other participants, another participant had this to say:

I assess learners through class exercises and weekly tests, it helps me to check learning in m learners. To understand those learners who participated and those who did not participate. I make up classes to those who do not understand. (PT 10 Semi-structured interviews, 26/4/22, 12:57PM).

PT2 highlighted that “I give them exercise and tests, It helps students improve their writing and training them for the future.” “I use tests to check learning.” Class exercises and tests are traditional methods of assessment since they only require students to recall information as opposed to meaningful real-word learning. Observational results below further show that participants used more traditional methods as opposed to authentic assessment methods to assess students.

Table 6 shows authentic assessment methods used during lesson observation

Strategy	Activities/evidence of strategy use	Remarks
Contextualization What kind of assessment methods does the pre-service teacher use during and after the lesson?	<i>PT10: The pre-service teacher assessed students through class exercise which he marks a few in class and asked students to take the rest of the exercises books to the staff room.</i>	<i>Students individually do the exercise which the teacher marks.</i>
	<i>PT8: The pre-service teacher gave group exercise and asked students in groups to present responses to the whole class.</i>	<i>Students work on the exercise in groups and present to the whole class. They actively participate in the group exercise.</i>
	<i>PT3: The pre-service teacher gave individual exercise and goes round to mark exercise. The question was for students to 'Identify the adverb and state what type of adverb.</i>	<i>Students work as individuals on the exercise.</i>

Source: *Researcher's field notes*

From the table above, PT10, PT8 and PT3 were observed using exercises to assess understanding after presentation of the lesson. The next section presents and discusses a contextualization strategy, use of authentic materials.

4.3.4. Authentic Materials

The study also found that participants use authentic materials in teaching English grammar to secondary school students. Authentic materials are teaching and learning resources which not created specifically for the classroom though they are effective teaching and learning resources. Participants responded to the question; *what materials they use to teach grammar?* PT10 said: *“I use grammar text books and Excel and Succeed, an English Language text book.”* Another participant PT7 said: *“I use text books.”* Responding to the question why she uses the textbooks, PT 7 had this to say: *“They are straight forward. They have the approved content on grammar and they are easy to use.”*

Adding to what other participants intimated, PT 6 emphasized by saying:

I use popular book, Excel and Succeed, I also use Senior Secondary Certificate English Student book. As well as Study and Master English for Malawi. In Excel and Succeed, the activities are clear and easy to teach. (PT 6, Semi-structured interviews, 26/4/22, 12:57PM).

In a similar manner, participant PT 2 expressed that: *“I use Textbooks, charts, audios. They motivate learners to learn and make learning interesting. They also arouse curiosity and attention in students”*. In line with the extracts. Classroom observation also revealed the authentic materials that participants use as indicated in the table below.

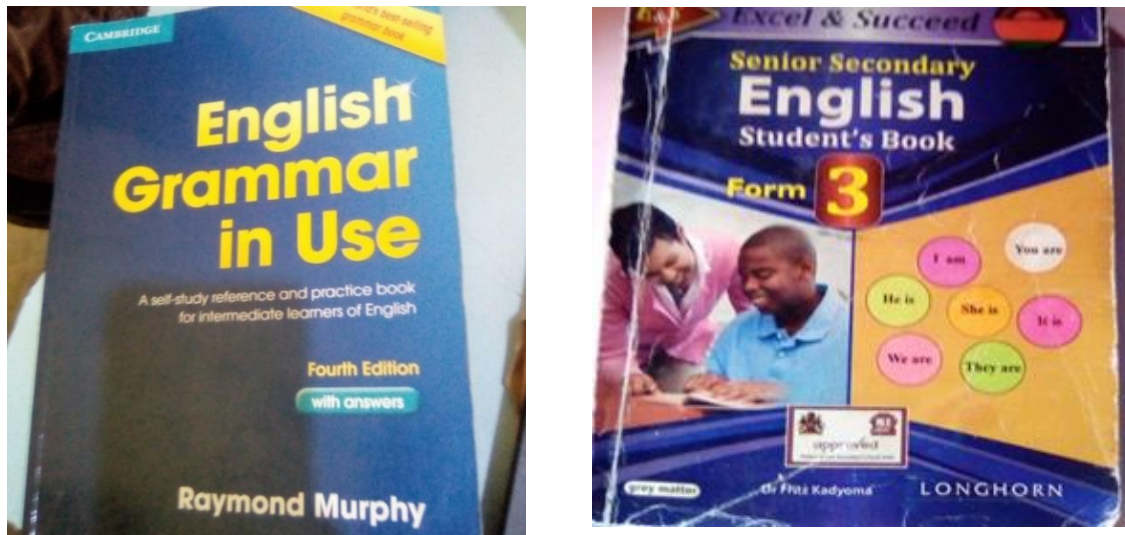
Table 7 shows use of authentic materials to teach grammar

Strategy	Activity/evidence of strategy use	Remarks
<p>Contextualization Does the pre-service teacher choose authentic materials natural to the teaching context, which can also be accessible to both the teacher and learner?</p>	<p><i>PT 4: The pre-service teacher shared textbooks to students and also used chats pre-arranged during lesson.</i></p>	<p><i>Students open the text books with interest shared in pairs on the page with target grammar aspects. All learners had access to a textbook.</i></p>
	<p><i>PT9: The pre-service teacher arranged chats on chalk board to introduce the lesson.</i></p>	<p><i>Students read the grammar content on the chart and take notes.</i></p>
	<p><i>PT7: Materials are mainly text books distributed among learners and accessible by and the learners.</i></p>	<p><i>Students have access to the text books and work on an exercise from the text book.</i></p>
	<p><i>PT3: The pre-service teacher used bottles of water brought by learners to introduce types of nouns.</i></p>	<p><i>Students' interest in the lesson is aroused at the teacher uses a bottle of water from one of the students.</i></p>

Source: *Researcher's field notes*

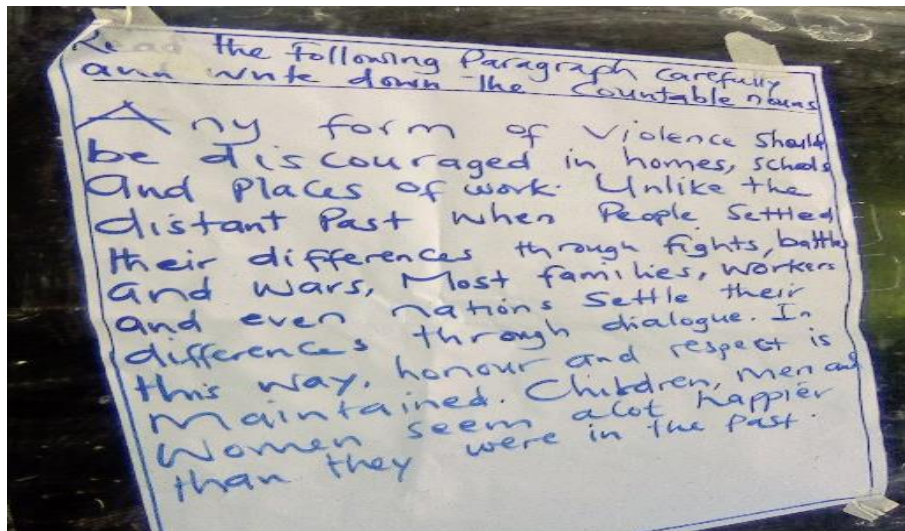
Table 7 above shows that most of the participants used textbooks and chats while others used locally available resources apart from textbooks and chats.

Figure 3 shows text book used to teach English grammar



Source: *Researcher's field notes*

Figure 4 shows a chat used to teach grammar



Source: *Researcher's field notes*

Figures 3 and 4 show two different types of authentic materials which participants used to teach English grammar among others. In the next section, a different information processing strategy, namely, rehearsal is presented.

4.4 Application of Rehearsal in teaching English grammar

Apart from contextualization strategies, the study also aimed to explore how pre-service teachers use rehearsal strategies to teaching English grammar to secondary school students. Rehearsal is another information processing theory cognitive strategy. This study therefore unveiled a number of the rehearsal strategies used by pre-service teachers when teaching English grammar to form 3 and 1 students. These included *visualization, note taking, probing questions, repetition and Mnemonics*. The first rehearsal strategy that is presented is visualization.

4.4.1. Visualization

The study through interviews, classroom observation and document analysis discovered that pre-service teachers used visualization through different activities during the teaching of English grammar. Responding to the question; *how do you visualized the grammar component?* One of the participants PT9, had this to say: *“I visualize lessons by making sure that I create images in student’s minds when teaching. For example, ‘nouns’, I ask them to look around and mention what they see. Hence the environment around them helps.”* Making a similar point, PT 5 stated that: *“I visualize the lessons by using demonstration methods and locally available resources.”*

Adding to the above statements, another participant stressed that:

A picture is better because someone can easily remember. If you use audio- visual materials, learners remember better. During the introduction of countable nouns, I tell them it is something you can touch. I also use resources that they can easily see. In addition, I underline the important points. If I repeat by showing an object, they easily remember. I also use chats and highlighting of the grammar aspect that am teaching. (PT8-semi-structured interviews, 25/4/22; 12:26pm).

Furthermore, a participant PT 3 pointed out that: *“I visualize my lessons through elaboration. Through giving more familiar examples, for example, water.”* Similarly, a participant PT10 said: *“Sometimes I ask student to come up with their own sentences.”*

Responding to the question on *why do you think visualizing the lesson is effective or desirable for teaching?* Some participants had this to say:

Visualization is effective because seeing something sticks more to memory than hearing.

It is effective because what is seen is not easy to forget. Through using chats, students will create mental images. I also use materials like charts containing pictures of object or people to help them visualize hence sticking to their imaginations. (PT10-semi-structured interview, 25/4/22, 10:30AM).

A participant PT 5 further expressed that visualization attracts attention of student. She indicated by saying: *“Visualization is indeed effective because it grabs attention of learners which is key in learning”*. Additionally, participant PT1 had this to say: *“Visualization avoids memorization and ensures that students use information in other situations. “Of course by doing so, I know that they have not memorized but understood and can use the examples in other situations.”* Visualization of the lesson was also observed in the classroom.

Table 8 shows visualization of grammar components

Strategy	Activity/evidence of strategy use	Remarks
Rehearsal strategies Does the pre-service teacher ensure that learners visualize and create mental images of the lesson?	<i>PT5: The pre-service teacher visualized the lesson by giving an example through demonstrating.</i>	<i>Students actively participated by responding to question and paying attention to the demonstration</i>
	<i>PT2: The pre-service teacher visualized the lesson through examples familiar to students and illustration. Used charts to consolidate the lesson.</i>	<i>Students easily connected what they already knew through images on the chat.</i>
	<i>PT4: The pre-service teacher used photos and images in the textbooks to visualize the lesson.</i>	<i>Students viewed images with interest and pay attention to teacher’s explanation.</i>

Source: Researcher’s field notes

4.4.2 Probing questions

The study found that participants used probing types of question during the teaching learning process. Participants said that they use probing questions to assess learners' understanding of the lesson. In response the question; *what kind of questions do you use to assess learners' understanding and why do you use such questions?*

One of the participants PT10 commented that *“Most of the time, I ask probing questions and those which involve critical thinking which improve students' grammatical expressions and vocabulary when they are responding.”*

Another participant made a similar statement:

Particularly, I mostly ask questions for students to rationalize. These are probing higher order questions that help learners use grammar and to think. *“Mm...such questions help learners to be critical thinkers with full understanding. Probing questions also help learners to be critical thinkers, to think deep. It helps them to apply what they learn to other situations. (PT6-semi-structured interviews, 27/4/22, 14:02pm).*

Commenting further on the types of questions and reasons for using them, participant PT7 stated:

I ask questions that require students to explain their understanding of the lesson. I ask probing questions requiring them to demonstrate their understanding, encourage critical thinking and to enhance grammar usage. Students should not be limited in their thinking but should think beyond what they see and hear. (PT 7, semi-structured interview, 27/04/22, 10:30 AM).

Classroom observation showed that participants used a combination of both higher order and lower order question.

Table 9 shows types of questions used

Strategy	Activity/evidence of strategy use	Remarks
Rehearsal Strategies What kind of questions does the pre-service teacher ask the learners?	<i>PT10: Pre-service teacher mostly recall questions followed by probing questions.</i>	<i>Student respond showing rote learning in some content and critical reasoning in other responses.</i>
	<i>PT1: Pre-service teacher mostly used “What” questions combined with activities where students are formulating own sentences.</i>	<i>Some questions asked are encouraging students to give chorus answers hence difficult to assess each student’ learning.</i>
	<i>PT4:Pre-service teacher generally asked probing but also questions that are of lower order.</i>	<i>However, questions asking them to construct sentences helped to assess each student of the grammar being taught. Students engage in deep thought searching responses to question.</i>

Source: Researcher’s field notes

The next section presents findings on use of repetition, another rehearsal strategy.

4.4.3. Repetition

Repetition, one of the rehearsal strategies is an occasion where a word or phrase or sentence is repeated in order to clarify, emphasize, or highlight deeper meanings of the content being taught. Participants responded to the question *what are the advantages of repeating instruction during a lesson?* A majority of agreed that they repeated instruction often and because it aids memory in learners.

A participants stated that:

Repetition of instruction injects in students’ memory what they learned, making it easy for them to store and retain information. It also helps them retrieve previous lessons. Sometimes, homework is given to them to remember content and to connect new topics to previously learned content. Sometimes, I introduce the lesson by revising previous lesson hence making connections. (PT9-semi-structured interview-25/4/22, 9:06am).

Another participant PT1 added that: “When am repeating, am giving them more chance to think about responses to probable questions. It also helps those who did not understand the first time to understand.” In the same way, a participant named PT3 articulated that: “It enables students to catch what they missed. They will come and seek clarification if they missed a point.”

In addition, PT4 agreed with other participants’ statements and said: “Repeating instruction enables students to have the clear content of the lesson or concept being taught hence it strengthens their memory.” However, asked how often they repeated instruction, it was revealed that a majority did not often repeated instruction though they repeated occasionally. One participant PT 7 indicated that: “I don’t repeat often. I repeat whole lesson of what I’ve taught not more than twice especially during weekends.” Classroom observation also reveals how participants repeated lessons and its advantages.

Table 10 shows use of repetition to teach English grammar

Strategy	Activity/evidence of strategy use	Remarks
Rehearsal Strategies Does the pre-service teacher repeat instruction cumulatively?	PT6: The pre-service teacher repeated instruction beginning from previous lesson. She gives an exercise and repeats instruction severally.	Students able to give correct responses to exercise.
	PT9: The pre-service teacher repeated through question and instructs students to work in groups.	Through group work, students are able to construct sentences using adverbs of manner.
	PT4: The pre-service teacher repeated instruction on types of clauses.	Students distinguish the between noun clauses and adverbial clauses.

Source: Researcher’s field notes

Table 10 shows evidence of how participants used repetition of instruction during lessons to facilitate meaningful learning and retention of grammar content. The next rehearsal strategy used by pre-service teachers was note taking presented below.

4.4.4. Note taking

Another rehearsal strategy used by participants when teaching English grammar was encouraging learners to copy or take notes during the lesson. When asked about the importance of encouraging learners to copy notes during lessons, one participant PT 9 stated that: *“Notes are important for reference and improve the skill of writing and there is an element of retention when you are writing notes on your own. It helps them to pick important points and go back to study.”*

In agreement, participant, PT1 articulated that: *“When the lesson has ended, students will go back to revise using the notes and they ask for clarification if they do not understand hence they use notes for revision and ask for clarification.”* Additionally, participant PT10 also had this to say: *“Learners cannot memorize everything am teaching. Therefore, taking notes helps them to remember what they learned. They can use notes for recalling previously learnt information.”* Classroom observations complement the interview results.

Table 11 shows how participants encouraged note-taking

Strategy	Activity/evidence of strategy use	Remarks
Rehearsal Are learners encouraged to copy or take notes?	<i>PT7: The pre-service teacher asks students to write down the types of registers as individuals.</i>	<i>Students take down notes on the types of registers written on the chalkboard. Later students answer questions relating to the notes.</i>
	<i>PT10: The pre-service teacher clearly writing sentences on the board and underlining the clauses encourages students to copy the notes.</i>	<i>Students copying the sentences from the chalkboard and reproduce sentences.</i>
	<i>PT 3: Pre-service teacher writes notes on types of adverbs.</i>	<i>Some students take notes while others do note.</i>

Source: *Researcher’s field notes*

Table 11 shows a few participants who encouraged students to take notes despite others not minding whether students were taking notes or note.

4.4.5 Mnemonics

Results of this study also showed that some participants used mnemonics to rehearse the grammar content. Depending on the content, mnemonics strategies may be developed by teachers, or students may be encouraged to come up with their own. Teachers and pre-service teachers are at liberty to use any type of mnemonic that exist depending on the content they intend to teach.

Participants responded to the question; *what has been your experience using mnemonics in teaching grammar?* Initially, most participants were ignorant of what is meant by the term 'Mnemonics'. The researcher had to explain the meaning and give examples. At this point, participants were able to respond. A participant termed PT 8 explained that:

Yes in English, I use mnemonics when teaching the order of adjectives. I use them to teach order of adjectives for them to easily remember. I use the abbreviation **DOSASCOMUN**-it's more like a formula. D for Determiner, O for Opinion, S for Size, A for Age, another S for Shape, C for Color, O for Origin, M for Material, U for Use and N for Noun. (PT8-semi-structured interview, 25/4/22, 13: 04PM).

Other participant equally alleged that using mnemonics helps students to follow the lesson and to retain what has been learned. For instance, PT7 stated that: *"It's very easy for students to understand if I use mnemonics. It enables students to understand the concept and to find out what is needed."* PT 5 said: *"The use of mnemonics when teaching grammar helps learners to follow grammar rules and retaining information as well as retrieval."* In addition, participant PT3 commented that: *"I've been using mnemonics in order for them to master the concepts. It is one way of making students retain information."*

In spite of the above expressions, some participants said they had no experience with using mnemonics. For instance, PT6 said: *"I've never come across that."* PT 1 also expressed her ignorance saying: *"Of course I've never used it but I plan to use it when I will be teaching order of adjectives."* Additionally, a participant PT 9 commented that: *"No, I've never used mnemonics but they are used under adjectives. I think it can help remember if it comes with guidelines. It helps aid memory."*

Classroom observations showed that none among all the participants used mnemonics techniques during in the grammar lessons. This confirms the interview assertions that participants were ignorant of what mnemonics were are their use in the classroom. Having presented some rehearsal strategies that pre-service teachers, the next section presents findings of use of IPT strategies of elaboration.

4.5 Application of Elaboration in teaching English grammar

The study also sought to explore the application of elaboration strategies in teaching English grammar by pre-service teachers. In line with this, the study unveiled a number of Elaboration strategies used by pre-service teachers. These strategies include; *construction of sentences with words, activating prior knowledge, asking and answering questions, paraphrasing and summarizing and use of practical examples*. The first elaboration strategy to be presented is construction of sentences with words.

4.5.1. Construction of sentences with words

This study found out that participants used an elaboration activity of encouraging learning to construct meaningful sentences from the grammar content they taught. Participants responded to the question of how they encourage construction of meaningful sentences on the grammar content. Participants responded to the question; *how do you encourage construction of meaningful sentences on the grammar content?*

One of the participants had this to say:

I encourage them to use the grammar content to construct simple sentences. I usually tell them not to check the examples that I've given. They should stick to simple things, or vocabulary which they would also easily understand and not get confused. (PT 9- semi-structured interview, 26/04/22, 12:57PM).

Responding to the same question, another participant added that:

I encourage learners to construct sentences after teaching and later. I mostly give and mark exercises on sentence construction. I like making corrections of the wrong sentences that students have constructed.

Students improve in the next exercise. (PT8-semi-structured interviews, 25/04/22:9:30AM).

Responding to the same question, a participant labelled PT3 also said: *“Sometimes I just give exercise so that they use nouns in sentences. Meaning that they will be able to use the grammar aspect in sentences.”* In addition, participant PT5 said: *“For example, I teach about adjectives, I ask them to construct sentences, then check if the sentences are accurate and correct the mistakes.”*

Other participants narrated as follows:

When asking them to construct sentences, I first give instruction on how to do it. Before that, I ask if they have understood, if they have not, I explain and repeat the instruction where I know that they have some weaknesses. (PT1-semi-structured interview, 27/4/22, 9:38am).

In trying to emphasize the views of previous speakers, another participant stated that:

I encourage them when I give an exercise to construct sentences using adjective for example. I emphasize that when they have written the sentence, they should explain which word is an adjective, which noun does it qualify to be an adjective? I repeat by giving them exercises and emphasizing on the particular grammar aspect. (PT4- semi-structured interviews, 4/5/22, 10:01am).

During classroom observations, participants gave exercises to learners where they asked them to construct their own sentences from a grammar component that had just been presented. It shows most of them give exercises asking learners to construct sentences which they graded and corrected errors. Both interview classroom observation findings correspond that the participants encouraged construction of sentences through exercises and correction of errors. The tables below presents classroom observation results.

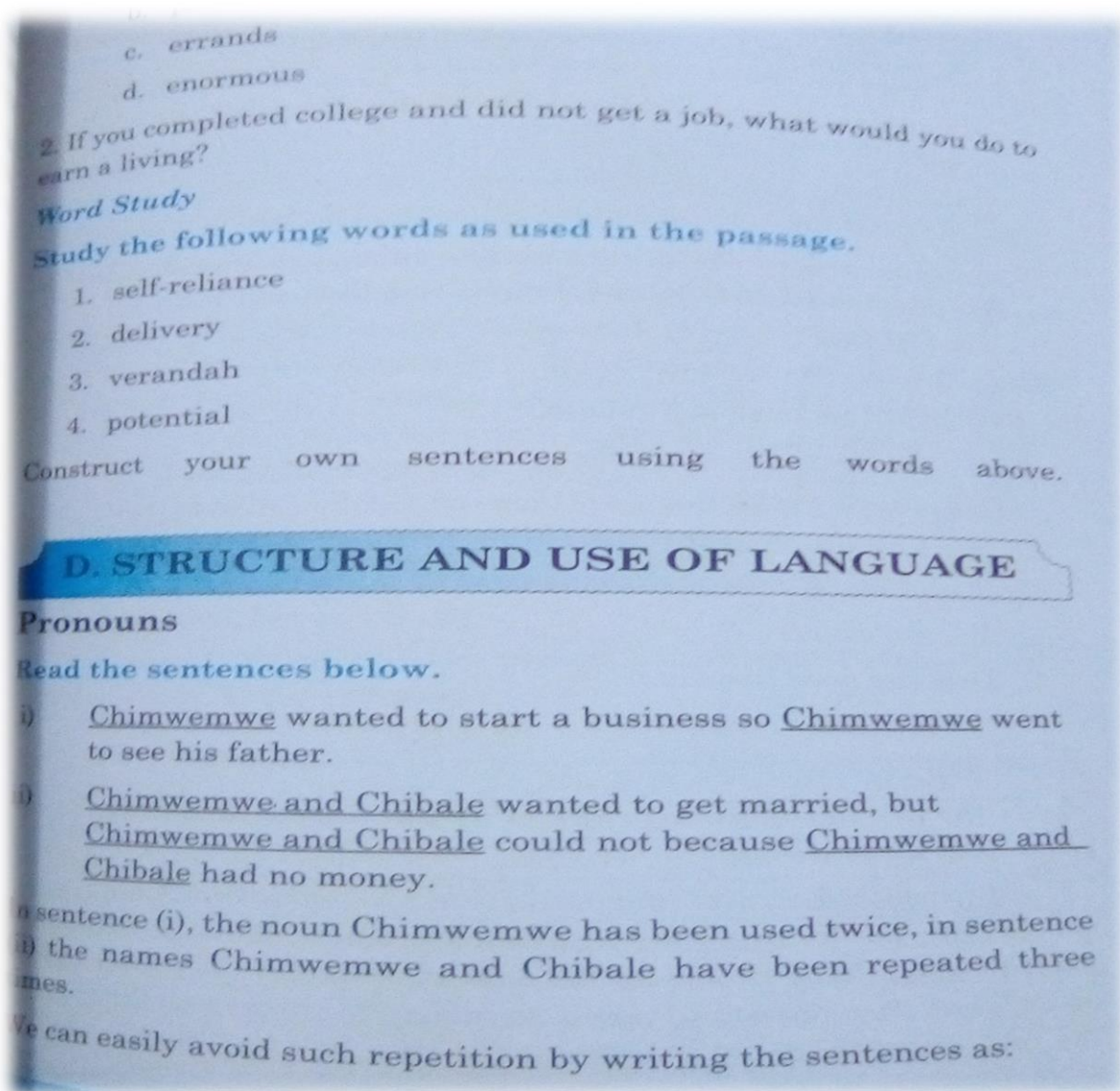
Table 12 shows classroom observation of construction sentences

Strategy	Activity/evidence of strategy use	Remarks
<p>Elaboration How does the pre-service teacher encourage construction of meaningful sentences on the grammar content?</p>	<p><i>PT4: The pre-service teacher gives an exercise to students to construct sentences using noun clauses.</i></p>	<p><i>Students use nouns clauses to construct their own sentences.</i></p>
	<p><i>PT7: Teacher asks students to construct their own sentences using registers after giving an example on types of registers.</i></p>	<p><i>Students are able to use registers in sentences. The teacher is able to correct errors.</i></p>
	<p><i>PT1: Asked students in groups to construct sentences using different types of adverbs by giving examples of sentences with</i> <i>Adverbs of manner- They played the game well.</i> <i>Adverbs of place- The Lion died here.</i> <i>Adverbs of degree-</i> <i>Adverbs of frequency.</i></p>	<p><i>Support provided by correcting, errors and marking students' sentences.</i></p>
	<p><i>PT6: The teacher asks students to orally give their sentences from given adjectives.</i></p>	<p><i>Students use the grammar item to orally construct sentence. This enables the teacher immediately correct errors in the oral sentences.</i></p>

Source: *Researcher's field notes*

Table 12 shows how participants encouraged students to construct their own meaningful sentences during the lesson. It shows that encouraging sentence construction makes students to actively participate in their own learning. Similarly, the figure below an extract from one of the textbooks shows how sentence construction is encouraged.

Figure 5 shows the use of construction of sentences in textbook



Source: *Researcher's field notes*

Figure 4 shows the how the English text book encourages students to construct their own sentences using given words. According to the secondary school English text book, students are encouraged to construct their own sentences using the given words. The next section presents prior knowledge activation one of the elaboration strategies used by pre-service teachers when teaching English grammar.

4.5.2 Prior knowledge activation

Another elaboration strategy which the study revealed is activation of prior knowledge during lesson introduction. Participants responded to the question, *how do you introduce new grammar lessons?* A majority of participants articulated that they introduced new grammar lessons by first reviewing the prior lesson. One participant had this to say:

Like when I previously taught nouns, now I want to teach about pronouns, I ask students what word they can use in place of a noun. I connect the two by repeating that a noun is a naming word, then they respond by making connection and this enables them to understand what a pronoun is. I also use question and answer technique. (PT4-semistructured interviews, 4/5/22, 10:01am).

Other participants gave more evidence of how they introduce grammar lessons. In response to the same question, this participant had this to say:

I use previous lesson so that I teach from known to unknown. Then sometimes if there is no link between previous lesson and the new lesson am about to teach, I ask them questions about previous lesson so that they should not forget. In short, I use previous lesson to introduce the new lesson. (PT 8-semistructured interview-26/4/22, 10:00am).

In the same way, a participant PT 9 said: *“I first start with review of previous lesson and ask them to relate it to the new lesson.”* To further support the use or prior knowledge of previous lesson, participant PT10 commented that:

...for example if I taught about verbs, then my new lesson is types of verbs, I ask students about what a verb is. Then I introduce the types of verbs. Students easily connect and understand the new lesson because they have been reminded about what they already learned. (PT10, semi-structured interview-2/5/22, 10:22PM).

Additionally, a participant PT 2 said: She used previous lessonS in order to make students find similarities between new and previous information. *“I go back to previous lesson. Teaching from*

known to unknown. For example, when teaching adverbs, and adjectives, I ask them questions about adverbs before introducing adjectives.”

The interview findings are supported by information from the classroom observation as the table below shows.

Table 13 shows activation of prior knowledge

Strategy	Activity/evidence of strategy use	Remarks
Elaboration Does the pre-service teacher introduce lessons from prior knowledge?	<i>PT1: The pre-service teacher asked questions about previous lesson.</i>	<i>Students answer questions about the previous lesson on adverbs of manner.</i>
	<i>PT4: The pre-service teacher introduced the new lesson from simple known content to complex unknown after reviewing the previous lesson.</i>	<i>The summary of previous lesson enables students to easily connect to new lesson.</i>
	<i>Pre-service teacher continues with new lesson on adverbial clauses.</i>	<i>Students pay clause attention to the introduction. Their curiosity is aroused.</i>
	<i>PT2: The pre-service teacher asked questions from previous lesson on types of clauses.</i>	<i>Students responding to questions on types of clauses.</i>
	<i>PT10: The pre-service teacher introduced the content by linking it to previous lesson.</i>	<i>Students take notes on previous lesson and attentive.</i>

Source: *Researcher’s field notes*

Table 13 outlines how participants used prior knowledge in teaching grammar. It shows that they asked questions about the previous lesson. They also began with simple to complex material.

In addition to activating prior knowledge, findings show that participants ensured that learners found similarities between new information and previous knowledge. They responded to the question; *how do you ensure that learners find similarities between new information and information previously learnt?*

A participant PT1 commented that: *“I ask questions from previous lesson that is always if the lesson was previously introduced. If not, I find materials and techniques to make them find a connection.”*

Another participant labeled PT 10 added that:

Through the responses to my questions, I ensure that they connect information. Posing questions and guiding them on the relationship between the previous lesson and the new task. This ensures that students make links making learning of the new grammar easier. (PT10-semi-structured interview, 25/4/22, 10:22AM).

Similarly, participant PT5 stated that: *“I just recap on previous lesson through questions. I ask questions about previous lesson because even learners themselves create mental maps and there is no disconnection of what they know and new information.”* Classroom observation complement interview results of showing participants helped students to find similarities between new and prior knowledge as shown below.

Table 14 shows how students make links and found similarities

Strategy	Activity/evidence of strategy use	Remarks
<p>Elaboration Strategy Are learners able to find similarities between new information and information previously learnt?</p>	<p><i>PT10: The pre-service teacher linked new lesson to learners’ experiences through asking questions. She asked “Why do people suffer from Malaria?” The introduced a passage entitled “Malaria No More” which learners read and identified nouns from.</i></p>	<p><i>Students responded by explaining their knowledge of why people suffer from Malaria. This enabled them find similarities easily.</i></p>
	<p><i>PT1: The pre-service teacher asked questions about adjective before introducing the new lesson on adverb.</i></p>	<p><i>Students were able to find similarities and linked previous to new lesson.</i></p>
	<p><i>PT2: The pre-service teacher utilized higher order questions where she asked students to give examples of adverbs and to explain why they were adverbs. Then asked them to identify the types of adverbs.</i></p>	<p><i>Students explain their views on adverbs and were able to distinguish types of adverbs.</i></p>

Source: *Researcher’s field notes*

Table 14 shows how students found similarities in between previous and new information. It was made possible through questions from participants. The next section presents results of use of practical examples which is also a strategy of elaboration.

4.3.3 Use of practical examples

Examples produced by a teacher or offered in a write-up and during practical activities such as problem solving may be used for scaffolding leaning of any school subjects. Teacher generated examples are important for any meaningful learning. During semi-structured interviews, participants intimated that they give examples which are practical and which students are able to easily relate with when teaching English grammar. Participants responded to the question, *what kind of examples do you use to make learners understand the lesson?*

A participant named PT 4 said: *“When am teaching types of adjectives, I use adjective of color, I use practical examples using for example, a green dress which a student is wearing in class.”*

A few more participants a practical examples when introducing new grammar lesson. In response the question of how they introduced new grammar content, one participant had this to say:

...for example, when I was introducing adjectives, of course adjectives talk more about nouns, I used a duster, their own clothes, a tall girl among them, a short girl, light in complexion. From there, I told them today’s lesson. I inform them that we will be discussing more about nouns, and those description are called adjective. They tend to be eager and pay attention to the lesson. (PT1-semistructures interview-27/4/22, 9:49am).

Another participant labelled PT5 said: *“I ask them to look around them and ask them what parts of speech it. I contextualize.”* This was similarly observed during classroom observation. Participants were also observed to use examples which were practical and easily accessible to students when introducing new grammar content. The participants gave practical examples which were within the context of classroom as supported in the observation table below.

Table 15 shows use of practical examples

Strategy	Activities/evidence of the strategy	Remarks
<p>Elaboration Does the pre-service teacher give examples that learners are familiar with?</p>	<p>PT4: The pre-service teacher used learners to give practical examples when introducing the lesson. Used a student's red dress to introduce adjectives.</p>	<p>Students looked at their peer who wore the dress in teachers' example. They also easily give their own examples following the teachers' pattern.</p>
	<p>PT6: The pre-service teacher gave an example of a school where students are learning to introduce signaling devices. . E.g. "Almost all the students at P secondary school have passed."</p>	<p>Students' quickly related with the example. They respond to questions.</p>
	<p>PT 1: Pre-service teacher gave a real examples when introducing adverbs of manner. E.g. James played the game <u>well</u>.</p>	<p>Students join in laughter and respond to questions giving examples of adverbs.</p>

Source: Researcher's field notes

Table 15 table shows that participants gave examples that were practical and familiar including from the classroom and the school surrounding. This gives the impression that pre-service teachers elaborated grammar lessons through using practical examples. The next section presents findings of another elaboration strategy pre-service teachers used. This is question and answer strategy.

4.5.4. Question and answer

Findings of the current study also revealed that pre-service teachers used question and answer technique to teach English grammar. Question and answer technique is one of the most commonly used methods of teaching and learning by both teachers and students. Asking and responding to questions is one way in which teachers assess their students' understanding of the lesson. Participants expressed several reasons why they thought it is important for both teachers and students to ask questions during lessons. They responded to the question; *why do you think it is important to ask questions during the lesson?*

In response, a participant PT 1 said: *“As a teacher, I may overlook what students have missed, hence it is important for them to be a given chance to ask questions and I repeat to find out what they have not understood.”* Another participant PT6 further stated that: *“It is important for learners to ask questions and for the teacher to respond because they may get things right if they ask for clarification for the teacher to emphasize the important points in the content.”*

Asking and responding to questions is a way to allow students to think on the topic being learned more deeply thereby providing meaning and rehearsing what is learnt. Another participant PT10 pointed out that: *“We have to plan for questions at the end of the lesson. It is important because students get clarification and learning occurs. It also helps me to assess what students have learned.”*

Question and answer technique was also used by participants in order to enable students to effectively make connections between new information and previous lessons. In response to the question *‘How do you support your learners to enable them effectively remember the content you teach them?’* One participant PT7 said: *“I do so by ask questions about previous lessons.”* A Participant PT 9 added that: *“Through assessment and practice questions on previous lesson.”* Activities that involve learners like question and answer learners were asked to construct sentences orally were also observed. Another participants agreed with previous participants and had this to say:

The fact that one asks questions means that he or she has at one point has not understood the content or that they have understood but in a different way. Hence questions help me to clarify. Asking and answering questions makes teacher to clarify the content. (PT8-semi-structured interview-26/4/22, 10:29am).

Classroom observation as the table below also shows that participants used the question and answer strategy during the grammar lessons. This helped students to actively participate in the lesson and paid attention.

Table 16 shows classroom observation of question and answer strategy

Strategy	Activity/evidence of strategy use	Remarks
<p>Elaboration Does the pre-service teacher ask and answer questions about the materials being taught?</p>	<p><i>PT8: The pre-service teacher asked questions and responded to different questions from students during the lesson.</i></p>	<p><i>Students actively participated by asking questions to which the pre-service teacher responded.</i></p>
	<p><i>PT3: The pre-service teacher answered questions from students and asked questions of a topic ‘Types of clauses’. What is the difference between a noun clause and an adjective clause?</i></p>	<p><i>Students responded nouns and responded to questions from the teacher. Students were attentive to the response about the difference between noun clauses and adjective clauses.</i></p>
	<p><i>PT7: The pre-service teacher asked questions and allows students to ask where they did not understand on a topic ‘Countable and uncountable nouns’.</i></p>	<p><i>Student actively answered questions in groups. A few students responded to questions though they did not seem sure if they were correct since the teacher did not allow questions.</i></p>

Source: Researcher’s own field notes

Table 16 shows how the pre-service teachers used question and answer technique to teach grammar.

4.5.5 Paraphrasing and summarizing lessons

The last elaboration strategies that findings reveal as used by participants were paraphrasing and summarizing of the lesson. Paraphrasing is a brief outline of the ultimate important ideas from the passage and it is a useful device for effective communication. Summarizing enables the person to understand and isolate the main ideas of the text. Under these strategies, participants responded to the question ‘Why is it important to paraphrase and summarize the lessons?’

A Participant PT 4 during the interview said: “Summarizing reminds students in this regard what has been learnt and also it’s like you intensify retention of information.” Another participant PT3 articulated that: “Paraphrasing enables me to clarify information to students. It enables the students who did not understand to get a clear understanding of the lesson enabling them to learn how to use that grammar.”

More participants mentioned that paraphrasing and summarizing lessons was important because they enabled and gave an opportunity to students to coherently follow the lesson and clear their doubts. One of the participants, PT9 specified that: *“When I summarize the lesson, those students who missed a concept will now follow and ask where they did not understand.”* In addition, PT8 said *“Summarizing helps the students to remember what was taught and to understand something better.”* To further confirm the importance of paraphrasing and summarizing lesson, a participant, PT 4 had this to say:

Ok, in terms paraphrasing, I think it makes language easier for them to understand. It simplifies the language for students to understand better. Aaa I think summarizing acts as a consolidation of the lesson. I think someone who is a slow learner can pick out something which he or she did not understand. (PT4-semi-structured interview, 25/4/22, 12:33PM).

Participants were witnessed paraphrasing and summarizing lessons during classroom observation.

Table 17 shows use of paraphrasing and summarizing during lessons

Strategy	Activity/evidence of strategy use	Remarks
Elaboration How does the pre-service teacher paraphrase and summarizing the lesson?	<i>PT5: The pre-service teacher summarized the lesson through highlighting the main points.</i>	<i>Students took notes of important points and are able to answer questions.</i>
	<i>PT9: The pre-service teacher Summarized lesson by giving a group exercise and them emphasizing the key points in the lesson. Ended with explaining that ‘a’ is used before a word beginning with a consonant sound. “an” is used before a word beginning with a vowel sound.</i>	<i>Students identified articles is used in sentences without problems.hhh</i>
	<i>PT7:The pre-service teacher summarized lesson by empathizing they three types of registers :</i> 1. Formal 2. Informal 3. Neutral	<i>Students were able to use registers in sentences after the summary. They were able to differentiate among the three types of registers in language.</i>

Source: Researcher’s field notes

Table 17 shows that participants used different methods to paraphrase and summarize the lessons' content. Students were observed having no difficulty using the grammar content after the teacher paraphrased and summarized with key points. Having discussed Elaboration strategies above, the next section focusses on the last information processing theory strategy of organization which is also a cognitive strategy.

4.6 Application of organization in teaching English grammar

The study also sought to determine how the pre-service teachers used the information processing theory strategy of organization. This study found that the pre-service teachers used organization strategies in teaching English grammar. Particularly, the study found that pre-service teachers employed *chunking*, *concept mapping*, and *hierarchy creation or teaching* when presenting grammar lessons. First to be presented and discussed is the Hierarchy creation.

4.6.1 Hierarchy creation

The study found that pre-service teachers used the organization strategy of hierarchy creation or hierarchical teaching through logical presentation of grammar lessons. Hierarchical teaching implies that there is order and logical presentation of material in a progressive manner.

Participants confirmed that they presented their lessons in a logical manner to ensure that learners too organized the information in memory. They responded to the question; *'How do you present your lesson to ensure that learners organize information learned?'*

A participant PT3 said:

Ok so, yaaa! I teach all the content and after teaching, I ask any of the learners to summarize the lesson. In the process of summarizing, they should say, we have learned the definition of this, we have learned the examples. In that order, I know that they have learned. I make sure they don't lose truck because I plan and present the lesson orderly. (PT3-semi-structured interview, 5/5/22, 10:22am).

Other participants expressed themselves this way: PT10 said: *“First, I present the lesson in such a way that it should flow logically. So when going to class I have to show confidence and order in the way I present the lesson.”* Similarly, PT7 had this to say:

Ok for example, in the introduction, I ask the students to give ideas of what they already know about the topic I’ve introduced, and they start giving a lot of ideas. At the end of my lesson, I help them by explaining and summarizing from simple ideas to more difficult ones. Therefore, I teach, from known to unknown. (PT7, sem-istuctured interview, 28/4/22, 13:05PM).

In addition, another participant confirmed to presenting their lesson from simpler content to more complex aspects of the content meaning that she makes it coherent and logical. She expressed herself by saying:

Ok, I usually start with Aaa the simple ideas of the topic, and I can start with the title of the lesson am going to teach, then definitions, going further to detailed information, and then I go to deeper meaning of the topic. Because at first students will have the knowledge of what is going to be discussed, and then they will start to learn things they do not know. (PT9- semistrutured interview-26/4/22, 12:57PM).

Making the ideas clearer, PT8 emphasized how she used Bloom’s taxonomy and pointed out that: *“For learners to organize learning content, it will depend on how I present the lesson. I start my grammar lessons by presenting simple going down to complex content. Thus, I present the lesson in a logical, orderly manner.”*

These findings correspond with the classroom observation findings which showed that most participants presented their lessons by creating a hierarchy and logically beginning with simpler known to more complex unknown information as shown in the table below.

Table 18 shows use of hierarchical and logical lesson presentation

Strategy	Activity/evidence of strategy use	Remarks
<p>Organization Strategies What strategies does the pre-service teacher use that show organization? How does the pre-service teacher use of hierarchy of teaching and learning during the lesson?</p>	<p><i>PT9: The pre-service teacher presents his lesson beginning with reviewing previous lesson before introducing the new content hence teaching from known to unknown.</i></p>	<p><i>Students are reminded about previous lesson. This ensures that the lesson is well organized from what learners already know to what they do not know.</i></p>
	<p><i>PT4: The pre-service teacher presents the lesson from simple to complex. He Starts by giving examples of a sentence containing a clause. E.g. ‘This is the book, which I was looking for’.</i></p>	<p><i>Students able to construct their own sentences and identifying the clauses in the sentences.</i></p>
	<p><i>PT3: Pre-service teacher begins with definitions of clauses. Then gives examples of the types of clauses.</i></p>	<p><i>Students follow the flow of the lesson from simple to complex content on types of clauses, constructing sentences with clauses.</i></p>
	<p><i>PT6: Pre-service teacher introduced the lesson by asking questions on previous lesson. Describe the type of sentences that you know and give examples. The pre-service teacher then introduced the new topic ‘Prepositions’.</i></p>	<p><i>Students respond to the question and summarized the previous lesson. This is observed during the conclusion where they summarize what they have learned.</i></p>

Source: Researcher’s field notes

The overall impression from table 18 above is that participants organized their lessons through logical presentation where they taught according to order of difficulty, from simple to complex. The next section outlines another organization strategy namely chunking.

4.6.2 Chunking

The study results show that chunking is one of the organization strategies that most participants used to teach English grammar. Responding to the question; ‘What are the advantages of chunking (grouping) and classifying similar information?’ Participants pointed different advantages of chunking information. For instance, a participant labeled PT2 said: “*Chunking is important because it helps student to differentiate the content hence avoiding confusion.*”

Another participant had this to say:

Chunking or grouping similar content together helps someone not to get confused. For example, today's lesson, I started from informal registers then formal. It helps to avoid confusion in the information in the learners. It also gives me the teacher an understanding of the flow of the lesson logically. (PT3 semi-structured interview, 26/4/22, 1:30 pm).

In agreement, another participant emphasized that chunking helped to minimize confusion among students since it enables them not to mix-up content and retention of information.

Students will easily retain information and it avoids confusion through mixing up information. It enable easy recall without facing challenge hence avoids confusion among students. The content in syllabus is also presented in a logical order to avoid confusions and forgetting. (PT10-semi-structured interview, 25/4/22, 9:36am).

In addition, participants indicated that chunking helps the teacher to achieve the planned success criteria or objectives because the focus of the lesson is be on the information grouped into similar categories. This also enables hierarchical learning aiding recall and retrieval of the information. PT 1 articulated that:

It helps to achieve success criteria because learners too will focus on the lesson as classified and outlined by the teacher. For example, they listen to me, then I give pair work or group work and then individual exercise on the content. It helps achieve success criteria because learners will have focus and on the way the lesson has been organized. It ensures orderly learning from known to unknown. (PT1-semi-structured interviews, 27/4/22, 10:32am).

Another participant made similar remarks:

Aaa our minds are programmed in such a way that when you clutter the laying down of information, it becomes difficult for the learner to regroup it and it becomes difficult to remember. If the content is confused and

disordered, it becomes difficult for the learner to regroup and he or she will be confused. It becomes difficult students grasp the content. Therefore, chunking information aids retention. (PT8 -semi-structured interview, 26/4/22, 10:29am).

The classroom observation also established how pre-service teachers chunked their lessons as the table below shows.

Table 19 shows the use of chunking during lessons

Strategy	Activity/evidence of strategy use	Remarks
<p>Organization Strategies How does the pre-service teacher perform chunking-grouping and classifying similar information during the lesson?</p>	<p><i>PT1: The pre-service teacher grouped different types and gave examples of how each type can be used in sentences.</i></p> <ul style="list-style-type: none"> • <i>Adverbs of manner- 'They played the game well'.</i> • <i>Adverbs of place- 'The lion died here'</i> • <i>Adverbs of degree, Adverbs of frequency, Interrogative adverbs, Relative adverb</i> 	<p><i>Students were able to construct their own sentences for each type adverb following the given examples.</i></p>
	<p><i>PT3: The pre-service teacher asked students to identify countable nouns first and then uncountable from a passage.</i></p>	<p><i>Students easily grouped the types of nouns accordingly after identifying them from the passage</i></p>

Source: Researcher's field notes

Table 19 shows how participants used chunking and grouping similar information during lessons. As the table shows, PT1, PT4, and PT3 presented the grammar content according to their types or in groups. The last organization strategy presented and discussed in the next section is concept mapping.

4.6.3. Concept mapping

The study further found that the pre-service teachers used concept maps in teaching English grammar. A concept map as already indicated is a way of presenting and representing information

which enables students to clearly follow the flow of the lesson and relationship between ideas. The participants responded to the question; *‘Why do you think concept mapping is important?’*

A participant PT5 said: *“I use materials like a diagram on a chat from which students create mental maps.”* Another participant PT2 said: *“Those concept maps will be retained in their long term memory in form of images hence not easily forgotten.”* These expressions show that participants used concept maps because they believed that they support retention of what students learn and enable recall.

Other participants indicated that they ensured concept mapping because it helps students to logically follow the lesson. In turn, this facilitates learning since students easily followed and understood the grammar content being presented. For example, one of the participants PT4 said: *“Aaa... You understand if learners are able to follow what you are teaching them and once they understand, they are able to use them in different contexts. It will help them to use these grammar aspects in different contexts appropriately.”*

Similarly, another participant had this to say:

Mmm...I Aaa...I ensure that I ask questions on the topic, the topic we are going to discuss, to see their knowledge of what they learned so far, and I ask them to I give examples, to make sure that they were really know the meanings of the grammar we were talking about. Later, I give group work to make sure that they help each other. It important because it helps the learner to master the lesson. (PT9-semi-structured interview, 26/4/22, 12:57pm).

The excerpts indicate that the creation and use of concept maps has positive impacts on both the teacher and the learner. Expounding the same concepts of importance of concept mapping PT6 agreed with previous participants that concept mapping enables logical lesson presentation and visualization and that motivates students to learn. She had this to say:

It makes me to teach orderly and learners know that from this step, we are going to that step. It’s like a motivation for learners’ understanding. It helps teacher and learners to logically teach and follow the flow of the lesson. PT6, semi-structured interviews-(27/4/22, 7:30am).

Moreover, during interviews, participants revealed that using concept maps for teaching, facilitates students to retain information as well as motivates them to learn because of the visual representation of the knowledge. It motivates learning and helps the teacher to evaluate the lesson. In addition, critical thinking is stimulated in students. Participants labeled PT 10 and PT2 mentioned that concept maps are important because they help ease retention of what has been taught. In his view, PT 10 commented that: *“Using and creation of concept maps is important because it helps students to retain information. It enables logical storage of information as well as critical thinking and motivates to students.”* Similarly, PT2 said: *“Concept mapping has significant results. When well used, students easily remember and retain learning.”*

Another participant, PT 7 pointed out that: *“Concept maps help students to easily understand concepts and to visualize as well as helps the teacher to evaluate the lesson.”* The classroom observation shows that only a few participants used concept maps when teaching English grammar shown in the table below.

Table 20 shows use of concept maps in teaching

Strategy	Activity/evidence of strategy use	Remarks
Organization Strategies How does the pre-service teacher ensure concept mapping among learners?	<i>PT6: The pre-service teacher outlined the lesson success criteria before giving details of the lesson.</i>	<i>Students took notes and attentively listened to teacher.</i>
	<i>PT4: The pre-service teacher used text books with picture and asked students to look at the photo and guess what was happening from the photos.</i>	<i>Students followed instruction and paid attention.</i>

Source: Researcher’s field notes

Table 20 shows that only a few pre-service teachers used and created concept maps in their grammar lessons despite stating that using concept mapping was important during interviews. Having presented the different major and minor themes of the strategies of IPT used by pre-service teachers as revealed in the current study, some challenges were also brought into light. The next section presents findings of the challenges that pre-service teachers encountered while applying the information processing theory cognitive strategies.

4.7. Challenges faced in the application of the information processing theory strategies in teaching English grammar

This study also explored the challenges that pre-service teachers faced in application of the information processing theory strategies in teaching grammar. Despite the benefits, the study revealed some limitations of using the various information processing strategies by the pre-service teachers. Most challenges that were found centred on background of learners, teachers' competence, class size, inadequate authentic materials and time constraints. However, the study has revealed that challenges of using the IPT strategies of contextualization, rehearsal, elaboration and rehearsal are not different from those of teaching using other methods in general. First, to be presented is the challenge of learner background.

4.7.1. Learner Background

The study through interviews revealed that the background of many students acted as a barrier in employing the IPT cognitive strategies.

In response to the question *what has been your experience teaching grammar?* One participant, PT7 explained that *“My experience is kind of difficult, because students speak mother tongue because of their background.”* Making a similar point, a participant PT10 said:

Most students find difficulty to understand English language due to poor home background. Students find understanding English language difficult because they mostly use their mother tongue when they are away from school premises. Also special needs students are difficult to teach like the deaf and dumb I find it difficult to demonstrate. (PT10- semi-structured interview, 25/4/22, 9:30AM).

Another participant added that students find grammar difficult as compared to literature due to their background. This too could be due to their poor background in the way they were initially introduced to grammar in the previous grades or classes. He intimated that:

English grammar, of course is difficult. A sentence such as *“John has been admitted _____ Hospital.”* Students find it difficult to figure out which preposition is the correct one. So, I as a teachers we find it difficult to motivate learners because there are some grammar aspects such as

prepositions which students find totally difficult. So most of the students seem that they do have a negative attitude towards grammar. (PT 5-semi structured interview, 25/04/22. 12:56 PM).

Participants reported having difficulty with students who were less proficient in terms of how to elaborate or contextualize complex grammatical concepts. The next section presents the findings on challenges of large class size.

4.7.2. Large class size

Another challenge that participant faced when using IPT strategies to teach grammar, is large class size. Sometimes pre-service teachers had to teach a class of 130 students at the same time in a classroom. Participants stated that it was sometimes impossible for them effectively use authentic assessment or correct each students' grammatical errors in sentences due to large numbers in one class. In response to the question; what *challenges do you face when using IPT strategies?* A participant PT1 said:

Classes which are too huge for me to cater for each learner's needs. Even if I use all these strategies, I don't manage to correct the grammatical errors in their sentences. So the problem is not with the strategies but rather with the large numbers of students I have to deal with.

Another participant PT 6 said: *"Usually, I delay to mark students' exercises and homework because I have heaps of exercise books to mark."* Similarly, a PT9 commented that: *"The number of students in my class is large, like 130 students. Sometimes, I don't manage to check each students' work during or monitor them. But I conduct extra classes."* Another challenge presented in the next section is time allocation.

4.7.3. Time allocation

In terms of time, participants pointed out that they spend more time making lesson plans for how to use real life examples in contextualization and elaboration as well as how to use these strategies in a big class.

One participant said;

Learners have difficulties because they will rely on teacher experiences hence more elaboration needed and hence time consuming. They require more examples and more explanations. They find difficulties even after you contextualize. This is because most of them are afraid of being laughed at by fellow students. (PT10, semistructured interview, 25/4/22, 9:38AM).

Another participant PT2 had this to say:

Rehearsal is time consuming. Aaa On Elaboration, I have faced a lot challenges, Aaa like explaining the content, I've already said I explain from simple but they don't understand the simple word or simple explanation, they will need the translation into vernacular which is Chichewa. We are not supposed to translate but sometimes I have no option but to translate, otherwise I give group work assignments. (PT2, semi-structured interview, 5/5/22, 14:17).

A participant, PT5 further confirmed that time factor is a challenge when it comes to rehearsal strategies especially repetition. He stated: *“Rehearsal is time consuming. These information processing strategies needs a lot of time and teaching resources if you have to use them effectively.”*

Commenting on the same problem of time, some participants added that wide content of grammar and the short length of the school term caused difficulties for pre-service teachers if they have to cover the full syllabus.

In trying to make other expressions more elaborate, another participant had this to say:

English grammar seems to be simple but has wide content, so with the short term, repeating is time consuming. In terms of contextualization, use of practical examples is difficult in some lessons. Other students come from different backgrounds hence it is difficult to understand each student. (PT4, semi-structured interviews, 4/5/22, 10:01AM).

The last challenge that the study unveiled was inadequate materials.

4.7.4 Inadequate authentic materials

Most participants pointed out that they faced problems with materials like text books that are contextualized while teaching grammar in the classroom. In response to the question; *what challenges do you face when attempting to use the information processing strategies mentioned earlier in the teaching of English grammar?* A participant labeled PT 5 had this to say:

The teacher needs to be creative though the contextualized materials are not enough. I try to be creative by using teaching and learning using locally available resources abbreviated as TALULAR. As a solution, I usually arrange make up or extra classes. (PT5, semi-structured interviews- 27/04/22, 12:55PM).

Another participant PT 7 added that: *“There is no main content and materials for teachers, hence it difficult to teach especially if we are new teachers. In addition, students find problems because of their background.”* The classroom observations also corroborated with the interview findings as the table below shows.

Table 21 shows challenges faced when using IPT strategies

Challenges	Evidence of the challenge	Remarks
Learner background	<i>PT10: Pre-service teacher could not precisely connect previous lesson to new lesson because learners are passive</i>	<i>The teacher translates some terms for students to grasp the content.</i>
Large class size	<i>PT8: Pre-service teacher repeats instruction by using group work activities to ensure all learners in the huge class participation.</i>	<i>This is resolved through giving them group work. Students actively participate in groups and correct one another's mistakes.</i>
Time constraints	<i>PT6: Overlooks correcting some mistakes of learners in the lesson ‘She is a woman who stored my book’. This is due to large class size against the time.</i>	<i>Some students do not easily grasp the idea because the teacher rushed through the content due to limited time.</i>
Insufficient materials	<i>PT7: Pre-service teacher failed to contextualized activities due to use inadequate materials compared to the class size.</i>	<i>Resolves this by giving homework and asking questions.</i>

Source: *Researcher's field notes*

Table 21 shows the challenges which pre-service teachers faced when using information processing theory strategies of contextualization, rehearsal, elaboration and contextualization. Document analysis corroborated with interview and classroom observation findings because the documents contain several aspects of IPT strategies as shown in the below beginning information processing strategies identified in the Malawi senior secondary school English syllabus.

Table 22 shows the information processing theory strategies identified in senior secondary school English Syllabus

Core element: Structure and use of language (grammar)

Outcome: The students will be able to understand how sound, words and rules of language can be used to create, analyze and interpret texts.

Assessment Standard	Success Criteria	Theme/topic	Suggested teaching and learning activities	Suggested teaching, learning and assessment methods	Suggested teaching, learning and assessment resources
We will know this when the students are able to: • show awareness and correct use of language in oral and written texts	Students must be able to: • Use nouns correctly in oral and written texts • Form nouns	Nouns	• Using nouns as subject • Making own sentences using nouns • Forming plural nouns	• Pair work • Group work • Individual work • Question and Answer • Peer assessment • Discussion	• Lists of plural and singular nouns • Lists of nouns which show gender • Lists of sentences
• show an awareness and correct use of language in oral and written texts • develop and use own vocabulary	1 Use pronouns correctly in oral and written texts Write a list of pronouns	Pronouns	• Constructing sentences using pronouns • Writing texts using pronouns • Listing personal demonstrative,	• Pair work • Group work • Individual work • Question and answer • Brainstorming • Peer observation •	• Written texts • Oral texts • Tables and list of pronouns • Texts from other subjects • Passages • Incomplete sentences

Source: Malawi Institute of Education (2013). *Malawi Senior Secondary School English Syllabus*

Table 22 shows how the syllabus is structured. From the syllabus, the strategies used for teaching, learning and assessment are mostly learner-centred which enable the learners to use context, organize the learning in hierarchical order as well as construct their own learning. These strategies include construction of own sentences, use of other texts to teach grammar, activation of prior knowledge as well as use of authentic materials. All these strategies have been confirmed to enhance learning since learners are able to connect new learning with prior knowledge, construct their own understanding hence enabling retention.

The above results are also complemented by analysis of the schemes and records of work as shown in the table below:

Table 23 shows strategies for teaching, learning and assessment from the senior secondary English text book, scheme and records of work and lesson plans.

Document type	Author(s)	Teaching/Leaning Activities	Topic	Teaching/Learning & Assessment Resources
Textbook Excel and Succeed	Kadyoma F. (2017) Excel and Succeed Senior Secondary English Students Book 3, Nairobi, Longman	<ul style="list-style-type: none"> • Pair work • Group work • Individual work • Question and Answer • Peer assessment • Concept mapping • Discussion 	Nouns Pronouns Verbs Adverbs	<ul style="list-style-type: none"> • Class exercises • Lists of sentences • Home work • Peer Assessment
Schemes and Records of work	Pre-Service Teachers (April-May, 2022)	<ul style="list-style-type: none"> • Debate • Pair work • Group work • Question & answer 	Verbs Adverbs	<ul style="list-style-type: none"> • Newspapers • Short stories • Science & Agriculture articles • English text books

Lesson Plans	Pre-Service Teachers (April-May, 2022)	<ul style="list-style-type: none"> • Question and Answer • Discussion • Pair work • Group work 	Verbs Adverbs	<ul style="list-style-type: none"> • Internet videos • Short stories • English text books
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Source: *Researchers' field notes*

Table 24 shows that the English text book, schemes and records of work and lesson plans by pre-service teachers all incorporate the information processing strategies.

4.8. Information Processing Theory Model for teaching English grammar

Lastly, the study aimed at developing a model for teaching English grammar using the information processing theory strategies of contextualization, rehearsal, elaboration and organization. To achieve this, participants were asked to respond to the question; *'If you were asked to advise someone who intends to use IPT for teaching English grammar, what advice would you give him or her?'*

Responses varied from participants to another. A participant PT1 said: *"All strategies are supposed to be used because they will help achieving the success criteria. If you go to class without planning to use them, you will have difficulties delivering the lesson."* In agreement, participant PT2 commented that: *"Teachers should use all strategies because of the individual differences hence you have to integrate. Integrate the strategies to avoid boredom and monotony."* In addition, another participant agreed with the others, and had this to say:

As a teacher, you know your learners, then you should be able to contextualize, to elaborate and to organize your lessons well for the need of each learner to be catered for. If you know your students, it is easy to contextualize your content. You know the best way to connect new to previous lesson. So use all the strategies." (PT10, semi-structured interviews, 25/4/22/ 9:45AM).

The above response gives an impression that all information strategies should be used in teaching grammar. To confirm this further, participant PT6 said: *"I think they all work hand in hand, because*

you cannot because you cannot do well in organization, without elaboration.” Another participant emphasized that:

Ok, they should use all the strategies because they are important in their own way. But they should mostly encourage *Aaa ...elaboration Aaa...* because it is a way of making sure that they add differentiate content, and to have different ways of understanding. So elaboration makes them to differentiate what is being taught. (PT9-structured interviews, 26/4/22, 12:57pm)

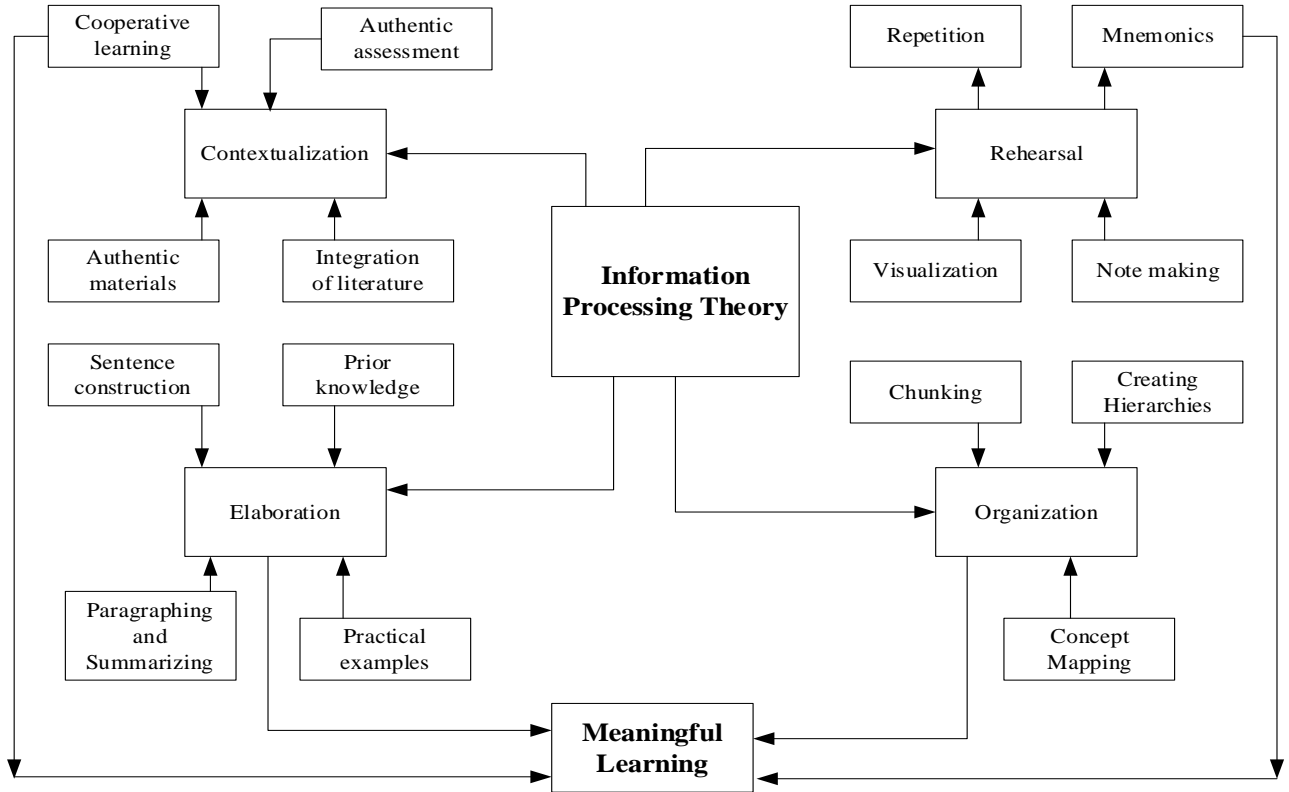
However, other participants had different views of the best strategies. Participant PT4 said: *“Preparation is key, while, preparing, understand student’s background. They should focus more on contextualization because it helps students to apply the content to different contexts.”* He meant that preparation to use these strategies should be done seriously but with caution. However, the participant was of the view that contextualization was the best way because it allows learners to apply what they learn in class to various situations. Participant label PT5 agreed with this and said *“I would ask them to use contextualization because learners learn well with familiar information.”*

Another point of view by participant is that organization should be emphasized in teaching grammar. Participant PT8 said; *“It is best to use organization because the students will easily follow the flow of the lesson.”* In agreement participant PT7 commented that; *“I would rather advise them to use organization because when content is well organized, it is easy to rehearse, contextualize and elaboration.*

The excerpts give the impression that firstly, before selecting any strategy, the teacher must understand the students, including their background and individual differences. Taking this into consideration, most participants agree that all the IPT should be used to teach grammar. It is believed that once teachers effectively use the model, the teaching and learning of English grammar in secondary schools will be meaningful. Below is a graphical presentation of the information processing theory model for the teaching of English grammar which I development from the findings from interviews, observation and document analysis. This model has not been adopted from any source.

Image 1: Information Processing Theory model for teaching English grammar

Information Processing Theory Model



Source: Field notes

The model demonstrates that information processing theory strategies can be integrated in the teaching, learning and assessment processes. For example, contextualization strategies such as group work can be integrated with organization strategies such as concept mapping or chunking to visualize the lesson and facilitate meaningful learning. Similarly, these strategies can be integrated with rehearsal such as visualization or repetition can be integrated with and elaboration strategies such as activation of prior knowledge or organization strategies such as hierarchical creation. Through integration of the various IPT strategies, teachers can create an all-inclusive and deep approach to application of information processing theory to the classroom.

CHAPTER FIVE: DISCUSSION OF FINDINGS

5.1 Chapter overview

This chapter discusses the findings that were presented in chapter previous chapter application of information processing theory to the teaching of English grammar to facilitate meaningful learning in secondary school students during teaching practice. The discussions are guided by themes and sub-themes which were generated from the research objectives as follows: To explore how pre-service teachers applied contextualization strategies in teaching English grammar to forms 3 or 1 students during their teaching practice, to explore how pre-service teachers applied rehearsal strategies in teaching English grammar to forms 3 or 1 students during their teaching practice and to determine how pre-service teachers used information processing theory strategies of elaboration in teaching English grammar to forms 3 or 1 students during their teaching practice.

The fourth objective was to describe how pre-service teachers used information processing theory strategies of organization in teaching English grammar to forms 3 or 1 students during their teaching practice. Objective number five was to identify the challenges that pre-service teachers faced in the application of the information processing theory strategies of contextualization, rehearsal, elaboration and organization when teaching English grammar to forms 3 or 1 students during their teaching practice, and finally to develop a model based on information processing theory for teaching English grammar to secondary school students.

5.2 Application of Contextualization strategies to teaching English grammar

Demir and Erdogan (2018) posits that grammar teaching can be difficult and boring for the learners who cannot apply the rules of grammar they learns to daily life. Therefore, to make grammar teaching and learning meaningful and interesting, it should not be considered as an independent and abstract lesson, rather, it should be integrated with other learning fields. In other words, grammar should not be taught in isolation but should be taught through integration. This in turn facilitates meaningful learning in students.

To explore how pre-service teachers applied contextualization strategies to the teaching of English aaagrammar, classroom observation, semi-structured interviews and document analysis were conducted. The findings show that pre-service teachers applied a number of contextualization

strategies including; *integration of literature to teach grammar; cooperative learning; authentic assessment* and *use of authentic assessment*. First to be discussed is how pre-service teachers applied integration of literature to teach grammar.

5.2.1 Integration of literature to teach grammar

Onchera and Kulo (2014, p.2) indicate that “Integration means merging two autonomous but related entities in order to strengthen and enrich both”. “For example, in secondary schools, teachers of English language can use poetry, short stories, novels and plays to enrich the teaching of grammar”. Demir and Erdogan (2018) posit that grammar teaching can be difficult and boring for the learners who cannot apply the rules of grammar they learn to daily life. Therefore, to make grammar teaching and learning interesting, it should not be considered as an independent and abstract lesson, rather, it should be integrated with other learning fields. In other words, grammar should not be taught in isolation but should be taught through integration.

Interview results show that participants integrated the teaching of English grammar using literature texts including stories, poems and newspaper extracts among others. They also alleged that they asked students to read passages from literature books in order to identify grammar aspects such as parts of speech, punctuation, signaling devices and more. These findings collaborate with numerous previous research. For instance, Onchera and Kulo (2014) recommend that English language teachers should target at affirming that learners acquire sufficient competency in grammar. This, can be realized through teaching language in context. Therefore, the use of literature texts and stories in the teaching of grammar in secondary schools would provide the learners with an unpretentious learning context.

Pre-service teachers responded that they used literature texts because they brought entertainment and motivated students to pay attention to the lesson. In line with these findings, Weber (2018) reiterates that literature texts can lead to motivation of students in language learning. Using authentic texts links the learner to their ‘real-world’ context of the learners thereby facilitating meaningful learning. More evidence of use of literary genres in teaching grammar was found as participants confirmed that they used stories and poems because grammar should not be taught in isolation. It should be integrated. Weber further contends that literature texts that teachers should

use to avoid teaching grammar in isolation can include newspaper articles, factual texts, or interviews. Literature has the potential of emotionally touching its readers, causing them to reflect on what they have read. In turn, readers can easily be animated to respond. Scholar (2022) also found that when literary texts are used to teach grammar, students are brought close to their everyday experiences. This in turn makes learning meaningful as they link the new information to what they already know.

Biswas and Anis (2017) added that grammar rules can be taught and contextualized through short stories if grammar is to be taught in an interesting way where students are actively involved in their own learning. In addition, some scholars argue that grammar should not be taught in isolation emphasizing on rules as this would hinder meaningfulness of grammar these findings are in line with what (Onchera & Kulo, 2014). Furthermore, Abdullah and Gadallah (2017) argue that literature is considered as the pillar of any language learning because it brings the learning of the language skills including grammar into context by replicating the traditions, customs, religions and beliefs of diverse student groups in the classroom. Scholars also agree that integration of literature in grammar, language teaching inspires students to read and to be familiar with its daily use thus motivating them and developing critical thinking abilities (Alawad, 2016; Ashrafuzzaman et al., 2021; Mestari & Malabar, 2016; Rao, 2019; Sentürk & Kahraman, 2020). Use of literary texts such as short stories according to findings by Sentürk and Kahraman (2020) increases students' knowledge of grammar.

Even though most pre-service teachers appreciated the importance of contextualization of teaching grammar through integration of literature during interviews, the study established during classroom observations that, most of the of them did not use literature in the teaching of English grammar because they did not know how to integrate the literature in classroom teaching (Weber, 2018). Thus results from classroom observation show that some participants did not integrate literature due to lack of knowledge. The next section discusses findings of use of cooperative learning by pre-service teachers.

5.2.2 Cooperative Learning

The findings of this study revealed that pre-service teachers applied various cooperative learning activities to teach English grammar. As previous studies indicated, cooperative learning is a contextualization strategy in which teachers place students in small groups and pairs to complete tasks or to help each other (Gillies, 2016; Tran, et al., 2019). According to interview findings, pre-service teachers used activities such as group work, pairwork as well as role plays and debate to teach grammar. The findings correspond to classroom observation as most pre-service teachers used group work while others used pair work. Analysis of the syllabus, textbooks, and lesson plans further revealed that participants planned for and used cooperative learning activities. These findings are in line with previous results by other researchers such as Chrisyarani, and Setiawan (2021). In their study, Chrisyarani, and Setiawan concluded that through collaborative activities such as group work and pair work, students can help one another to work on their given assignments and to learn new grammar content.

Alrayah (2018) also found that that students can collaborate through group discussions of the lesson with their peers making learning effective and enjoyable. In cooperative learning strategy, students are allowed to work in small groups or pairs in order to complete a given shared task under the guidance of a teacher. Findings also showed that when pre-service teachers used group activities, students helped each other to learn the difficult grammar concepts. Erbil (2020) maintains that through cooperative learning activities, students are engaged into active learning which enables them to carry out meaningful learning activities and think about what they are doing in an active learning process.

From the findings, it is clear that to facilitate meaningful learning of grammar in students, pre-service teachers should use cooperative learning activities such as group work, pair work, role-play and debate depending on their context in terms of class size. Students express themselves freely through such activities without fear of being ridiculed. Besides, through cooperative learning, students share experiences and link them to the new lesson. This further enables learning to be meaningful. Similar findings were reported by Aguilar and Aguilar (2017) who concluded that there is need for employing group work in classes in order to allow students to work together and help one another through experiences.

When using cooperative learning strategies, each student creates various ideas which facilitate individual learning (Li, 2015). Through group work or pair work, individual students learn through others. Renandya and Jacobs (2017) in their study revealed that participants in groups aim at benefiting individually as well as for other group members. Several studies also agree that cooperative learning activities facilitate students' learning since there are mutual benefit for everyone hence students are motivated to freely contribute to their own and others' learning (Duxbury & Ling, 2016; Renandya, & Jacobs, 2017; Suarez Flórez, et al., 2017). Students also practice the use of language and grammar and correct each other's errors.

While some pre-service teachers thought group work was ideal for large classes, others felt that it was difficult to monitor. This is similar to using pair work in the face of huge classes. Evidence from classroom observations confirms the statements from interviews. Therefore, even though pre-service teachers agreed that group work and pair work motivated students, the activities are used depending on the teacher's context in terms of the class size. Abedi, et al. (2019) argue that cooperative learning activities encourage teamwork and provide a means of stimulating learners' intrinsic motivation. Furthermore, other researchers have indicated that contextualization is constructed on the knowledge that some students learn more effectively when they are taught in a practical, real-world contexts as opposed to abstract manner (Kalchik & Oertle, 2010).

However, during classroom observation, pre-service teachers used group work more often than pair work. This gives the impression that cooperative learning activities such group work, pair work, and whole class discussion were used. Literature also indicates that using contextualized activities such as group work and pair work is to be effective for socially and linguistically varied students because it increases students' motivation by including their interests and strengths into the lesson (Wyattis, 2016). Through group work, pair work and class discussion, students actively participate in the lesson which enables them to connect the new content with their previous knowledge leading to meaningful learning (Chiyembekezo et al., 2019; Margana 2021). More scholars further collaborate with the results by indicating the cooperative learning through group work helps students to work as a team and support each other because the learning becomes enjoyable (Chrisyarani, & Setiawan, 2021; Cloud, 2014; Hu & Gao, 2018). Another contextualization strategy discussed below authentic assessment.

5.2.3 Authentic assessment

The study also showed that some participants used authentic assessment activities to assess English grammar while others predominantly used traditional assessment methods. According to Bordoh, et al. (2015), assessment is central to teaching and learning since it is a process to gather information about students' learning process and serves as support for teachers to improve teaching their strategies as well as to provide guidance.

Through interviews, findings showed that only a few participants used authentic assessment activities. As indicated by some participants, they used projects, composition writing, oral presentations, debate and continuous assessment which were authentic assessment methods. However, a majority of assessment activities were exercises, multiple choice and classroom tests. This is an indication that authentic assessment was rarely used by pre-service teacher when teaching English grammar. Previous scholars also found that only a few teachers use authentic assessment though they tried to include authentic assessment in some instances (Chiziwa 2020; Huang & Jiang, 2021; Rukmini & Saputri, 2017). Mueller (2016) contends that when designing contextualized approach to learning, the assessment activities should be designed appropriately based on authentic assessment instead of remembering. Griffith and Lim (2012) state that teachers have a task to find suitable ways to assess whether a student can use information learned to different real-world contexts effectively.

Additionally, the findings agree with results by Ulker and Yildiz (2021) who examined the frequency of use of authentic assessment by teachers and the study findings showed that most teachers were still using traditional assessment methods even if they recognized the importance authentic assessment. In addition, these results correspond with results by Norova (2020) who concluded that traditional types of assessment such as quizzes and pencil-and paper tests may not motivate students to learn. For meaningful learning to occur in students, there should a sense of genuine value in the assessment and should be helpful for linking to their previous learning. According to Novak (2020), assessment should require students to produce something, perform and create things using their real-contexts. Therefore, the assessment is authentic and meaningful because it reproduces what the learner has learned.

In addition, teachers need to assess students during learning in order to evaluate their understanding of content, knowledge and skills (Singh, 2017). Such kinds of assessment facilitate learning of grammar content because teachers are able to pinpoint their students' weaknesses and strengths. These results also differ from finding by Rukmini and Saputri (2017) who concluded that English teachers implemented the authentic assessment to measure students' English productive grammar skills even if they encountered challenges. The expectation therefore is that teachers should give assessments that will provide feedback of students' learning in meaningful ways.

Interview findings correspond to classroom observations are only a few pre-service teachers used authentic assessment. The observation findings showed that pre-service teachers mostly used class exercises and tests to assess understanding after teaching a grammar component. Similar findings are reported by Huang and Jiang (2021) in a study which revealed that though participants acknowledged the significance of authentic assessment, only a few had tried to use authentic activities. Ulker and Yildiz (2021) also found that most teachers were still using traditional assessment methods even if they recognized the importance authentic assessment.

Authentic assessment has the potential to facilitate meaningful learning in students since students are required to solve problems in relation to their real life experiences (Huan and Jiang, 2021; Koh, 2014). On the contrary, documents such as the syllabus and textbooks showed that authentic assessment activities such as projects compositions and continuous assessment were planned. Thus it can be concluded that despite the use of traditional assessment methods, pre-service teachers also incorporated authentic assessment during the English grammar lessons, a majority found using traditional tests, multiple choice and exercises easy to employ.

5.2.4 Authentic Materials

Findings showed that participants used authentic materials to teach grammar. Authentic materials are teaching and learning resources which not created specifically for the classroom though they are effective teaching and learning resources. Authentic materials are defined as materials that that expose students to real life language exposure and use in context (Kilickaya2004, in Mestari & Malabar, 2016). Findings show that participants used authentic materials to, teach grammar. The teaching of grammar has long been regarded as a contextualized process because it requires

authentic activities which are based on real-life situations in order to make learning meaningful for students (Vygotsky, 1978, cited in Erbil, 2020). These materials included text books, audios, chats and other visual aids such as magazines.

Findings also showed that participants used materials which they downloaded from internet in the grammar classroom. According to Benavent (2011), internet is one of the most useful sources of authentic materials. In his study, Yang (2020) in his study also concluded that teachers prefer to use authentic teaching materials in their grammar classes and that most of the teachers point out that they used a variety of teaching and learning resources such as English textbooks, chats, audio, video, and newspapers, most of which are downloaded from the internet. In a research conducted on Saudi teachers teaching ESP regarding their perception about use of contextualized text in the classroom for teaching ESP, the findings show that contextualized books can facilitate the learning of grammar (Us Saqlain et al., 2020). On the other hand, Yang (2020, p. 3) argues that “most textbooks pay attention to imparting English grammar structures. However, the ongoing use of textbooks leads to less motivation among students learning a second language and is often unsuccessful.

The use of authentic materials must be encouraged in teaching grammar (Weber 2018). Much as the use of textbooks and chats ensures contextualized learning, it may not be motivating to learners. Overall, teachers need to know and understand the advantages of using authentic materials that help them create authentic and contextualized grammar learning opportunities. Nădrag and Buzarna-Tihenea (2017), contend that presently, it is important to expose students to authentic learning situations. These situations are connected to students’ real-world where they use authentic materials to express themselves. According to Nădrag, and Buzarna-Tihenea, authentic materials and media enable students to develop connection between the classroom language and the outside world.

Classroom observations also revealed that participants mostly used materials such textbooks and chats, as well as other locally available resources around the classroom such as water bottles, chalkboard duster, students’ possessions and more. These are some types of authentic materials. This is in line with what previous studies concluded that sources of authentic materials that can be used in the classroom are numerous. Common ones include newspapers, songs and literature,

magazines, internet, textbooks, charts, cards, bottles, magazines, leaflets, menus and timetables (Rao, 2019; Sentürk & Kahraman, 2020; Yang 2020). Authentic materials are important for teachers in the classroom because they enable them to teach students meaningfully. Use of authentic materials contextualizes the teaching and learning. Such materials can be used to teach grammatical structures and for building dialogues between and among students.

Accordingly, it can be concluded that pre-service teachers used authentic materials to facilitate meaningful learning of grammar in students. Some materials such as textbooks have bright photos and colors that could attract students' attention and interest. Thailand and McCoy (2016) argue that authentic materials provide opportunities for students to learn language in environments that are contextualized which helps to learn to construct meaningful sentences. To sum up, findings revealed that pre-service teachers contextualized the teaching of grammar through strategies such as integration of literature, cooperative learning, use of authentic assessment and materials. Furthermore, findings by Moghaddasc (2013), revealed that these contextualization teaching strategies support meaningful learning of knowledge of English language including grammar. Therefore, these contextualization strategies should be employed to teach grammar by pre-service teachers to facilitate meaningful learning in students.

5.3 Application of Rehearsal in teaching English grammar

Rehearsal is another information processing theory cognitive strategy. Rehearsal involves activities that encourage repeating the content to be learned over and over through reading, writing or saying aloud (Liebendörfer et al. 2022). There are numerous rehearsal strategies that may be used to teach in the classroom that the study revealed. These included *visualization, note taking, probing questions, repetition and Mnemonics*. Visualization is discussed first.

5.3.1 Visualization

Findings showed that participants applied visualization in a variety of ways. Through interviews responses to the question that required them to explain how they visualized grammar lessons, some participants' said they visualized through using visual materials such as charts, photos and videos as well as by giving examples that are familiar. These activities in turn created mental images in students' minds.

These findings correspond to previous studies which concluded that visualization of content is effective in facilitating learning of different subject areas including grammar. For instance, Nurullayevna (2021), in a study that examined the methods and techniques of explicit grammar instruction concluded that visual aids such as charts, maps and drawings help students to understand the material better because they are convenient. In addition, results from a study on how visualization principles can be used in teaching by Fadiran, Biljon and Schoeman (2018) demonstrated that visualization is beneficial in facilitating learning since it simplifies retention of information.

In addition, findings showed that pre-service teachers visualized grammar lessons because it supports memory retention in learners. Several studies agree that visualization supports knowledge transfer in teaching and learning (Fadiran, Biljon & Schoeman, 2018; Renaud, & Van Biljon, 2017; Van Biljon & Renaud, 2015). Moreover, learners are enabled to construct their own knowledge rather than merely recipients of knowledge. In addition, findings show that visualization was effective for teaching and learning because visual information did not easily get erased in memory. These findings correspond with studies by Dineva (2019) and Li et al., (2023) who concluded that visualization facilitates meaningful learning since difficult topic become simplifying, and easy to be grasp, because the visual materials enable students to link new content to their experiences and not easily forgotten. Hovorun et al. (2021) in their study concluded that visualizing the lesson increases the students' level of English grammar mastery.

In addition to argumenting memory, the findings show that visualizing lessons draws students' attention which is an important factor for learning to occur. Visualizing lessons through videos, pictures and charts attracts students' attention and facilitates memorization of content which can lead to retention. These findings are confirmed by previous findings on the importance of visualization that it helps learners to pay attention and make sense of the content (Dineva, 2019; Djumanova, 2021; Shatri, & Buza, 2017). Nurullayevna, (2021) also established that visuals enable students to pay attention and concentrate on important information.

Classroom observation results also revealed that pre-service teachers used a variety of visualization techniques including charts, advance organizers, demonstration, photos and illustrations. These findings complement the results from the interviews showing that charts, photos and images were used to visualize the teaching of grammar and how they enabled meaningful learning. Similarly, a study by Sultanovich et al. (2020) which concluded that visualization of learning when teaching grammar has been proven to be an ideal technique in which lesson ideas, are connected through images and epitomized graphically. Sultanovich et al, also add that some of the ways of visual teaching and learning include use of charts and graphs to augment thinking and learning.

Furthermore, results from document analysis also showed that the text books, and schemes of work planned for lesson visualization through the resources for teaching, learning and assessment. A study by Shatri and Buza (2017) additionally showed that visualization of lesson has positive effects on students when used in teaching. Using visuals enables students to develop critical thinking. The study also revealed that visualization of lesson in general enables students to be motivated to learn and to be more cooperative. In view of this, pre-service teachers need to utilize a variety of teaching methods and resources like visual aids to teach grammar to help students to retain the content in meaningful ways. In the next section, another rehearsal strategy, use of probing questions is discussed.

5.3.2 Probing questions

Teachers usually ask display questions also called probing questions to provoke students' thinking as well as to inspire students to elaborate on their concepts (Lemke, 1990, in Wash 2013). Fadilah and Zaini (2020) agreed that the questions that teachers ask can be categorized as display questions and referential questions in addition to Lower Order Thinking (LOT) questions and the High Order Thinking Skills (HOT) questions.

From the interview findings, most pre-service used higher order probing questions in order to provoke students' deeper thinking, improve reasoning abilities and improve grammar use. In essence, it shows that the participants used the questions that would provoke students to attach meaning to what they learn. These findings are supported by results of a study by Astrid, et al. (2019), who revealed that teachers' questions could attract students' attention and facilitate

development of critical higher order thinking skills. This further facilitates meaningful learning in students. When teachers use probing questions, students are encouraged to speak out their minds and teachers assess the grammar through hearing the way students express themselves. This further encourages verbal interaction between the teacher and students as well as among students in the classroom hence facilitating learning of grammar (Al-Zahrani, & Al-Bargi, 2017).

Findings of this study also revealed that questioning strategies used by teachers facilitate students' engagement in deeper cognitive information processing and consequently facilitates their learning since they help to relate and provoke prior experiences and knowledge. This is corroborated by previous studies which concluded that higher order questions facilitate meaningful learning. For instance, Fadilah and Zaini (2020), in their study on the most asked questions by teachers concluded that the questions helped students to relate with everyday life surroundings and help students to improve their grammar skills beside critical thinking skills.

Findings from classroom observation however showed that participants used a combination of lower order and higher order questions to assess what they taught. Clearly, higher order questions worked best for teachers because they aided effective assessment of learning since students had to use the grammar in responding to questions. The types of questions teachers ask stimulate and activate students' reasoning skills, in the process, facilitating meaningful learning (Aminov, et al., 2021). Thus pre-service teacher should appreciate the importance of the types of questions they ask to assess understanding of what they teach in order to enhance the students learning.

Similarly, documentary analysis of text books and lesson plans showed that participants used questions which were both higher order and lower order. Scholars agree that probing questions and teacher questioning is an essential element of classroom collaboration (MacFarlane, 2015; Wahyudin, 2017; Sukmadewi, 2014). Other studies also argue that in order to facilitate meaningful learning, students have to actively link new information to their experiences through questions (Mystakidis, 2021; Rannikmäe, Holbrook, & Soobard, 2020). This can be made possible if teachers ask questions that can encourage critical thinking and active participation. Furthermore, a study by Fadilah and Zaini (2020) on types of questions used most by teachers revealed that they used questions that encouraged students to speak and develop critical thinking skills. Questions are

important for both teachers and students because they facilitate higher levels of thinking and learning leading to meaningful learning (Almeida, 2020; Al-Zahrani, & Al-Bargi, 2017; Astrid, Amrina, Devitasari, Fitriani, and Shahab 2019; Yang, 2017). Thus pre-service teacher should appreciate the importance of the types of questions they ask to assess understanding of what they teach in order to enhance the students learning since they serve multiple purposes.

5.3.3. Repetition

Repetition is another rehearsal strategy which findings of this study revealed. Atkinson and Shiffrin (1968) in Martinez and Rourke (2020), contend that newly formed memories are strengthened with each repetition. Responses to the questions on the importance of repetition from participants during interviews showed that repeating instruction enabled students to retain the information and created opportunities for those who did not understand the first time to understand. Teachers should thus intentionally repeat the grammar content several times to facilitate meaningful learning since repeated information is easily connected to similar previous knowledge in LTM.

The interview findings showed that through repetition, students' memory is supported and it helps to facilitate understanding. Previous studies agree with these findings. For instance Firman, et al. (2020) in their study concluded that content has to be repeated as often as possible in order to facilitate meaningful learning. They add that repeating instruction provides students enough space to connect new information to prior knowledge making learning more meaningful and easy to retrieve. In addition, the results of this study revealed that repeating is important because it helps teachers to clarify the content of the lesson and enabled students to remember lesson content. The interview also showed that repetition is a way of revising the lesson to strengthen students understanding. Kumayas (2022) in his study which examined the value of using repetition concluded that use of repetition was an effective method for teaching English grammar.

Other studies revealed that repetition of content as a storage strategy facilitates meaningful learning because it helps students to retrieve previous knowledge which significant for linking to new content because it also functions as a retrieval strategy (Ahour, & Berenji, 2015; Lillicrap, & Santoro, 2019). Alyami, et al. (2019), in their study also revealed that content that are often

repeated become stronger and are easily linked to previous knowledge. This shows that if not frequently repeated, information becomes weaker hence difficult for students to retrieve.

Findings from classroom observation and document analysis similarly showed that pre-service teachers repeated instruction during lessons to facilitate meaningful learning and retention of grammar content. The observations also showed that once the grammar content was repeated, students were able to take notes and respond to questions. Scholars have additionally revealed that students who use rehearsal techniques perform better on memory tasks than students who did not and they agree that retention of grammar content can be attained by repetition of vocabulary words that have already been taught (Idris, et al. 2022; Sousa 2017). In the next section, findings on note taking, another rehearsal strategy are discussed.

5.3.4 Note-taking

The findings of this study also showed that pre-service teachers encouraged students to take notes during the lesson. During interviews, they responded to the question that required them to state the importance of encouraging students to take notes. Most of them said that it is important for students to take notes during the lesson because they are used as reference and that they improve their writing skills. This further helps students to retain information. In addition, interview findings showed that notes were used for revision which helps students to ask teachers for clarification where they did not understand.

These findings are supported by previous scholars who concluded that students rely on their notes to revise, and learn new content. Ekinci and Ekinci (2022), argue that in note-taking, students capture the most significant information and avoid the trouble of trying to remember everything. Morehead, Dunlosky et al. (2019) also postulate that students depend on their notes to learn content and memorize what they learn hence it is critical for student learning. Note-taking, is critical for student learning, and notes are an important stimuli for student learning since it facilitates meaningful learning through linking new and preexisting information as other scholars confirm (Alzu'bi, 2019; Ekinci, & Ekinci, 2022; Morehead, et al. 2019).

Ekinci, and Ekinci, (2022) for instance also assert that one advantage of note-taking is that students can help students to capture key ideas of the lesson as well as use the notes for revision. Other scholars agree that when students take notes, encoding is facilitated, there is efficiency in studying and the end result is meaningful learning since students are typically engaged in the lesson (Friedman, 2014; Witherby & Tauber, 2019). Therefore, note-taking leads to meaningful learning because students easily retain and retrieve the information learned in addition to making the content categorical for future reference.

The findings from interviews thus give the impression that encouraging learners to take notes is advantageous because it aids memory since notes are used for revision and serves as reference thereby supporting meaningful learning. In addition, it serves as a way to activate and connect previously learned information to new information which is fundamental for meaningful learning. Salame, and Thompson, (2020) further postulate that note-taking improves students learning as it plays a major role in formal learning contexts. Encouraging note taking enables meaningful learning of grammar in students. Khosravi, and Taheri, (2018) in their study on impact of note-taking and summarizing, on grammatical accuracy concluded note taking helps students to have accuracy grammar.

Classroom observation however, showed that only a few participants encouraged learners to take notes even if they affirmed that note-taking facilitated meaningful learning despite others not minding whether students were taking notes or not. The notes were used as reference when completing exercises. It was easy for them to remember what they learned. In their research, Salame, and Thompson, (2020) concluded that note-taking expands students' memory of the content learned, increases their understanding of the material and helps them to prepare for examinations. Thus pre-service teachers need to deliberately encourage learners to take notes during grammar lessons in order for them to retain the content and in turn facilitate meaningful learning. Note-taking in documents such as schemes and records of work were not shown though syllabus and textbooks and some plans for note taking. This shows that despite the strategy being reflected in the syllabus, pre-service teachers do not deliberately plan for use of note-taking in their lesson. The next section discusses findings on the use of mnemonics by participants.

5.3.5 Use of mnemonics

According to Putnam, (2015), mnemonics are memory approaches that help the student to eloquently combine and chunk information thereby enhancing encoding and facilitating retrieval. They are strategies, verbal or visual in nature, that are used to help students to improve their storage of new content, and retrieve the information from the long term memory. During interviews, pre-service teachers were asked to explain their experience in using mnemonic strategies. Findings showed that most pre-service teachers had no knowledge of what the term mnemonics actually meant until it was clarified to them.

Results showed that only a few participants attempted to use mnemonics during grammar lessons. They mainly used first letter types of mnemonics especially when teaching the order of adjectives. It was found that using mnemonics is considered an effective method for teaching English grammar because it helps students to easily remember some grammar topics such as order of adjectives. In a similar study, Cheriti, Bousdira, & Bounar, (2023) found that incorporating mnemonic strategies makes teaching of topics on phrasal verbs easier and effective. It also motivates students to learn.

In addition, findings showed that using mnemonics when teaching grammar helped students to follow grammar rules and retain the content. Khatoon, (2022) in his study found that using keyword mnemonics influenced vocabulary learning among students. Mnemonic techniques aim at making students learn meaningfully, remember and retain the information long-term memory. The mnemonics also help teachers to present information logically relating is to what students already known is easily retained learned meaningfully. Through the use of mnemonic strategies, pre-service teachers can connect new grammar content to previously learned information which students have already stored in their long-term (Parima, Siros, & Ali, 2018).

The findings further reveal that the pre-service teachers who use mnemonics and those who had never used them agree that using mnemonics facilitates meaningful learning and retention of content students. In line with these findings, many researchers consider mnemonics as being able to improve memory and retention through other natural memory processes such as elaboration, visual imagery and organization. Once memory is augmented and retained, the information is used

to link to new learning thereby influencing meaningful learning (Radionova, Sharaeva, & Mukhtarova, 2021).

Classroom observations and document analysis of schemes and records of work plus the lesson plans showed that none of the pre-service teachers used mnemonics or planned to use them during the grammar lessons. This confirms the interview assertions that participants were ignorant of what mnemonics were and their use in the classroom. All in all, pre-service teachers applied IPT rehearsal strategies of various kinds. Most of them had knowledge of the strategies and the findings showed that once rehearsal is appropriately used, they facilitate meaningful learning of English grammar among secondary school students. The next IPT strategy to be discussed is elaboration.

5.4 Application of Elaboration in teaching English grammar

Another information processing theory strategy that the findings of this study revealed was elaboration. According to Santacruz, and Ortega (2018), examples of elaboration include paraphrasing or summarizing content and material to be taught and learned, creating analogies, generative note-taking, explaining the ideas in the material to be learned to someone else, and asking question answering questions as well as activation of prior knowledge. Among these strategies, results of this study showed that pre-service teachers used strategies such as activation of prior knowledge, construction of sentences with words, use of practical examples, paraphrasing and summarizing as well as question and answer. The first strategy to be discussed is construction of sentences with words.

5.4.1 Construction of sentences with words

The findings of this study showed that pre-service teachers encouraged students to construct their own sentences with words from the content. According to Baronia, (2020), sentences are the building blocks of coherent and efficient writing, and a critical ability that characterizes skilled writing is the creation of syntactically accurate and complex sentences. The responses to the question of how they encouraged construction of meaningful sentences from interviews showed that they encouraged construction of meaningful grammar sentences through providing examples before giving an exercise. However, the common exercise was to ask students to construct their

own sentences from the grammar aspect that they had taught. In this way, students used their experiences to construct sentences enabling meaningful learning.

During classroom observations, participants gave exercises to learners where they asked them to construct their own sentences from a grammar component that had just been presented which the teacher graded and corrected errors. The document analysis findings complement the interview and classroom observations which found teachers encouraged students to construct their own meaningful sentences in order to facilitate meaningful learning of grammar. Analysis of textbooks and schemes of work revealed that the participants encouraged construction of sentences through exercises and correction of errors. A number of studies correspond with these findings emphasizing that teachers should encourage students to construct their own sentences in order to facilitate meaningful learning and increase their confidence in the use of basic grammar rules (Akramov, & Hasanov, 2022; Samieva, 2020; Tuyboeva, 2022). When students are encouraged to construct sentences, they learn grammar in more familiar context where they can practice using grammar rules.

Furthermore, Afifah (2022), found that that students' capability to construct grammatically correct sentences is also reflected in their writing ability. This means that through constructing their own sentences, students demonstrate their understanding of use of grammar. Syafiqah et al. (2019) also concluded that teaching and learning of grammar using games helps to allow students to construct sentences and this is beneficial to students. Similarly, a study by Mwanza and Manchishi (2022) concluded that participants used exercises of different kinds including asking students to construct their own sentences in teaching of English grammar. Weber, (2018) stipulates that grammar should be taught for constructing texts in the context in which they are used and the focus on should be on meaningful tasks, in other words, with everyday language.

Lastly, Mourii (2020) argues that if teaching and learning of grammar has to be meaningful, students should be able to construct meaningful sentences and understand how to apply the grammar rules. Thus encouraging students to construct their own sentences enables teachers to observe students' weaknesses in some grammar areas such as subject-verb agreement, and other areas. Moreover, when students are engaged in a task concerning prior knowledge, it becomes

easier for them to learn new content. The findings demonstrated that sentence construction by students is a common activity that English language teachers engage in since it supports grammar learning as students use their everyday experiences with grammar thereby facilitating meaningful learning.

5.4.2. Prior knowledge activation

Prior knowledge is the knowledge which the learner previously stored in long term memory before new learning is provided (Hattan, & Alexander, 2020). It is the information that is brought by a student to a new learning context. In other words, it is the knowledge a student has about a specific topic based on their past experiences or learning. For meaningful learning to arise, students have to integrate new information into previous knowledge. Responding to the question that asked how they introduced new grammar lessons, participant's stated that they did so by activating previous lesson through questions. They also reviewed previous lesson and linked it to the new topic. This enabled students to connect the new lesson to prior knowledge.

Findings from interviews, classroom observations and document analysis showed that pre-service teachers used various activities to activate prior knowledge when introducing new grammar content. As the findings showed, they asked questions about previous lessons, repeated main points of previous lessons and asked students to summarize what they learned in the last class before introducing the new topic. These results agree with a number of past research findings. For example, a study by Simonsmeier, et al. (2022) revealed that activating prior knowledge facilitates the learning of new content. Simonsmeier et al, as shown also asserts that prior knowledge can only influence learning when activated and not when just stored in long term memory. The study results also showed that prior knowledge is an important component of teaching and learning, hence it is imperative for pre-service teachers to be aware of what students already know. In addition, through activating prior knowledge, teachers can deal with problems that student face in remembering what they learned previously (Adhesion, 2017). In addition, Witherby, and Carpenter, (2021) concluded that teachers should activate students' prior knowledge because it enables them to link new content to previous information providing a context that facilitates meaningful learning of new information.

Additionally, findings showed that pre-service teachers also linked the new content to what students already know because doing so enabled students to find the new topic meaningful and easy to understand. This study showed how participants made connections between prior knowledge and new content. They did not just activate prior knowledge but ensured that students found similarities between prior knowledge and new information through question and answer techniques. There should be a clear link between new content and the prior knowledge in order for learning to be meaningful. Hattan, et al., (2015) in their study concluded a variety of strategies can be used to activate prior knowledge and linking it to new information. They include asking questions to activate students' prior knowledge. Lismayanti, (2014) indicates that activating prior knowledge can facilitate meaningful learning since students find it easy to understand once they make a connection with what they already know.

Prior knowledge has also been found to arouse interest and motivations in the topic and subject matter and also expedites memory for new information since it offers a base on which the new information can be assimilated encoded, and retrieval from memory (Shing, & Brod, 2016). Scholars argue that meaningful learning in students is facilitated when there are similarities between new content and previous information (Ausubel 1968; Simons et al. 2022; Shing & Brod, 2016). Activating and linking prior knowledge to new content enables students find similarities thereby making the new lesson much easier to understand (Novak, Bailey, Blinsky, Soffe, Patterson, Ockey, & Jensen, 2022). There should be a clear link between new content and the prior knowledge in order for learning to be meaningful. Question and answer is the next elaboration strategy discussed below.

5.4.3 Asking and answering questions

Question and answer technique is one of the most commonly used methods of teaching and learning by both teachers and students. Asking and responding to questions is one way in which teachers assess their students' understanding of the lesson. Participants responded to the question that needed them to explain why they thought asking and responding to questions was important during the lesson. Findings of the study showed that questions help teachers to assess the lesson and help students to get clarification of the content where they did not understand besides activating prior knowledge.

In addition, the findings of this study revealed that asking and responding to students' questions is a way of allowing students to engage in critical thinking about the topic thereby enabling meaningful connections and rehearsing. Thus questioning is one strategy of rehearsal which facilitates retention. These findings correspond with a study by Biyikli, and Dogan, (2015) who concluded that questions facilitate creation of a productive communication development between teachers and students and eventually, this facilitates the learning of grammar. When teachers allow students to ask questions, they are actively involved in the learning process as they will be supported to clearly understand what they initially did not and this will in turn help them meaningfully learn and retain the information.

Question and answer technique was also used by pre-service teachers in order to enable students to effectively make connections between new and previous lesson content. The findings of the study showed that through questions, students easily connect the new lesson to their prior knowledge either from previous lessons or from their experiences outside the classroom. Participants responded to the question that asked how they supported students to remember what they learned during interviews. Activities that involved students such as question and answer where asked to construct sentences orally were also witnessed during classroom observation. It was observed that learners were active since they were allowed to ask questions and to respond to questions from participants from the pre-service teachers.

This is in line with findings by Fitriati, Isfara, and Trisanti, (2017) in their research focused on examining questioning techniques used by English language teachers. Teachers' questions are important for making students actively engaged in the learning process leading to lesson comprehension because questions clarify the lesson content for students since teachers assess learning. In agreement with the above findings from the interview and classroom observations, Condrill and Bennie (2004), in Wahyudin, (2017) argued that asking and answering questions signifies that the listener, in this case the student understands your key ideas, hence, it accomplishes accuracy in the learning and retention of content. Questions also allow students to have the chance to contribute to their learning when they are simultaneously asked to respond to questions. In

addition, questioning have the potential to help students in cultivating their learning of grammar alongside critical thinking skills besides attracting active participation in their own learning ((Fadilah, & Zainil, 2020). Fadilah and Zainil found that questions helped students to relate with their everyday experiences.

Furthermore, Astrid, et al. (2019) in Fadilah, and Zainil, (2020) found that teachers ask questions in order to assess students understanding, draw their attention, as well as to develop higher order thinking skills. Questions from teachers may serve various functions such as wielding discipline, getting feedback and as well as encouraging students to participate. It can thus be concluded that question and answer strategy has an important role in teaching and learning since they facilitate meaningful learning in students and engage them in active participation which helps them construct their own meaning of the content. Thus question and answer technique facilitates the learning of grammar because when answering questions, students are forced to use language and teachers assess grammar in the spoken words.

Moreover, findings from classroom observation showed that most pre-service teachers ask questions, and responded to questions from students on the grammar component taught. Asking and answering questions allowed the students to pay attention and actively participate in the lesson. This in turn facilitates learning since students were able construct their own learning which enables encoding and retrieval (Li, & Lan, 2022). Questioning is a meaningful activity in teaching and learning because it allows students to use their prior knowledge and link it to the new content when responding to questions (Goldstein, 2014). However, a few participants did not allow questions from students and the lessons were passive.

Documents analysis complement classroom observation and interview findings since the documents show activities where students are required to answer questions. This facilitate meaningful learning of grammar content. The next section discusses findings of how pre-service teachers used paraphrasing and summarizing strategies.

5.4.4 Paraphrasing and summarizing

Paraphrasing is a brief outline of the ultimate important ideas from the passage and it is a useful device for effective communication. Summarizing enables an individual to understand and isolate the main ideas of the text. Findings showed that summarizing reminded students what had been learnt and also strengthened retention of information. Paraphrasing enabled the pre-service teachers simplify the lesson for students. Pre-service teachers pointed out that summarizing the lesson is important because it permitted students to take note of the important points from the lesson. Biyikli and Doganand (2015), in agreement found that summarizing supports students in explaining the meaning of information and in storage of the information in long-term memory.

The interviews findings indicated that paraphrasing and summarizing the grammar lesson are important strategies because they enable students to clearly understand what had been taught though students found it difficult to master the skill. On the other hand, paraphrasing simplified the lesson while summarizing repeated the lesson content helping students to make connection of new content to what they already know. Additionally, paraphrasing and summarizing facilitate meaningful learning and retention of information to long term memory since the lesson is simplified and repeated. These findings are similar to results of a study by Davis-Duerr (2016) who concluded that when the lesson is summarized, students are able to understand and explain the meaning of information. This further encourages storage of the information in the long-term memory.

Results of study by Popayan (2021), showed that summarizing the lesson supports students to swiftly find out the most important main points of the lesson thus, creating a strong understanding of the complex material. Similarly, Mouri (2020) concluded that summarizing is important because it helps students to apply the rules of grammar correctly when they are required to use them in constructing sentences. Therefore, teachers should have the knowledge of how to apply these strategies during the lesson to enable students to easily grasp the most significant ideas of the grammar being taught.

The classroom observation similarly revealed that paraphrasing and summarizing are common strategies among pre-service teacher during English grammar lesson. This is the case because they had become familiar with the learning needs of the students and realized there was need to simplify

the lessons through these strategies. They simplified the lesson through paraphrasing and isolated key points of lesson through summarizing. Nambiar (2007), cited in Mouri (2020), argued that summarizing the grammar lesson assists students to grasp the main ideas of the lesson and to separate important elements from the minor ones. It was however difficult to identify aspects of paraphrasing and summerzing through documents analysis. Use of practical examples is the last elaboration strategy presented.

5.4.5 Use of practical examples

Findings of the study showed that pre-service teachers used practical examples during the grammar lessons. An example an actual situation of a broader class, from which one reasons and generalizes. In response to the question of they type of examples they used, pre-sevice teachers stated that they used practical examples which where within reach of students. Results from interviews showed that other pre-service teachers said they used actual items when introducing grammar lessons. According to Nurullayevna, (2021), an example should be examined in context and should carry characteristics that anticipated to be illustrated. Wilson, (2018) mentioned that learning is a process which is constructive where students alter words and practical examples are real-world or applied examples that can be concretely visualized by students. Thus examples in the teaching and learning process serve as scaffolds upon which new learning should founded.

During classroom observation, particiapnts were seen using examples that were practical within the context of the students. It is generally accepted that teaching is particularly efficient whenever students can establish connections and relate with what is being taught. Linking the subject to students' own experiences enables them to learn abstract topics in meaningful ways (Bikowski, 2018). The use of practical examples by pre-service teachers is seen as an attempt to contextualize the teaching and learning grammar through the environment in which learning takes place. The environment should be conducive if learners are to retain information being taught (Munsaka, 2020). Such strategies facilitate meaningful learning because apart from connecting new topics to prior knowledge, learners are also less anxious of difficult topics. It is apparent that students can learn English skills including grammar through practical examples of real-life situations.

Furthermore, use of practical examples facilitate students' ability to practically apply what they learn. It was also observed that the participants gave examples which mostly were created from within the classroom setting or from learners' settings outside the classroom such as their homes. This strategy made students pay to attention and used similar examples thereby improving their grammatical use. Mvududu and Kanyongo (2011) argued that using real-world examples is fundamental to teaching and learning of abstract, concepts. According to Santrock (2018), examples are a noble approach to elaborate information. If teachers need their students to learn concepts meaningfully, they should relate the information to their practical experiences through practical teacher generated or personal examples. Analysis of documents such as schemes and records of work and lesson plans showed no evidence of planned lessons where pre-service teachers were going to use practical example. This is contrary to findings from interviews and observations. This could mean that practical examples can be used depending on the classroom context and demonstrate the teachers' creativity.

In summary, elaboration strategies facilitate meaningful learning since they influence prior knowledge to be activated and linked to new information. According to the information processing theory, humans' do not merely respond to environmental stimuli, but they process it, link it to already existing information and create their own understanding. This corresponds to Ausubel's (1968) explanation of meaningful learning that new information should be linked to prior knowledge in order for it to be meaningful. Therefore, pre-service teachers should utilize these elaboration strategies in teaching English grammar to secondary school students to facilitate meaningful learning. Tay, (2013), maintains that each action taken within elaboration strategies aims to link new and unfamiliar materials with students existing knowledge which leads to meaningful learning and construction of new knowledge. Having discussed elaboration strategies above, the next section focusses on the last information processing theory strategy of organization which is also a cognitive strategy.

5.5 Application of Organization strategies to teach English grammar

The study findings revealed that pre-service teachers used organization strategies to teaching English grammar. Shamrock (2018) contends that organization is a component of information processing that facilitates learning and that material that is organized, is easily linked to previous

knowledge. Additionally, Keskin (2019) concluded that memory is enhanced when material that is taught and learnt is organized as it associates new information to preexisting knowledge. According to Woolfolk (2016), information that is well-organized within a structure is easier to store. The study results showed that that pre-service teachers used organization strategies of hierarchy creation, chunking, and concept mapping to teach English grammar. The discussion begins with hierarchy creation.

5.5.1 Hierarchy creation

Hierarchical teaching can help teachers to teach in a sequential manner from lower level ascending to a higher level of thinking. By using Bloom's taxonomy of educational objectives, teaching and learning is described as hierarchical (Sağkol, 2022). The study results revealed that pre-service teachers presented their lessons in a logical manner through numerous ways to enable students organize their memory in similar way. One way was to ask students to give a summary of the lesson in the same order as it was presented. Once students are able to follow the order of the lesson enables them to organize the content in memory. This facilitates meaningful learning of new content since students will easily make connections between new information and prior knowledge. The findings also revealed that pre-service teachers began their lesson through asking students to brainstorm and predict the content of the lesson from the title in the process, teaching from known to unknown.

The interview results showed that participants presented their lessons in an orderly sequence through a variety of techniques. They first presented simple content moving to more complex content. This entails that they follow the hierarchical method according to Bloom's taxonomy (Chen, et al., 2021). Bloom's taxonomy thus classifies learning objectives or success criteria to progress from lower order and simpler content to more complex information. The findings showed that pre-service teachers presented their lessons from simple to complex in order for students to make connections between new information and previous knowledge and thus facilitating meaningful learning. It shows that they were logical and there was hierarchical teaching. Once lessons are presented in a logical order, the information becomes easier to recall and serves as prior knowledge which is key for facilitating meaningful learning. The findings correspond with study results by Chen et al. (2021) which concluded that teachers should create hierarchical relationships

among the grammar components including words and phrases as well as parts of speech. The hierarchical and logical strategies which participants used enabled students to organize the information which influences retention. Santrock (2018) stated that information can be easily learned and remembered through hierarchical organization and presentation.

These findings complement the classroom observation findings which showed that most participants presented their lessons by creating a hierarchy and logically beginning with known to unknown information. Similarly, Adger (2013), cited in Chen, et al. (2021), concluded that the hierarchical relationships among different grammar components, determine how they are combined, ordered and presented and thereafter how they will be remembered. A study by Zohar et al. (2021), also revealed that learning is simplified when complex material is presented in an orderly and logical manner through breaking it down into smaller parts. This helps students to process information in the same order and easily link new content to their real-life experiences. Thus, once teachers present information in a hierarchical order, learning becomes meaningful for students. Moreover, the document analysis showed that the presentation topics were in sequence in such a way that simpler content was at the beginning moving towards topics that needed more complex reasoning. This encouraged students to organize information in memory which often enables them to remember it more (Santrock 2018). The next section discusses another organization strategy which is chunking.

5.5.2 Chunking

Findings revealed that pre-service teachers used chunking to teach grammar. Chunking is an important organization memory strategy that includes grouping, or clumping information into categories that enables learning of bulky information as single meaningful component (Lu & Wang, 2022; Zhang, 2019). Through chunking, the content is organized into smaller meaningful units making it more manageable. It is often expected to help recall of information in the working memory.

Results from interviews showed that pre-service teachers used chunking to teaching English grammar because it was helped students not to get confused with mix-up bulky content. The findings revealed that one advantage of chunking similar information is that it enabled students to

avoid being confused with too much content and helps to retain information. This falls in line with results of an experiment by Thalmann, et al. (2019), which showed that chunking benefits recall of the grouped information as well as the information not chunked simultaneously in working memory and in the process, it reduces the cognitive load. Once information is chunked, confusion of information is reduced since the load is well managed. Thalmann, et al. further contends that a load on STM is reduced through retrieval of compressed representations of these chunks from LTM hence the assumption that chunks occur in long-term memory. Chunking also helps information in STM to be consistently linked to LTM thereby facilitating meaningful learning (Norris, & Kalm, 2021).

Findings further revealed that chunking information helps the teacher to achieve the success criteria or objectives. This can be accomplished since the chunked information is easy to follow and manage due to the focus on only the grouped content. Nia and Ekaningsih (2020), in their study found that chunking in the classroom activities is beneficial to students because it helps them to get hold of verbal information enabling a free STM capacity hence reducing cognitive load. When information is grouped and presented orderly, retention of learning is facilitated. Miller (1956) in Suppawittaya and Yasri, (2021) points out that the teacher can categorize information in meaningful components to facilitate meaningful learning.

In addition, through classroom observation, findings showed that pre-service teachers categorized the grammar components according to the types. This helped students to link new content to their everyday experiences. Therefore, this gives the impression that chunking of information facilitates meaningful learning because it supports easy storage of information in LTM (Niu, & Osborne, 2019). This enabled students to organize the content and use it to construct sentences. It shows that students understood the lesson because the content was presented according to categories or chunks.

Furthermore, document analysis of the English syllabus and text books revealed that the information was chunked in such a way that similar topics are grouped together and divided in smaller units. In addition, the content in the documents was classified according to their types and presented in an orderly sequence. This was seen to make understanding easy as the content was

well arranged and broken into smaller parts. The last organization strategy discussed below is concept mapping.

5.5.3 Concept Mapping

Concept mapping is another organization strategy that the findings of this study revealed. The findings from interviews showed that pre-service teachers used concept mapping because it helped students to logically and orderly follow the lesson. In turn, this facilitates learning since students understood the grammar content being presented. The findings also showed that use of concept mapping helps create mental images of the lesson. This enables visualization which has numerous benefits. These findings are confirmed by Normawati (2020) who concluded that effective learning occurs when there is active involvement of students in understanding the content through using concept maps. Moreover, concept maps act as an outline to construct, understand, and represent relationships between concepts through the use of words.

In addition, use of concept maps was found to be for both teachers and students. Results revealed that a concept map may enable logical presentation of the lesson by the teacher. For the students, it may lead to systematic and coherent storage as well as visualization of the grammar component. This facilitates meaningful learning since retention and retrieval are likely to be easy for the learner. These findings are in line with previous results by scholars. Oluikpe, (n.d) in a study on effectiveness of concept mapping in teaching English grammar concluded that using concept maps influences grammar retention which is significant for contributing to meaningful learning. Similarly, other studies agree that concept maps stimulate growth of critical thinking skills, develop meaningful learning, and can be used as a tool for assessing progress of learning in students (Barta, et al. 2022; Chu, Wang, & Wang, 2019; Tseng, 2015; Wang, & Seepho, 2017).

In addition, findings revealed that using concept maps for teaching, motivates students to learn because of the visual representation of the information. Therefore, concept mapping enables meaningful learning because it helps to clarify the material to be learned and to be presented with simple language and examples related to the prior knowledge of the student (Novak, & Cañas, 2008). The concept maps also help students to better visualize the lesson which makes it easy to

recall (Betancur, & King, 2014). This also helps students to gain comprehension because simpler concepts are isolated and clearly connected to complex ideas of the lesson in a coherent manner.

Even though results from interviews showed the importance of concept mapping, the findings of the classroom observation revealed that very few participants used concept maps to teach English grammar. This gives the impression that participants have no experience in using concept maps. Documents analysis similarly revealed that there was very little use of concept maps. However, research in general agrees that concept mapping has enormous benefits to teaching and learning. These benefits include, meaningful learning of concepts, motivation, critical thinking, increased teacher-student interaction, efficiency in note-taking, encouraging collaborative learning as well as aiding memorization and recall (Durst, & Zieba, 2019; Polat, Aydın, 2020). Therefore, the teaching-learning process must be well-structured through well-constructed concept maps in order to expedite meaningful learning and improve retention of information in LTM. This can be achieved by relating new concepts to previously learned familiar concepts (Vallori, 2014).

In summary, the information processing theory strategies in the previous sections have been found to have many benefits to teaching and learning because they facilitate meaningful learning of English grammar. As Stewart (2021) stated, there are several significant teaching and learning outcomes when a teacher understands how information is encoded, stored and retrieved and linked to new learning. When new information is connected to prior knowledge, meaningful learning of the new item is enabled and retention is made faster and easier. Thus applying information processing strategies of contextualization, rehearsal, elaboration and organization cognitive strategies influences meaningful learning through finding connections and linking it to new information (Young, Merrienboer, Durning, & Ten Cate, 2014). The next section discusses findings of the challenges that pre-service teachers faced when using IPT strategies.

5.6 Challenges faced in the application of the information processing theory strategies in teaching English grammar

Findings of this study found that pre-service teachers experienced some challenges when using information processing theory strategies of contextualization, rehearsal, elaboration and

organization to teach English grammar. The challenges included; learner background, large class size, time constraints and inadequate authentic materials. These are discussed below.

5.6.1 Learner background

Learner background was one of the challenges that the findings of this study unveiled. From the interviews, the study findings showed that pre-service teachers faced challenges such as the use of mother tongue by students which made it problematic for them to comprehend English expressions. This was so since the home interactions with parents, peers and the community were usually in their mother tongue. This shows that the students' mother tongue or home language constrains them from learning English grammar meaningfully since they are deeply rooted in it. The interview findings revealed that students found it difficult to understand English language due to their poor background. This was in terms of proficiency in English which was clearly due to the language they used at home. This is in line with findings of a study by Dhillon and Wanjiru (2013) who concluded that students had difficulties articulating themselves in English due to the influence of their mother tongue. In addition, Duong and Nguyen (2021), in a study on challenges of using learner-centred strategies concluded that mother tongue interference and students' weak English proficiency, were some of the challenges that teachers faced.

A study by Devi et al. (2015) also revealed that use of cooperative learning activities was challenging because of poor English proficiency of students. Several scholars also found that students' different aptitudes or proficiency levels act as a hindrance to using strategies such as contextualization and organization (Molsing, Perna, & Ramos, 2015; Serafini, & Sanz, 2016; Zakarneh, Al-Ramahi, & Mahmoud, 2020). Classroom observation findings also revealed that in addition to background of students, pre-service teachers had to deal with diverse students' individual differences including those with learning difficulties, age, experience, as well as socioeconomic status. Thus the problem of having heterogeneity in secondary school has been found to be one of limitation that use of IPT strategies to teach English grammar among secondary school students.

5.6.2 Large class size

According to the study findings from interview, sometimes, pre-service teachers had to teach large a classes of about more that 100 students at the same time. This caused difficulties in effectively using authentic assessment activities or correcting students' errors in grammar. Due to large classes, participants found it challenging to carter the needs of each student. Duong and Nguyen, (2021), argue that classes with large numbers of students are typically challenging to engage in active learning activities such as group work. In addition, pre-service teachers stated that large classes are sometimes difficult to manage even in terms of discipline during lessons of key grammar aspect. Hence strategies such as rehearsal are ideal for small class sizes because the teachers manages to drill grammar skills than large classes (Yang, 2006, in Duong, & Nguyen, 2021). The size of the classes affected pre-service teachers' use of somw IPT strategies such as rehearsal and contextualization of the grammar component and they had challenges in helping students to learn meaningfully.

Moreover, interview as well as classroom observation findings showed that large class affected choice of IPT strategies to be used in a class due to limited space for the teacher and students to accomplish the planned activities. If classes were smaller, each learner would be given a chance to present his or her own ideas after the group or pair work. This is technically impossible in large classes. Similarly, Almu hailib and Al-Ahdal (2021), in their study revealed that overcrowding was the main challenge that pre-service teachers experienced in implementing the IPT strategies. Almu hailib and Al-Ahdal (2021), concluded that large classes caused disruptions during lessons which made it difficult for pre-service teachers to monitor the activities and to evaluate learning.

Furthermore, Wright et al. (2019), argue that when classes are small and manageable, they are frequently used as a measure for meaningful and effective learning at any level of education. Teachers including those in pre-service handling smaller classes easily use learner-centred strategies such as visualization, concept mapping other context based strategies that involve mental activity. Furthermore, the study revealed that large classes also limit pre-service teachers from giving efficient feedback to students after authentic assessment activities. They had huge marking loads hence they delayed giving feedback to students. This shows that large classes might also be the basis of other challenges such as limited student feedback on tasks, minimum attention from

teacher to student, and inadequate materials and limited time for responding to students questions and asking questions (Kulkarni, Bernstein, & Klemmer, 2015; Septiani, Emiliasari, & Rofi'i, 2019). Thus classroom observations equally confirmed the challenges that large classes brought along. An average class had more than 60 students and pre-service teachers could not focus on each student.

5.6.3 Time allocation

Time constraints was pointed out as another challenge which students faced in using IPT strategies. Findings from interviews showed that pre-service teachers faced problem to rehearse and contextualize information due to limited time allocation for teaching on the time table. Pre-service teachers responded that they had difficulties because students relied on teacher experience to elaboration and contextualize the lesson which was time consuming. In addition, the results showed that they were more concerned with completing the syllabus within limited time hence some strategies such as rehearsal and contextualization demand more (Duong, & Nguyen, 2021). A study by Kanko (2022) also reported that teachers needed more time to get accustomed to use strategies such as mnemonics, concept mapping and authentic assessment which are some of rehearsal, contextualization and organization strategies in the teaching-learning process.

Findings of classroom observations were similar to interview findings. Rehearsal strategies were rarely used by most pre-service teachers during grammar lessons. In order for information to be remembered, it should be rehearsed severally and related to prior knowledge. Through classroom observations, results showed that since the grammar content is wide and teachers are in a hurry to complete the syllabus, they neglect the used of strategies such as repetition and some of the contextualization strategies. Additionally, they had little time to help students to improve their grammar. These findings confirm previous findings by several scholars who assert that teachers rush to cover the entire syllabus hence using some strategies such as rehearsal, contextualization and organization through chunking are problematic (Nyimbili, 2016; Shafqat, & Hassan, 2020; Van Le, 2014).

Other scholars also agree that contextualization requires sufficient time for preparation, and experience to understand the issue stated (Suganob, & Oliva, 2021). A study by Alnoori, (2019) revealed that teachers indeed take little time to help learners improve their grammar through

rehearsal and elaboration strategies. This study found time restrictions as a challenge for participants to effectively employ IPT strategies to teach English grammar. Information processing theory strategies of rehearsal and elaboration according to some participants are time consuming when it comes to applying them to teaching grammar effectively yet time tables have limited.

Due to inadequate time, they quickly rushed through the lesson with little or no paraphrasing or rehearsal. Authentic assessment was also not well coordinated. These challenges were resolved through arranging makeup classes over the weekend. Use of authentic assessment also needs ample time for teachers to prepare activities, mark and give feedback. Rukmini and Saputri (2017), explored challenges of application of authentic assessment by teachers to measure creative skills concluded that English teachers faced problems using authentic assessment due to limited time. Similar results are reported by Fitriani (2017) that teachers' had problems with huge marking loads which needed adequate time to mark.

5.6.4 Inadequate authentic materials

Adding to the above challenges, results of this study revealed that pre-service teachers faced the problem of inadequate authentic materials. Information processing strategies need creativity hence authentic materials were not enough. Additionally, findings showed that teaching grammar was challenging because because the teaching materials were not enough or not available in schools especially for pre-service teachers. Findings from classroom observations showed that pre-service teachers had challenges due to materials such as textbooks which were not enough and not all students had access to chats and other materials. This was resolved through using some real object around the classroom as well as students contexts. Use of realia or real objects around the classroom, pre-service teachers were able to contextualize, rehearse as well as organize their teaching.

These findings corroborate with by Chiphiko and Shawa (2014) who explored how teachers implemented learner-centred methods. The study findings showed that teachers experienced challenges such as insufficient teaching and learning materials, large class sizes and poor learning facilities. Kaçar and Zengin (2013) in another study concluded that pre-service teachers encountered challenges such as lack of competence in using authentic materials and assessment,

contextualization and how to integrate the teaching of grammar. From the classroom observation, it was evident that the challenges are not necessarily directly caused by the IPT strategies, but rather by other factors such as learner background, time and class size. This indicates that information processing strategies can only be efficiently applied by pre-service teachers in contexts where these challenges, are mitigated or minimized through integrating different strategies in one lesson as observed. Previous studies have also concluded that the students background, class size, inadequate teaching materials as well as time constraint, pose the biggest challenge of applying IPT strategies in teaching grammar (Jannah, 2019; Le, 2019; Pfothenauer, 2019; Wyattis, 2016).

The documents analysis findings reveal that the authors have knowledge of the IPT strategies and are included in the different curriculum documents. This is so because the strategies are learner-centred and enable meaningful learning since students construct their own learning through connecting their previous experiences and the new content. It is thus up to teachers to prepare adequately to apply them and actually use them in teaching-learning process in order to facilitate learning. Several past and recent studies agree that meaningful learning is facilitated when students connect prior knowledge to new content and construct their own meaning (Jonassen, & Strobel, 2006; Silalahi, & Hutauruk, 2020). The next section discuss findings on the model of the information processing theory for teaching English grammar.

5.7 Information processing theory model for teaching English grammar

A teaching model is plan or an outline designed to be used in teaching with the aim of shaping the curriculum content, selecting appropriate material for teaching and generally guiding the teacher's activities in the classroom (Morrison, 2019; Reigeluth, 2013). According to Joyce and Calhoun (2024), teaching models are instructional designs which outline the process of stipulating and creating particular learning situations suitable for influencing learning in students. It is simply a theory of teaching and learning. A model in teaching is an instructional design because it outlines teaching activities. Zeng Fu et al. (2019), argue that in research, a model is a graphic demonstration of key concepts. With the help of arrows, it shows, the relationship between various types of variables and themes. A model is able to generate reasonable and visually genuine results with consistent and clear structures. Using models of teaching can help teachers facilitate meaningful learning in students. From the study findings which demonstrated that pre-service teachers

integrated the IPT strategies when teaching English grammar to facilitate meaningful learning, a model was developed.

The purpose of developing a model was to enable teachers to have the opportunity to integrate the IPT strategies when teaching English grammar to secondary school students since each of the strategies of IPT could facilitate meaningful learning as they enable retention, activation of prior knowledge and link new content to the prior knowledge. Interview findings showed that not one strategy could effectively influence meaningful learning on its own. Rather, integration of strategies was used because each contributed to learning. Each of the strategies has some advantage which contributes to learning. The classroom observations complemented this as pre-service teachers' integrated the strategies through a variety of activities. The findings also showed that all strategies were important in their own way and one could not contextualize without rehearsing and one could not rehearse without elaboration. The idea behind the use of IPT strategies is that in the process of contextualizing, rehearsing and elaboration the lesson, organization is unavoidable. Joyce and Calhoun (2024) contend that a model provides guidance to the teacher on selecting suitable teaching and learning activities and methods depending on the subject and level of students.

In line with the findings, a model for teaching and learning English grammar was proposed to facilitate meaningful learning in secondary school students. The model could be used by both pre-service and in-service teachers and based on the information processing theory strategies that facilitate meaningful learning (Baeten, & Simons, 2014). The new IPT grammar teaching model comprises four phases, each containing key teaching activities that facilitate the teaching and learning of English grammar which focus on cognitive strategies of contextualization, rehearsal, elaboration and organization. It is believed that all these strategies facilitate meaningful learning because each of them brings out different strengths (Canaran, & Mirici 2020). The information processing theory model for the teaching of English grammar was developed from the findings from interviews, observation and document analysis.

CHAPTER SIX: CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

6.1. Chapter overview

The study sought to explore the application of information processing theory in teaching English grammar to facilitate meaningful learning in secondary school students by pre-service teachers. Particular, the study aimed at exploring how the pre-service teachers applied the information processing theory cognitive strategies of contextualization, rehearsal, elaboration and organization when teaching English grammar to facilitate meaningful learning in secondary school students during their teaching practice. Besides, the study was guided by the following specific objectives: Firstly, to explore how pre-service teachers of the applied contextualization strategies in teaching English grammar to forms 3 or 1 students during teaching practice, secondly, explore how pre-service teachers applied rehearsal strategies in teaching English language to forms 3 or 1 students during teaching practice.

The third objective was to determine how pre-service teachers used information processing theory strategies of elaboration in teaching English grammar to forms 3 or 1 students, fourth, to determine whether pre-service teachers use information processing theory strategies of organization in teaching English grammar to forms 3 or 1 students during teaching practice. The fifth objective was to identify the challenges that pre-service teachers faced in the application of the information processing theory strategies of rehearsal elaboration and organization in teaching English grammar to forms 3 or 1 and lastly, the study aimed at developing a model, based on information processing theory for teaching English grammar to secondary school learners. This chapter presents conclusions, implications and recommendations.

6.2. Conclusions

The main and specific objectives of the this study aimed at investigating how pre-service teachers applied information processing theory strategies in teaching English grammar to secondary school learners during their teaching practice. These strategies included contextualization, rehearsal, elaboration and organization. The conclusions are presented beginning with contextualization.

6.2.1. Contextualization strategies used by pre-service teachers

The study aimed at exploring how pre-service teachers used contextualization strategies to teach English grammar to facilitate meaningful learning. The study findings revealed four contextualization strategies that pre-service teachers commonly used when teaching grammar. These included integration of literature, cooperative learning, authentic materials and authentic assessment. Firstly, the study findings show that when literature is used to teach grammar, learners easily relate the content to their everyday life thereby facilitating meaningful learning. The results further showed once literature is integrated, students easily understand grammar rules and how they are used.

Secondly, results revealed that pre-service teachers used cooperative learning activities in teaching grammar. Among others, group work, pair-work, role play, debate whole class discussion and brainstorming were the commonly used cooperative learning activities. These were found to facilitate meaningful learning since learners found it easy to work in groups where they help each other through varied experiences. The study results also showed that pre-service teachers used authentic materials to teach English grammar. These materials included English text books and charts, videos and internet materials. Such materials facilitate meaningful learning and retention of information since they enable students to relate the new content to their real-life experiences. The last contextualization strategy that the results revealed was use of authentic assessment to assess the grammar content. Results showed that only a few pre-service teachers used authentic assessment methods such as projects, presentations and continuous assessment. Rather, the findings show that traditional methods were the most used. These included weekly tests, class exercises, multiple choice and quizzes. Authentic assessment activities such as projects, essays and presentations which a few participants used facilitate meaningful learning since students used their experiences to learn new content.

6.2.2. Rehearsal strategies used by pre-service teachers

The study also sought to find out how pre-service teachers use rehearsal strategies to teach English grammar to secondary school students to facilitate meaningful learning. The study revealed five rehearsal strategies which pre-service teachers commonly used when teaching grammar. These included visualization, repetition, mnemonics, note taking and probing questions. The study results

showed that pre-service teachers ensured that their students visualized lessons through several activities including using materials such as videos, pictures, drawings on charts and textbooks as well as through giving examples for which were familiar to students. In addition, the study revealed that visualizing lessons is effective and desirable for teaching because it simplified difficult content by linking it previous knowledge. In the process, learners easily retain lessons because visual memory has long lasting effects than audio memory.

The rehearsal strategy which pre-service teachers commonly used was probing questions to assess grammar learning. These are types of questions which enables students to express themselves in the process improving critical thinking skills. The study thus concludes that pre-service teachers used higher order probing questions in order to provoke students deeper thinking, improve reasoning abilities and meaningful learning of grammar since they attach meaning to what they learn. In addition, the study findings showed that pre-service teachers used repetition when teaching grammar. Repetition was found to be important because it aids memory. When the lesson is repeated, students are able to isolate important points of the lesson. This helps them to remember and use the previous for linking new information for meaningful learning.

Furthermore, the study findings revealed that pre-service teachers encouraged note taking when teaching grammar. Note-taking has been found to enable learning because students' use the notes for revision for easy retention. The last rehearsal strategy which pre-service teachers least used was mnemonics. The findings showed that a few pre-service teachers used mnemonic devices to teach English grammar. It was revealed that the use of mnemonics when teaching grammar helps learners to follow grammar rules and relate new information to their experiences thus influencing meaningful learning.

6.2.3. Elaboration strategies used by pre-service teachers

Apart from contextualization and rehearsal strategies, the study also sought to determine how pre-service teachers used elaboration strategies in teaching English grammar. Results showed five elaboration strategies. These were constructing sentences using words, paraphrasing and summarizing, prior knowledge activation, asking and answering questions and use of practice examples. Pre-service teachers encouraged learners to construct meaningful sentences using the

grammar content that they taught as shown by the results. Through sentence construction, students learn how to use grammar rules and use their real-world experiences in sentences thereby facilitating meaningful learning of new grammar lesson.

Another elaboration strategy according to results of this study was prior knowledge activation. The findings showed that pre-service teachers introduced new grammar content through reviewing previous lesson and linking it to new content. According the findings, prior knowledge activation is an important component of teaching and learning because what students already know facilitates meaningful learning of the new information. In addition, through prompting prior knowledge, teachers can deal with problems that students face in remembering what they learned previously.

Apart from the above strategies, results showed that pre-service teachers also used strategies of paraphrasing and summarizing. Paraphrasing and summarizing lessons is important because it gives students an opportunity to take note of the important points from the lesson and notes are used for revision. Another strategy revealed by the results of this study was asking and responding to questions. The findings of this study indicated that pre-service teachers asked questions on the grammar content they taught and responded to questions from learners on the same. Asking and answering questions allowed the students to pay attention and actively participate in the lesson. This in turn facilitates meaningful learning since questions activated students' prior knowledge and linked to new learning. The last strategy that the study results showed was use of practical examples. These were used made students to pay attention, understand and retain the lesson. In addition, the practical examples made learning meaningful as they related to students real-life experiences.

6.2.4. Organization strategies used by pre-service teachers

The study also sought to determine how pre-service teachers used organization strategies when teaching English grammar. Among other organization strategies, chunking, concept mapping, and hierarchical teaching were specifically used by the pre-service teachers. The findings revealed that pre-service teachers organized their grammar lessons through hierarchical order. This entails that there was logical presentation of the grammar content. According to the findings, grammar lessons were taught according to order of difficulty, from simple to complex. This technique was found to

facilitate meaningful learning because students easily made links between new content previously learned information.

The study also revealed that pre-service teachers used the chunking strategy to teach grammar. Results showed that chunking or classifying similar information together, and breaking it into smaller units helps to avoid confusion in learners as well as teachers. The document analysis also showed that similar topics were chunked together to enable teachers to easily follow the sequence. This further facilitated meaningful learning since chunks are easy to understand and connect to previous knowledge. Additionally, the results revealed that chunking helped the pre-service teachers to achieve the planned success criteria since it focuses on specific information grouped into similar categories.

The last organization strategy that the results of this study revealed was concept mapping. The study results showed that pre-service teachers used concept maps because they supported retention of what students learn and support retrieval. In order for meaningful learning to occur, students have to link new information to prior knowledge which needs to be activated. Moreover, the findings revealed that creation and use of concept maps had positive effects on both the teacher and the learner. To the teacher, a concept map enabled logical presentation of the lesson, and to the learner, there is systematic and coherent storage as well as visualization of the grammar component presented by the teacher. All in all, all information processing strategies have the capacity to make learning meaningful in more ways.

6.2.5. Challenges in using information processing theory strategies

Despite these gains, the study also revealed some challenges in the course of using the various information processing theory strategies by the pre-service teachers to teach English grammar. The greatest challenge in the use of all strategies involved learner background most of whom were found to have problems in comprehension English language, large class sizes, inadequate authentic materials and time constraints. These challenges made using strategies such as rehearsal, contextualization and elaboration unsuitable if the pre-service teachers did not manage the classes effectively. However, the pre-service teachers resolved such challenges through using locally

available resources and frequently used group work activities as well as arranged for remedial lessons to deal with time constraint.

6.2.6. Information processing model for teaching English grammar

Having explored the different strategies and challenges of that pre-service teachers used and experienced in the use of the information processing theory, the study further sought to develop a model based on the theory which secondary school teachers would use to teach English grammar to facilitate meaningful learning in students. The model designed from the findings revealed that information processing theory strategies of contextualization, rehearsal, elaboration and organization can be integrated in teaching and learning to facilitate meaningful learning of English grammar. Results showed that contextualization strategies could not be effective on their own but with intergration of rehearsal, elaboration and organization strategies. When properly applied, these IPT strategies facilitate meaningful learning of English grammar because they easily link new information to students' previous learning.

6.3 Implications

This study findings provide great insights into how pre-service teachers and teachers in general should to employ the information processing theory strategies in teaching English grammar to secondary school learners. The findings have shown that IPT strategies can facilitate the teaching and learning of English grammar if well applied and when materials and adequate time is provided. Thus it can be concluded that use of contextualization, rehearsal, elaboration and organization facilitates meaningful learning since they help students to attach new information to previous knowledge. The following implications were therefore noted:

6.3.1 Contextualization strategies

The findings of the study revealed that pre-service teachers used various contextualization strategies to teach English grammar. The strategies such as integration of literature, cooperative learning, authentic assessment and use of authentic materials connect students' everyday experiences to the classroom learning hence facilitating meaningful learning. In regard to this, the implication to teacher education institutions and the MoE is that they need to incorporate strategies that facilitate meaningful learning in the curriculum for pre-service teachers to apply.

Additionally, the findings show that ability to apply theoretical knowledge classroom contexts by pre-service teachers provides evidence of preparedness for actual teaching. Thus teacher education institutions should ensure that teaching practice is well conducted to ascertain that pre-service teachers are able to translate theoretical knowledge to actual classrooms.

6.3.2 Rehearsal strategies

The study results also showed that pre-service teachers applied a variety of rehearsal strategies. As shown from the findings, pre-service teachers used these strategies because they helped students retain information. Therefore, MIE should ensure that the secondary school English syllabus design provides opportunities for rehearsal of content at different levels of education. Rehearsal strategies such as visualization and note taking should be augmented to enable teachers to adequately apply them the teaching and learning context.

6.3.3 Elaboration strategies

Elaboration strategies that pre-service teachers used according to the findings facilitate meaningful learning since students' prior knowledge is activated and linked to new content. The strategies such as construction of sentences, prior knowledge activation, paraphrasing and summarizing, question and answer as well as use of practical examples enable students to relate new information the their everyday life. The implication to MoE is that the curriculum documents should be framed in such a way that it should emphasize use of strategies that enable students to link new information to their previous learning. In addition, teacher education institutions need to prioritize practical methods during face to face training of pre-service teachers.

6.3.4 Organization strategies

The study also revealed that pre-service teachers used organization strategies to teach English grammar. Organization strategies were found to facilitate learning since information that is well organize is easy to retain and recall. Besides, such strategies help to reduce the cognitive load in short term memory enabling students to accommodate more chunks of information. The strategies that included hierarchy creation, chunking and concept mapping enable large chunks of information to be reduced for easy retention. In view of this, teacher education institutions should improve

methodology courses to include strategies that prepare pre-service teachers for practical use of such strategies.

6.3.5 Challenges of using information processing theory strategies

Findings also showed that pre-service teachers faced challenges in applying the IPT strategies to teach English grammar. The challenges included learner background, large class size, inadequate authentic materials as well as time constraints. These challenges made use of IPT strategies difficult. Due to such challenges, the implication to DTED and MoE is that they should monitor teaching practice and schools to appreciate these challenges and find ways of alleviating them. Additionally, teacher education institutions should train pre-service teachers to handle diverse types of students during teaching practice. Further, secondary school managers should devise mechanisms of supporting pre-service teachers to resolve the challenges they face in the actual classrooms during teaching practice.

6.3.6 Information processing model for teaching English grammar

The study findings facilitated the development of a model for teaching English grammar to secondary school students for meaningful learning to occur. The model recommends that IPT strategies should be integrated during English grammar lessons because each facilitates meaningful learning through different activities. The results revealed that it is not practically possible to use one strategy without using the other. For instance, when using contextualization strategies, rehearsal has to be applied to enable recall. Similarly, when using elaboration strategies, organization strategies have to be used to enable reduction of the cognitive load. Therefore, the implication to teacher education institutions is that they should incorporate the IPT model in the methodology courses to allow pre-service teachers to practice its use. Malawi Institute of Education (MIE) should also incorporate the IPT model in the English syllabus to enable teachers to use it.

6.4. Contributions of the study to existing literature

Teacher education has been overwhelmed with theories of which pre-service teachers are unable to apply in actual teaching settings. One specific theory that has had such challenges is the information processing theory (IPT). The current study has added to the knowledge on IPT

strategies that are useful for facilitating meaningful learning of English grammar in secondary school students.

Another contribution of my thesis to the existing body of knowledge is on how theory can be put into practice by pre-service teachers. This is important because it will enable teacher education institutions to improve their methodology course delivery to enable pre-service teachers effectively apply the theoretical knowledge to actual classrooms. A major contribution is the development of a model for teaching English grammar to facilitate meaningful learning based on information processing theory, a cognitive learning theory. This model could be adopted and included in the secondary school teacher Education curriculum for teaching grammar to secondary school students in Malawi as well as the secondary school syllabus.

6.5 Recommendations

The study has the following recommendations:

6.5.1 Recommendations for Teacher Education Institutions and MoE

1. The current study revealed that pre-service teachers applied a variety of information processing theory strategies successfully while they had challenges with a few. Therefore, we recommend that teacher education institutions should ensure that pre-service teachers apply the different theoretical knowledge through peer teaching before teaching practice in order to build practical skills in use of learning theories.
2. The study results showed that pre-service teachers faced a number of challenges in implementing information processing theory strategies of contextualization, rehearsal, elaboration and organization. Therefore, we recommend that the Ministry of Education (MoE) should find ways of alleviating the challenges faced by pre-service teachers and students in the course of teaching and learning. This could be done through developing and implementing policies that advocate for English as a language of instruction at all levels of education. In addition, the MoE should ensure that schools provide adequate teaching and learning resources for facilitating meaningful learning.

6.5.2 Suggestions for further studies

Further studies should focus on:

1. How particular IPT strategies i.e contextualization, rehearsal, elaboration or organization influence achievement in English grammar.
2. Perceptions and attitudes of pre-service teachers towards teaching practice in general.
3. Effects of clinical supervision on pre-service teachers' performance during teaching practice.

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APPENDICES

APPENDIX A: PARTICIPANT CONSENT FORM

Ph.D. Research Project

Researcher: Esther Nanyinza

Supervisor: Dr Ecloss Munsaka

CONSENT

I _____ (full names of participant)
hereby confirm that I understand the contents of this document and the nature of the research project. I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form. I understand that I am at liberty to withdraw from the project at any time, should I so desire.

Signature of Participant

Date

APPENDIX B: PERMISSION LETTER FOR DATA COLLECTION

Telephone: +265 1 312 144
+265 1 312 107
Fax: +265 1 312 640



Communications should be addressed to
MINISTRY OF EDUCATION
EDUCATION DIVISION MANAGER (NORTH)
P.O. BOX 133
MZUZU

Ref No: REF/NED/ADMIN/2/1A

18th April 2022

TO: HEADTEACHERS IN SECONDARY SCHOOLS IN RUMPHI, KARONGA,
CHITIPA, MZUZU, NKHATABAY AND KASUNGU

RE: ESTHER NANYINZA, REG NUMBER: ID 2019125242

The above captioned subject matter refers.


This letter serves as a permission for Esther Nanyinza who is a student at the University of Zambia, to collect data in selected secondary schools in Rumphu, Karonga, Chitipa, Mzuzu, Nkhatabay and Kasungu for her academic research. Please provide the research candidate with the support required in her research. You can always refer to this office for guidance.

Your support in this regard is highly sought for.

A handwritten signature in black ink, appearing to read 'Ndongolera C. Mwangupili'.

NDONGOLERA C. MWANGUPILI, PQA0
FOR THE EDM (NORTH)

APPENDIX C: RESEARCH CLEARANCE PERMIT

	UNIVERSITY OF LIVINGSTONIA <i>Malawi, Central Africa</i>	P.O. Box 112 Mzuzu Tel: +265 (0) 1311615 Email: unilia@unilia.ac.mw de@unilia.ac.mw Website: www.unilia.ac.mw
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UNIVERSITY OF LIVINGSTONIA RESEARCH ETHICS COMMITTEE

Your Ref.:
Our Ref.: UNILIA-REC/06/2022/Esther Nanyinza
21st April, 2022
Mrs. Esther Nanyiza
University of Livingstonia
P.O. BOX 112
Mzuzu, Malawi
Cell: +265994645624/+265881262533
Email: enanyinza@unilia.ac.mw/nanyinzae@gmail.com

RESEARCH CLEARANCE PERMIT

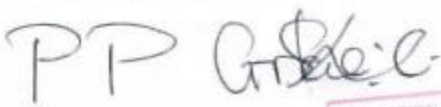

I am pleased to inform you that the UNILIA-REC acting on behalf of NCST, has given you authority to conduct the study titled **"THE PRAXIS OF INFORMATION PROCESSING THEORY TO ENHANCE THE TEACHING ENGLISH LANGUAGE TO SECONDARY SCHOOL STUDENTS: A CASE OF UNIVERSITY OF LIVINGSTONIA PRE-SERVICE TEACHERS."**

This follows a successful review process of your research proposal on 25th March, 2022 and the inclusion of the main comments from the committee and its submission.

You are advised to report to the District Commissioner at every district council involved in your study before you start your exercise, for their information and recognition.

Upon completion of your research study, you may submit one copy of your study report to District Council, University of Livingstonia and may conduct a dissemination exercise in the study area.

Should you need clarification, please contact the undersigned.



B.C. Mbakaya (PhD)
Associate Professor

The University of Livingstonia, through excellence in teaching, research and learning environment, shall educate and inspire students to become principled leaders who will transform society for the glory of God.

APPENDIX D: CLASSROOM OBSERVATION SCHEDULE

TOPIC: Application of Information Processing Theory to the Teaching English grammar to facilitate meaningful learning in Secondary School Students: A Case of Pre-Service Teachers in Malawi

Introduction: The purpose of this study is to explore how the pre-service teachers apply the information processing theory strategies of contextualization, rehearsal, elaboration and organization in teaching English grammar during their teaching practice.

SECTION A: Demographic Information of Participants

1. Name of School: -----
2. Sex -----Age-----
3. Subject -----English -----
4. Time: From-----to-----
5. Topic-----

SECTION B: To explore how pre-service teachers apply information processing theory strategies of contextualization in teaching English grammar to forms 3 or 1 students during teaching practice.

Strategy	Activities/evidence of the strategy
<p align="center">Contextualization strategies</p> <p>a. Does the pre-service teacher give examples that learners are familiar with?</p> <p>b. Are the pair and group work activities among learners encouraged?</p> <p>c. How are teaching materials arranged in the classroom?</p> <p>d. How does the pre-service teacher allocate participation among learners?</p> <p>e. What kind of assessment methods does the pre-service teacher use during and after the lesson?</p>	<ul style="list-style-type: none"> - Pre-service teacher gives familiar examples on types of adjectives. - Used group work and pairwork - No materials to show contextualization - All students allocated participation through groups and role/play. - Assessed through group exercise and homework.

f. Does the pre-service teacher clarify the assessment nature of the success criteria to learners?	
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SECTION C: To explore how pre-service teachers use information processing theory strategies of rehearsal in teaching English grammar to form 3 or 1 students during teaching practice.

Strategy	Activities/evidence of the strategy
<p align="center">Rehearsal strategies</p> <p>a. Does the pre-service teacher ensure that learners visualize and create mental images of the lesson?</p> <p>b. What kind of questions does the pre-service teacher ask the learners?</p> <p>c. Are learners encouraged to copy or take notes?</p> <p>d. How does the pre-service teacher use literature texts to teach grammar?</p> <p>e. Does the pre-service teacher repeat instruction cumulatively?</p>	<ul style="list-style-type: none"> - Used chat and textbooks to visualize the lesson. - Asked both probing and recall questions. - Asked students to take notes. - Used stories and poems to teach pronouns. - Others did not use any literary genres - Instruction repeated during exercises

SECTION D: To determine how pre-service use information processing theory strategies of elaboration in teaching English grammar to form 3 or 1 students during teaching practice

Strategy	Activities/evidence of the strategy
<p style="text-align: center;">Elaboration strategies</p> <p>a. Does the pre-service teacher introduce lessons from prior knowledge?</p> <p>b. How does the pre-service teacher encourage construction of meaningful sentences on the grammar content?</p> <p>c. Are learners able to find similarities between new information and information previously learnt?</p> <p>d. Does the pre-service teacher ask and answer questions about the materials being taught?</p> <p>e. How does the pre-service teacher paraphrase and summarizing the lesson?</p>	<ul style="list-style-type: none"> - Asked questions about the previous lesson and made a recap. - Explained what an adjective clause was, gave examples and asked students to construct sentences used clauses. - Teacher revised previous lesson and linked it to the new lesson. - Asked questions about the topic - Asked questions of previous lesson. - Gave chance for students' questions - Summarized the types of clauses

SECTION F: To describe how pre-service teachers use information processing theory strategies of organization in teaching English grammar to form 3 or 1 students during teaching practice

Strategy	Activities/evidence of the strategy
<p style="text-align: center;">Organization strategies</p> <p>a. What strategies does the pre-service teacher use that show organization?</p> <p>b. How does the pre-service teacher use of hierarchy of teaching and learning during the lesson?</p> <p>c. How does the pre-service teacher perform chunking-grouping and classifying similar information during the lesson?</p> <p>d. Does the pre-service teacher outline the lesson in a logical manner?</p> <p>e. How does the pre-service teacher ensure concept mapping among learners?</p>	<ul style="list-style-type: none"> - Used chunking method - Sequenced the lesson through from simple to complex. - Chunks the lesson by classifying the content into similar groups. - The lesson is logically outlined from simple to complex. - Concept mapping not seen being encouraged.

SECTION G: To Identify the challenges that pre-service teachers face in the application of the information processing theory strategies of contextualization, rehearsal, elaboration and organization in teaching English grammar to form 3 or 1 students during teaching practice.

Strategy	Activities/evidence of the strategy
<p>Challenges in using the strategies</p> <p>a. What challenges does the pre-service teacher face in using the above information processing strategies?</p> <p>b. How are the challenges being resolved in the process of teaching?</p>	<ul style="list-style-type: none"> - Students were unable to construct grammatical sentences - Teacher corrected some mistakes in the lesson e.g. She is a woman who stored my book. - Correction: “She is the woman who store my book.”

APPENDIX E: DOCUMENT ANALYSIS GUIDE

TOPIC: Application of Information Processing Theory to the Teaching of English grammar to facilitate meaningful learning in Secondary School Students: A Case of Pre-Service Teachers in Malawi

Introduction: This purpose of this study is be to explore how the pre-service teachers would apply the information processing theory strategies of contextualization, rehearsal, elaboration and organization in teaching English grammar during their teaching practice.

SECTION A: Demographic Information of participants

1. Type of Document-----
2. Unique physical Characteristic of the document-----
3. Date of the Document-----
4. Author of document/Responsible person for the content-----
5. Target audience of the document-----

6. Document Information

- a. What are the main topics of the document? -----
- b. Is there specific focus on **Contextualized** teaching strategies?
- c. Is there any specific focus on **Rehearsal** strategies? Provide examples
- d. What indicators are there in the lesson plans/records of work that the teacher used **elaboration** strategies?
- e. In what ways does the teacher show **organization** of material in the presentation of lessons as shown in the lesson plans/records of work?
- f. Any other information that shows the use of IPT?

APENDIX F: INTERVIEW GUIDE FOR PRE-SERVICE TEACHERS

TOPIC: Application of Information Processing Theory to the Teaching of English grammar to facilitate meaningful learning in Secondary School Students: A Case of Pre-Service Teachers in Malawi

SECTION A: Demographic information of participants

1. Name of School:-----
2. Sex -----Age-----
3. Position in the school-----
4. Number of years/months/weeks in teaching---

SECTION B: Application of Contextualization to the teaching of English grammar

1. Would you tell me what kind of examples you use when teaching to make learners understand what you are presenting?
2. What activities do you prefer to use when teaching grammar?
 - a. Are the pair and group work activities among learners encouraged?
 - b. How does the use of pairs and group work provide meaningful and purposeful learning of English Grammar?
3. Would you tell me how you assess the learners after you have taught a component of grammar? Would there perhaps be a particular reason why you prefer that form of assessment? Any advantages?
4. What English materials do you use when teaching grammar?
 - a. Why do you use such materials?
5. What assessment methods do you use to ensure that the grammar aspect you have taught has been effectively learnt and can be used by your learners?
 - a. Would you tell me why you prefer to use that method of assessing grammar?

SECTION C: Application of Rehearsal strategies to the teaching of English grammar

1. How do you ensure that your learners visualize and create mental images of the grammar aspects you are teaching?
 - a. Why do you think visualizing the lesson is effective or desirable for teaching?
2. How do you use stories in the literature books to teach grammar?
 - a. Why do you use the literature texts in the teaching of grammar?

- b. What kind of questions do you use to assess learners' understanding of the lessons you teach them?
 - c. Why do you use this type of questions?
- 3. Are learners encouraged to copy or take notes?
 - a. Why is it important to encourage them to take notes?
- 4. What are the advantages of repeating instruction during the lesson?
 - a. How often do you repeat instruction?
- 5. Have you ever attempted to use mnemonics in the presentation of your lessons?
 - a. If yes, would you tell me what your experience has been using mnemonics?

SECTION E: Application of Elaboration strategies to the teaching of English grammar

1. How do you encourage construction of meaningful sentences on the grammar content?
2. How do you introduce new grammar content?
 - a. Do you use question and answer technique?
3. What activities do you encourage your learners to be performing while you explain the grammar content?
 - a. How do you encourage note-taking by learners during the lesson?
4. What is your view about grouping similar grammar content together as the lesson is going on?
5. How do you ensure that learners find similarities between new information and information previously learnt?
 - a. Why do you think it is important to activate prior knowledge in learners during the lesson?
6. Why is it important to paraphrase and summarize the lessons?
7. Do you allow your learners to ask and answer questions about the materials being taught during and after the lesson?
 - a. Would you tell me why you think it is important for learners to ask questions during lessons?
8. Why is it important for learners to create mental images of the grammar aspect being taught?

SECTION F: Application of Organization strategies to the teaching of English grammar

1. How do you present your lesson to ensure that learners organize information learned?
2. What are the advantages of chunking (grouping) and classifying similar information?
3. Tell me ways through which you make connections between what you taught previously and the new lessons you want to teach.
4. How do you outline your lesson in a logical manner?
5. How do you ensure concept mapping among learners takes place?
 - a. Why is concept mapping important?

SECTION G: Challenges faced in applying the information processing strategies

1. What challenges do you face when attempting to use the information processing strategies mentioned earlier in the teaching of English grammar?
2. How do you attempt to resolve these challenges in the course of teaching?
3. Would you say your lecturers at university adequately prepared you to use the IPT in the teaching of grammar? If they did not adequately prepare you, would you tell the areas of deficiency?

SECTION H: Best way of teaching English grammar using information processing theory strategies

1. If you were asked to advise someone who intends to use IPT for teaching English grammar, what advice would you give him or her?