Incidental Vocabulary
Acquisition through Reading
A Literature Review Examining Vocabulary Acquisition, Reading Comprehension and their Connection

Vokabulärinlärning som en konsekvens av läsning
En litteraturstudie som undersöker inlärning av vokabulär, läsförståelse och deras koppling

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Title

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Sammanfattning Summary

In order to learn a language, it is important to develop a vocabulary because it facilitates the language skills: reading, listening, writing and speaking. According to the Swedish curriculum, students must be able to develop these skills in English. However, the national tests show that students have poor results in reading and reading comprehension in English. Therefore, as future teachers of languages in Sweden, we chose to investigate how students can develop and strengthen their vocabulary through reading. Our research questions are: What cognitive processes and strategies are used when learning vocabulary? What does research say about incidental vocabulary learning through reading? What relationship does vocabulary have with reading comprehension? We have answered our questions by synthesizing and analyzing empirical studies which have been divided into two categories: cognitive processes and strategies, and vocabulary acquisition through reading. The findings show that, when encountering new vocabulary, learners use memory, determination, social and metacognitive strategies. Learning vocabulary happens both incidentally and intentionally and during this procedure words go through cognitive processes that determine where in our knowledge system they belong but this procedure can be affected by both internal and external factors. Results show that learners find reading and reading while listening to be a good method of learning vocabulary and these approaches also show good results in incidental vocabulary acquisition. Learners acquire new vocabulary incidentally through reading but the number of words they learn varies greatly. Learner’s prior vocabulary knowledge and the level of the target text is important for the outcome of new vocabulary acquisition. If the learner does not have an adequate prior vocabulary, associations and connections cannot be made and coherence not completed. In summary, the relationship between incidental vocabulary acquisition and reading comprehension is mutually beneficial. Reading provides context during a learner’s integration process and this leads to comprehension and vocabulary growth. There is a reciprocal relationship between comprehension and vocabulary growth, where both build on one another. However, since all the empirical studies did not take the same factors into consideration, the results have varied. In other words, external and internal factors can have a major impact on incidental vocabulary acquisition through reading. We suggest further research to investigate these factors in order to get a clearer picture of how we as teachers can improve strategies and instructions for vocabulary acquisition through reading.

Nyckelord Keywords

Second language acquisition, incidental vocabulary acquisition, reading processes, reading comprehension, cognitive processes, learning strategies
Table of Contents

1. Introduction ................................................................................................................................. 4
   1.1 Aim and Research Questions ............................................................................................... 4
   1.2 Outline of the Review ......................................................................................................... 5

2. Background .................................................................................................................................. 5
   2.1 Relevance of Vocabulary .................................................................................................... 5
   2.2 The Situation in Sweden ...................................................................................................... 6
       2.2.1 National Exam in English .......................................................................................... 7

3. Data and Method ......................................................................................................................... 7
   3.1 The Nature of the Sources ................................................................................................... 7
   3.2 The Procedure for Gathering Sources .................................................................................. 8
   3.3 The Procedure for Processing and Analyzing Sources ......................................................... 9
   3.4 Problems Encountered ....................................................................................................... 10

4. Research Review ........................................................................................................................ 10
   4.1 Acquisition Theories .......................................................................................................... 10
       4.1.1 Piaget’s Basic Tendencies in Thinking ....................................................................... 10
       4.1.2 Krashen’s Input Hypothesis ....................................................................................... 11
   4.2 Vocabulary Theories .......................................................................................................... 11
       4.2.1 Nation’s Criteria for Knowing a Word ......................................................................... 12
       4.2.2 Three Fields of Vocabulary Knowledge ...................................................................... 13
   4.3 Comprehension Theories through Reading ......................................................................... 14
   4.4 Empirical Studies .............................................................................................................. 14
       4.4.1 Vocabulary Acquisition Strategies ............................................................................ 14
       4.4.2 General Learning Methods, Strategies and Instructions .............................................. 17
       4.4.3 Cognitive Processes of Vocabulary Acquisition ........................................................ 19
       4.4.4 Vocabulary Acquisition through Reading ................................................................. 21

5. Discussion ................................................................................................................................... 28
   5.1 What Cognitive Processes and Strategies Are Used When Learning Vocabulary? ........... 28
   5.2 What Does Research Say Regarding Incidental Vocabulary Learning through Reading? ... 33
   5.3 What Relationship Does Vocabulary Have with Reading Comprehension? ...................... 34
   5.4 Conclusion .......................................................................................................................... 36
   5.5 Future Research .................................................................................................................. 37

List of References ......................................................................................................................... 38

Appendix ....................................................................................................................................... 42
1. Introduction
The importance of vocabulary in second language acquisition (SLA) has been overlooked for quite some time, but it is now at last gaining well-deserved recognition (Beheydt 1987). When learning a new language, the main aim is usually being able to communicate, and thus vocabulary is very important to achieve communication between individuals. Keith S. Folse (2004), who is both an experienced scholar and second language teacher, has debunked several vocabulary myths in his book *Vocabulary Myths: Applying Second Language Research to Classroom Teaching*. A common myth states that vocabulary is not as important as grammar but Folse has debunked this by pointing out that the worst breakdown in communication happens when the speaker does not know the appropriate word. One of his examples is the story of when he tried to buy flour from a Japanese store. No matter how he changed the question grammatically, he could not convey that it was flour he wanted to buy. This meant he had to leave the store empty-handed.

As future teachers of languages, our goal is to make our students communicate freely in the target language and one way to increase vocabulary learning is through reading books. From our own experience out in the schools, as well as speaking to students and teachers made it clear that reading was one of the areas where students lacked motivation and teachers struggled to motivate or did not see value in the students’ reading. This has become evident in results from the Swedish national exam, where reading is one out of four focus points (speaking, reading, listening, writing) in which students did the poorest (Skolverket 2016b). Since there has always been an assumption that vocabulary learning happens incidentally through reading we thought, as future teachers of languages in Sweden, that it was obvious to investigate if this is true and how much vocabulary can be learnt incidentally through reading. If this assumption were to be true it would essentially be a win-win situation for both students and teachers.

1.1 Aim and Research Questions
This literature review investigates vocabulary acquisition and incidental vocabulary learning through reading. As future teachers of languages, the aim of this review is for us to gain knowledge of how vocabulary is learnt in general, but also to know how reading works as a learning strategy for vocabulary acquisition. Furthermore, this review will be used for our future study within the same field of vocabulary acquisition. In this review we investigate and
answer the following questions:

- What cognitive processes and strategies are used when learning vocabulary?
- What does research say regarding incidental vocabulary learning through reading?
- What relationship does vocabulary have with reading comprehension?

1.2 Outline of the Review
The review is divided into five sections. This introduction is followed by the background section which addresses the relevance of vocabulary, the Swedish curriculum regarding what the aims and knowledge requirements are, as well the current situation in Swedish schools among students regarding reading comprehension in English. The third section, data and method, describes in detail how our review has been processed. It addresses which type of material has been used and the methods applied when selecting the material. It also includes problems we faced during the process. The fourth section comprises the research review, where the material found is compiled in a systematic way. In the fifth and last section the findings are analyzed in the discussion, and we end with a conclusion as well as suggestions for future research.

2. Background
The following chapter explains why this topic is relevant to us as future teachers. Authors and studies are mentioned and the current situation in Sweden is described.

2.1 Relevance of Vocabulary
Paul Nation, who is a leading linguist and researcher in English and foreign languages, has stated that “vocabulary is not an end in itself” (1994: IX) but rather something that is needed when listening, speaking, reading, and writing. With vocabulary, communication can be achieved, since one can build better sentences and convey meaning through key words. This could mean that vocabulary is a central part of the foundation of language proficiency. Furthermore, Gass (1999: 319) states that “at least some, if not a large part, of one’s second language vocabulary is acquired incidentally that is, as a by-product of other cognitive exercises involving comprehension”. This interesting fact has caused several researchers as well as us to focus on how much incidental vocabulary children learn from unfamiliar words encountered during natural reading.
2.2 The Situation in Sweden
The current situation in Sweden and views on vocabulary learning and reading can be seen in the Swedish curriculum *Lgr11* (Skolverket 2011: 34), which states that "language is people’s primary tool for thinking, communicating and learning" (authors’ translation). This suggests that the purpose of learning English in school is to support the student to develop his or her language proficiency to be able to communicate and interact with others in contexts in which English is used. Therefore, a large vocabulary is important for communication, and just as Folse states: "lack of grammar knowledge can limit conversation; lack of vocabulary knowledge can stop conversation" (2004: 2-3). The Swedish curriculum states that the student should be given the opportunity to develop his or her skills in understanding and interpreting meaning in various kinds of written work in all languages taught in school (Skolverket, 2011: 34), which means that the student will encounter unknown vocabulary when reading new texts.

Vocabulary in written work ties to reading, one of the four learning skills: reading, listening, speaking and writing. These four skills are the cornerstones of learning in the Swedish curriculum, and the aims of knowledge in the curriculum are that the student should be given the opportunity to develop the four skills in all subjects during his or her education. Unfortunately, there is no specific information or guideline in the Swedish curriculum that states that reading promotes vocabulary learning. The curriculum itself is written in a general way to cover many bases and this opens up for individual interpretation which in turn could lead to vary varied teaching approaches throughout the country.

Concerning the requirements to pass English in the 9th grade, reading comprehension is one of them. For instance, the student should understand content and instructions, as well as comprehend the important details in texts of different genres. Students should also be able to present and discuss content and details both orally and in written form (Skolverket, 2011: 39-40). Since reading comprehension entails the student understanding the meaning of a text, this requirement is essential to the aims of knowledge. As Nation has stated: “a rich vocabulary makes the skills of listening, speaking, reading and writing easier to perform” (1994: IX).
2.2.1 National Exam in English
To see how the skills in English are developing among Swedish students, there is an annual national exam created and distributed by Skolverket. This exam is conducted in all schools (primary and secondary), and the main purpose is to see if there is the same assessment of quality throughout the country, as well as provide an analysis of the extent to which knowledge requirements are met in the school system (Skolverket 2016a). The English exam consists of three sub-tests that measure different skills: part A, speaking; part B, reading and listening; and part C, writing. The results from the 2016 exam show that it was part B, reading and listening, in which the majority of the students did the poorest (Skolverket 2016b). This could mean that students have difficulties with comprehension because of a lack of vocabulary in reading and listening. Due to the fact that students do this exam annually, it becomes clearer for the school system to see what students struggle with, and this in turn could help with the work of improving the teaching approach and the education of students.

3. Data and Method
The following chapter describes how the data used was collected, processed and analyzed, as well as what problems arose during this procedure. This is a literature review, as data has been collected and analyzed to describe the situation within this particular area to motivate empirical studies in the future (Barajas et al. 2013).

3.1 The Nature of the Sources
To comply with the criteria of a literature review defined by the book Systematiska Litteraturstudier i Utbildningsvetenskap (Barajas et al. 2013), our analyzed material consists mainly of empirical studies and scholarly books. Due to the fact that we are future teachers based in Sweden, the Swedish curriculum Lgr11 (Skolverket 2011) and other Swedish regulations are also brought up and analyzed. The scholarly books and sources found in the empirical studies provide most of the foundation for the background and the theoretical part of the research review and they are chosen because they are cited several times in the empirical studies as well as some being recommended by our supervisor. The empirical part of the research review, which consists of studies regarding vocabulary has been processed and analyzed. The empirical data gathered is what we believe to be a good representation of the field of vocabulary acquisition through reading, as it has covered a number of decades and include studies from different countries.
3.2 The Procedure for Gathering Sources

The starting point for the empirical studies is an American database called the Educational Resource Information Center (ERIC). It is a digital library for education and research and is updated frequently. In ERIC’s search engine one can easily find relevant and specific information within the field of interest, thus eliminating irrelevant data through various options such as choosing only peer reviewed results. During our search through ERIC, some of the keywords used were “second language acquisition”, “incidental vocabulary acquisition”, “reading processes”, “reading comprehension”, “cognitive processes” and “learning strategies” as well as authors and titles of scholarly. Bryman (2016) suggests that Google Scholar could be a reliable search engine for academic literature. Thus, through a search in Google Scholar, more information about the authors and their works as well as their research was found. However, the search engine Google Scholar was used only when we tried to expand our search beyond the ERIC database. It should also be noted that we have been cautious when reviewing any studies from this search engine. Additionally, Linköping University library has provided us with scholarly books regarding scientific theories within educational development and language acquisition.

When the selection of studies was made, the quality of criteria mentioned by Bryman (2016: 41-42) was followed. The criteria he mentions are reliability, replication, and validity. Another focus was to gather data that is peer reviewed as well as up-to-date. When a study has been reviewed by peers the reader is assured that the facts have been verified and examined by experts in the same field (Jones 2014), which means that the facts in question are held in high regard when it comes to reliability, validity and quality. Some exceptions were made regarding studies whose authors have had a significant role in the field of vocabulary acquisition through reading and thus some of the studies we have looked at are older.

We have also tried to make a global selection of empirical studies to get international coverage of the area. Different languages from different language families have vast differences in patterns of grammar, syntax and vocabulary (Orna 2017). This could mean that learners whose native language belongs to one language family, such as Mandarin, might struggle learning English which belongs to another language family. Furthermore, as Yazdi and Kafipour (2014) mention, different teaching approaches are preferred in different countries and cultures, which could be a factor that could affect the result of a study of the same type or method.
The material collected consists of both quantitative research, which has provided concrete results from surveys and observation, and qualitative research, which has given us a deeper understanding of the field of vocabulary acquisition through reading. We have tried to present both quantitative and qualitative studies because they both have strengths and weaknesses, which ensures that one does not outweigh the other (Bryman 2016).

The data was collected through the methods theoretical sampling and snowball sampling (Bryman 2016: 410-411, 415 and Eriksson Barajas et. al 2013: 138). The purpose of theoretical sampling is to collect data and analyze it order to create a theoretical view of the area under investigation. By using the method snowball sampling, we were able to looked more closely at the references that the empirical studies mentioned as sources and we have particularly looked at researchers whose work have been mentioned several times in the studies.

Due to the fact that the area of interest is a major research field, limitations to our study have been made and the focus has been on incidental vocabulary acquisition in the second language through the specific learning method reading. Through this process, studies that did not adhere to the criteria and limitations mentioned above have been eliminated.

3.3 The Procedure for Processing and Analyzing Sources
In the procedure for processing the material, the main steps that Bryman (2016: 378-379) recommends for qualitative research have been followed roughly. It is a six-step process where you: 1) make general research questions, 2) select relevant sites and subjects, 3) collect relevant data, 4) make interpretation of data, 5) do conceptual and theoretical work; which is to narrow the specification of the research questions down and/or collect further data, and the final step 6) write the summary of your findings and a conclusion. Even though these steps were in regards of a qualitative research study we found these steps helpful, as we followed all the steps except the second one.

When reading the empirical studies, an overview was made in the form of short summaries of each article to ensure an easy and clear way of organizing the studies. A decision was made to organize them into four areas based on the aim of the studies: vocabulary acquisition strategies; general learning methods, strategies and instructions; cognitive processes of vocabulary; and vocabulary acquisition through reading. This categorization lends itself to a clear and structured way to analyze one area and question at a time. Even though the focus was on the aim of the studies, their methods have also been
analyzed and compared to one another.

3.4 Problems Encountered
The results of our review could have been affected by the fact that not all of the sources of interest were accessible due to paywall restrictions. Therefore, there are two second-hand references in our review, namely: Palmberg’s continuum of vocabulary development (1987 cited in Laufer & Paribakht 1998) and Piaget’s basic tendencies of thinking paraphrased in Woolfolk (2014).

4. Research Review
The research review is divided into two parts, theories and empirical studies, which provide answers to our research questions:

- What cognitive processes and strategies are used when learning vocabulary?
- What does research say regarding incidental vocabulary learning through reading?
- What relationship does vocabulary have with reading comprehension?

The theoretical part reviews three different areas of theory that are relevant to SLA: acquisition theories, vocabulary theories and comprehension theories through reading. The empirical part synthesizes studies consisting of 4 different categories: vocabulary acquisition strategies, general learning methods, strategies and instructions, cognitive processes of vocabulary and vocabulary acquisition through reading.

4.1 Acquisition Theories
Research into SLA has been around since the 1960’s, and in order to explain different theories, researchers have “borrowed” theoretical models from cognitive development theories to create their own hypotheses (Ellis 2015:8-9).

4.1.1 Piaget’s Basic Tendencies in Thinking
Piaget (Woolfolk 2014) states that there are two cognitive main functions when we think: organization and adaptation. Organization is a process of arranging new information into different mental systems or “schemes” (Woolfolk 2014: 55) and adaptation is another process where psychological data either becomes assimilated and/or accommodated with existing knowledge or schemes. In other words, to understand new information, human beings adapt
and process data to integrate it in order to make sense of the new information. According to Piaget, when cognitive processes take place, new information is absorbed, organized and adapted to existing knowledge. This process occurs through a balancing act of processing information explained through Piaget's theory of equilibrium, i.e. the brain being in a balanced harmony between perceived information and existing knowledge. However, if new information does not adapt to the current schemes, disequilibrium arises and consequently the brain keeps up the process of organizing and adapting the information in order to reach equilibrium. However, there are also times where adaptation never takes place because the perceived information is too unfamiliar and thus the chance of ignoring it is higher than trying to adapt and understand it.

4.1.2 Krashen’s Input Hypothesis
The “borrowed” theoretical models and new hypotheses within SLA started to appear in research studies in the 1960s and 1970s and many acknowledged theories have emerged since then (Ellis 2015:8-9). One of the best known theories is the Input Hypothesis (Krashen 1985), which is the most central of Krashen’s five hypotheses within language acquisition. His hypothesis emphasizes that it is only possible to learn language through input, i.e. by using the learning strategies reading and listening, which adapt new information and context to our existing linguistic knowledge. Krashen also states that writing and speaking are the result of what we have acquired through our input. Essentially, writing and speaking are ways to measure what internalized through input (Ellis 2015:13).

It should be mentioned that Krashen’s Input Hypothesis has been criticised. For example, Zafar argues that Krashen’s hypothesis is not explained properly, thus making it unsatisfactory when it comes to being “empirically tested” (2009:145). However, Krashen’s hypothesis has survived throughout the years and has proven useful in language education. Results have remained consistent with his hypothesis and according to the rules of science, “this is all one can demand of a hypothesis” (Krashen 2003: VII).

4.2 Vocabulary Theories
Researchers have acknowledged different definitions of vocabulary knowledge, to be able to measure the level of vocabulary of a learner.
4.2.1 Nation’s Criteria for Knowing a Word

Paul Nation (2015) has defined how to know a word by defining its criteria. He addresses three fields of knowledge which are involved in “knowing a word”: 1) its form, which is to know the spelling, sound and different word structures; 2) its meaning, which is knowing the concept of a word and be able to associate it with other words, and 3) its use, which is knowing how to use it in different contexts, both written and orally. The three fields are included in two other categories of knowledge: receptive and productive, which are required in different learning strategies. Nation explains that receptive knowledge is required when input such as reading and listening. He stresses the use of receptive knowledge to process and understand the new information we receive through these inputs. For instance, receptive knowledge is when we recognize the grammatical structure of the word “ice cream” as the concept of “ice cream”, when it appears in written form. We notice the word when reading or what it sounds like when spoken. Productive knowledge on the other hand, is connected to output such as speaking and writing, i.e. producing information. An example of productive knowledge is to know how the word “ice cream” is spelled by the learner or how it is pronounced when talking (Nation, 2005: 583-585).

Nation’s (2005: 583-585) explanation of receptive knowledge can be connected to Krashen’s Input Hypothesis (1985) as they both address reading and listening as the optimal inputs the acquisition of language. Moreover, to follow Nation’s criteria for knowing a word, the learner needs productive knowledge and use output such as speaking or writing in order show acquired knowledge. Therefore, Nation’s explanation of productive knowledge can also be connected to Swain’s Output Hypothesis (2005). Besides learning through input such as reading and listening, Swain stresses that learners also need to produce language, i.e. to speak and write, in order to internalize it. In other words, the outgoing product is as important as the incoming data the learner is processing.

Furthermore, Nation (2012) has also created a test called Vocabulary Level Test, to measure a learners’ vocabulary knowledge. The test measures three different types of vocabulary knowledge: the written word form, the form-meaning connection and to a small degree, concept knowledge. The aim of the test is to measure written receptive vocabulary knowledge, which is required for reading. The unit used of measurement in the test is known word families in the English language. An example of a word family would be help and a member within that family would be helplessness. A word family usually consists of 7 words. This test is widely used when conducting studies of vocabulary acquisition through reading.
4.2.2 Three Fields of Vocabulary Knowledge

Paul M. Meara (2009), professor in bilingualism and SLA, discusses a three-dimensional model of vocabulary acquisition, which can be comparable to Nation’s (2005) criteria for knowing a word. At the end of 1980’s, Meara and his colleague Buxton measured receptive and productive vocabulary knowledge, using YES/NO tests, i.e. participants were simply asked whether they knew the words presented in a test. However, the tests created problems, as Meara realized that there was a gap between receptive and productive vocabulary. The participants in the tests could not always answer yes or no, as they had some knowledge of the words, but could not put them into a context: “[Learners] typically use about 50% or 75% of the vocabulary they know, while the remainder of their vocabulary remains in a passive state. This position implies that there is a substantial gap between receptive and productive vocabulary […]” (Meara 2009: 30). What Meara means is that there is need for an intermediate answer between yes and no to fill the gap in the tests, and he states that it would be interesting in future studies “to track the relationship between vocabulary size, vocabulary organization, and vocabulary accessibility” (Meara 2009: 30).

The “substantial gap” Meara (2009) is missing can be defined in Palmberg’s (1987 cited in Laufer & Paribakht 1998) continuum of vocabulary development. His model is used in Laufer and Paribakht’s (1998) study where they investigate the relationship between different fields of vocabulary and organize and define vocabulary knowledge into three different fields: 1) passive vocabulary, 2) controlled active vocabulary and 3) free active vocabulary knowledge. Laufer and Paribakht explain that the first field in Palmberg’s continuum (passive vocabulary) contains words the learner has some knowledge of but has difficulties in using and this field would make up for Meara’s “substantial gap” between receptive and productive knowledge.

Defining the dimension of receptive and productive knowledge can be rather difficult. Some researchers, such as Palmberg (1987 cited in Laufer & Paribakht 1998) and Meara (2009) say that different fields of vocabulary are placed on a continuum where receptive knowledge gradually turns into productive, while other researchers see only two aspects: it is either receptive or productive (Nation 2005). In addition, researchers who have used the same terms for different processes can make it difficult to set clear boundaries between the different categories of knowledge.
4.3 Comprehension Theories through Reading
Vocabulary processes are used when reading texts because the learner is presented with known and unknown words which are presented in a context. Comprehending texts is not a simple process; it requires many different skills, such as retrieving information, understanding the main concept of the story and applying information in written or spoken form, just to understand a simple story (Van den Broek & White 2012). Throughout the last two decades, discourse psychologists have developed different theoretical models of text comprehension. For this study, the focus is on Kintsch’s theory of construction-integration as it describes the processes of input and comprehension.

The Construction-Integration model by Kintsch (1988) explains that comprehension begins with the bottom-up approach when it comes to the activation of knowledge. The model itself is based on two phases; the construction phase and the integration phase. During the construction phase the reader creates a propositional text base, which consists of strings of words. These strings contain what the reader believes is the meaning of the text. They are constructed from linguistic input as well from the knowledge already held by the reader. Propositional text bases are also created by the reader, without regard to the context of the texts, making many inappropriate associations and forms of meaning. Thus, complete comprehension has yet not been acquired, and what is needed is the integration phase. The context here is applied by the reader and the propositional text bases are made coherent. Thus, during the integration process many connections are excluded, as the learner tries to make sense of the knowledge acquired. These two processes happen simultaneously as the reader reads, and both of them are essential for comprehension.

4.4 Empirical Studies
This part of the research review synthesizes empirical studies regarding vocabulary acquisition through reading. It is structured in such a way that the studies are divided according to their main focus and by the research method that has been used.

4.4.1 Vocabulary Acquisition Strategies
The following three studies focus on what strategies learners intentionally and unintentionally use when dealing with encountered vocabulary. The first study (Ender 2014), which investigates learners of French, uses both quantitative and qualitative methods when collecting data through vocabulary tests as well as an audio recording. The other two studies
(Yazdi & Kafipour 2014, Asgari 2011) are only based on qualitative data from personal journals and interviews, where all participants are EFL and ESL learners at university and have an intermediate language level in English.

**Processing Strategies**

In the first study, Ender (2014) investigated different processing strategies for incidental vocabulary acquisition among Germans learning French at intermediate level. Incidental learning occurs unexpectedly and unintentionally whereas intentional learning occurs in a planned and purposeful way. This means that it is possible to learn words even though one never had the intention to do so. The data collection had three steps: a pre vocabulary test, an audio-recorded reading-for-comprehension exercise and a post vocabulary test which was completed together with a self-report called *Vocabulary Knowledge Scale* (VKS) (Paribakht & Wesche 1993).

The purpose of recording the reading-for-comprehension exercise was to be able to register learners’ strategic behaviour and processing strategies when encountering new words. The recordings were later transcribed and categorized according to four lexical processing strategies (Fraser 1999: 226): 1) ignoring the word, 2) use of a dictionary, 3) inferring the word’s meaning with the help from various cues, and 4) inferring the word’s meaning and subsequently using a dictionary to check it. The VKS self-report contained possible strategies the learner had to choose between while completing the vocabulary post test and the purpose of the self-report was to strengthen the strategies perceived in the audio recordings. It should be noted that the majority of the learners in Ender’s investigation had studied at least four other languages and she highlights that their “broad linguistic background knowledge” (2014: 548) could be a useful lexical processing tool in vocabulary learning.

**Taxonomy of Vocabulary Strategies**

The second and third studies investigated learners’ use of strategies and was based on Schmitt’s (1997) taxonomy of vocabulary strategies which are categorized in the following way: 1) Memory, 2) Determination, 3) Cognitive, 4) Metacognitive and 5) Social.

Yazdi and Kafipour (2014) collected data for their study from six week’s daily submitted personal journals where EFL learners had to describe all their activities regarding language and vocabulary learning. The reason for choosing this type of qualitative measurement was because a “personal journal is a technique through which information about the routines and
activities of participants when studying a specific course can be elicited” (2014: 3). Therefore, using this type of measurement provides more details regarding each learner’s daily learning process. After gathering all the data, the journals were transcribed, categorized and classified according to the vocabulary strategies in Schmitt’s model.

Asgari (2011) based her qualitative study on individual interviews from ten ESL learners concerning their use of strategies when encountering new vocabulary. Asgari’s reason for choosing this type of measurement was because “the method of conducting an interview is one of the most popular means to investigate, research and to inquire data from the one phenomenon” (2011: 87). The data collected were later categorized and classified according to Schmitt’s model, in the same way as in Yazdi and Kafipour (2014) study. However, Asgari (2016), Yazdi and Kafipour (2014) did not specify what questions were used to in their data collecting methods nor the guidelines for the participants.

Ender’s (2014) results show that most learners chose to either ignore the word or check a dictionary when encountering them. The result of ignoring a word was unexpected, as Ender had thought that the interference of other language knowledge would have helped them. However, the choice of ignoring usually depends on whether the word interferes with the comprehension of the context and this strategy has, according to Ender, “also been confirmed in other studies” (2014: 548). The use of dictionaries, is considered to be a determination strategy according to Schmitt’s taxonomy of vocabulary and this strategy includes using tools such as dictionaries or trying to analyze the words or smaller linguistic aspects of words.

In Yazdi and Kafipour’s study (2014), the results show determination strategies coming in second place regarding used strategies, whereas memory strategies are the most used by learners, i.e. making mental images of the word or try to connect the word personal experiences or other existing knowledge. Asgari’s (2011) interview results strengthen Yazdi and Kafipour’s results regarding determination strategies as her findings show that one of the frequently used strategies was determination. However, she also discovered that social and metacognitive strategies are used when learners deal with interaction with people and other types of input, such as English-language media.

However, Asgari (2011) highlights internal and external factors such as the language proficiency level of the learner, the context in which vocabulary is learnt and/or culture and educational traditions, which can influence the choice of strategies. Due to the fact that the
students in Asgari’s study are ESL learners, they are already living in an English-speaking environment and therefore surrounded by English media, i.e. English literature and newspapers as well as TV, music and computer games. This is very different to Ender’s (2014), and Yazdi and Kafipour’s (2014) studies, where the students are EFL learners and they are not surrounded by the English language to the same extent, which means that the choice and therefore use of strategies might vary. Asgari emphasizes that focus should be on making learners aware of learning strategies so they have a variety to choose from in different learning contexts (2011: 84, 89).

4.4.2 General Learning Methods, Strategies and Instructions
This section still focuses on strategies, but specifically on general learning methods for vocabulary acquisition that can be influenced by both learner and teacher. Two quantitative studies that used experimental procedures are analyzed and the vocabulary learning outcome is measured from various groups of learners who were exposed to different types of learning methods and instructions. The learners were all EFL university students with an intermediate level of English.

Experimental study: Three Learning Inputs
In the first study conducted by Brown et al. (2008), Japanese students tried three different learning methods. The researchers investigated which method the students preferred for vocabulary acquisition and also examined whether the frequency of the occurring word helped them to retain vocabulary. Furthermore, they wanted to see if there was any difference in the results between the two post tests used to measure acquired vocabulary. The three learning inputs were: 1) reading, 2) reading while listening and 3) listening to an audio recording only. They were followed by two vocabulary tests which were designed in two different ways: a simple translation test of target words and a multiple choice test, where the learners had to choose the correct translation of the target word. The tests were completed directly after practicing each learning input, one week and three months later in order to see if the words had begun to fade.

Results show that reading and reading while listening are the preferred methods among learners and the same methods also gave the best results in the vocabulary tests. Brown et al. (2008: 148) state that reading is a good input, as learners can read at their own speed. However, reading while listening gives a better understanding of both words and
context. None of the learners favoured the input listening-only, because due to the speed of
the recorded speech, they could not process the information and therefore did not manage to
identify or recognize much vocabulary. Brown et al. emphasize linguistic differences in
English and in Japanese which derive from different language families. The learner’s
“phonological knowledge of English varies from the phonological system employed by
[Japanese] native speakers” (2008: 148). This means that it can be more difficult to
understand words in spoken form than in written form because the learner has less time to
grasp the information.

Furthermore, the results showed that frequently repeated words in texts helped recall
and that compared with the translation test, the multiple choice test gave better results for
retained vocabulary each time. Brown et al. point out that due to the fact that the learners
were given different options in the multiple choice test, they were given a context which
activated strategy skills to retrieve existing knowledge. This also applies to the reading and
reading while listening methods. Due to the fact that the learner is given more contextual data
to process, new words can more easily be learnt with the help of context. What Brown et al.
underline is that when we learn vocabulary through reading, it requires our attention of the
surrounding context, which makes reading comprehension an important part in learning and
retaining vocabulary. The researchers draw the following conclusion:

[...] if learners do a lot of reading and listening, there will be considerable cumulative enrichment
of partially known words as well as the establishment of certain new words in their lexicons.
Inferring the meanings of unknown words from context is therefore important both for coping with
and learning unfamiliar words. (Brown et al. 2008:156)

Experimental study: Direct and Indirect Learning Strategies and Instructions
In the second study Naeimi and Chow Voon Foo (2015) investigated the vocabulary
acquisition outcomes from reading in connection with direct and indirect vocabulary learning
strategies and instructions. Besides general learning methods such as reading or listening,
there are subcategories with specific approaches aimed at different parts of language
knowledge such as vocabulary (Nation 2001). According to Oxford (1990) there are direct
and indirect strategies and instructions in vocabulary learning, where direct strategies and
instructions use more structured tools such as dictionaries, games or computers, while indirect
strategies and instructions focus more on learners’ effort in understanding the meaning and
the form of new words. Indirect strategy and instruction can involve more discussion and analysis and can include the use of diaries or notebooks. Data was collected from EFL university students, who were divided into two experimental groups: the first one which used a direct approach, and the second one which used an indirect approach. One pre and one post test measured vocabulary learning outcomes and eight reading lessons were conducted where the decided approach was performed in each group.

The results show that vocabulary improved in both groups, but the results from the group who used the direct approach increased significantly. The results also show that direct instructions are preferred among learners because these instructions are easier to follow as they are more specific than indirect instructions. According to the observations, the learners who had used the indirect approach had difficulties in understanding instructions and thus required more assistance from the teacher throughout the whole experimental process. The researchers also emphasize that learners’ level of L2 proficiency may have influenced their vocabulary acquisition outcomes, which could mean that indirect learning strategies and instructions work better with learners of higher level of L2 proficiency, as they are expected to be more independent in their learning. This means that it is necessary to adjust the choice of both strategy and instruction when teaching.

4.4.3 Cognitive Processes of Vocabulary Acquisition
This section focuses on the processing of newly encountered vocabulary, as well as the internal factors that may affect this process. Two quantitative studies are presented and the researchers have based their studies on pre and post vocabulary tests, questionnaires and scale surveys. Participants were both ESL and EFL learners with an intermediate proficiency level of English.

The Relationship Between the Three Fields of Vocabulary
Laufer and Paribakht’s (1998) study investigated the relationship between the three fields of vocabulary: 1) passive vocabulary, 2) controlled active vocabulary and 3) free active vocabulary knowledge. This model was predicated from Palmberg’s (1987 cited in Laufer & Paribakht 1998) continuum of vocabulary development. Passive vocabulary is considered to be vocabulary the learner has a basic understanding of but might have problems using in context. Controlled active vocabulary is considered to be vocabulary the learner can recall
and make use of in context, and free active vocabulary knowledge is considered to be vocabulary the learner can make spontaneous use of in any context. Data was collected from three vocabulary tests which measured the three different fields of the learner’s English vocabulary knowledge. Due to the fact that the participants are both ESL and EFL learners living on two different continents (Asia and America), four variables were taken into consideration in the study: passive vocabulary size, language learning context (if participants were ESL or EFL learners), knowledge of French (only among the ESL learners) and length of residence in L2 context. Therefore, background questionnaires were completed before the tests began.

Results show that passive vocabulary is always larger than controlled active vocabulary among ESL and EFL learners. Furthermore, learners who have both large passive and controlled active vocabularies also have a larger free active vocabulary. Laufer and Paribakht also found that EFL learners had a significantly larger controlled active vocabulary than the ESL learners and they point out that this is probably because they put more effort into learning English (1998: 385). However, knowledge of French did not increase the free active knowledge among the ESL learners and this result was rather unexpected, as they believed that prior linguistic knowledge would be an advantage.

Laufer and Paribakht’s study shows how the dimension of vocabulary knowledge is divided within the three fields but not what process puts a word into one of the three fields. Consequently, this leads us to the next study which investigates internal factors which can affect the process of language learning and vocabulary acquisition.

**Features Affecting Cognitive Processes**

The study by Zhao et al. (2016) investigated some internal factors, i.e. the linguistic, cognitive and affective features in the process of incidental vocabulary acquisition through reading. Vocabulary acquisition is based on processing new words and the study examines some of the possible factors that might affect the choice of strategies and thus the learning process. The following features were investigated among Chinese EFL learners: L2 proficiency level, anxiety, skills of strategies and motivation. To measure participants’ level of L2 proficiency, one reading session and a vocabulary test were completed and scores from the national exam *Test for English-Majors* (2016: 231) were gathered to strengthen their L2 proficiency results. Data from the other three factors (anxiety, skills of strategies and
motivation) were collected through scale questionnaires with different statements and questions.

The results show that L2 proficiency level, anxiety and skills of strategies are correlating features in vocabulary acquisition, but surprisingly, motivation is not. The result regarding L2 proficiency level shows that learners with a high level of proficiency acquire more words while reading than learners with a lower level. Thus, the link between the learner’s “decoding skills” (Zhao et al. 2016: 235) and learner’s skills of strategies have a correlating relationship.

Moving on to the next feature, anxiety and frustration can occur when learners encounter new words they can not interpret or understand. Consequently, anxiety could affect vocabulary learning because it can hinder the learner’s focus. However, the researchers emphasize that through anxiety, words are noticed which can be followed by a learning process and thus have the chance to be retained, but that this depends on whether the learner uses an appropriate strategy for retaining the words. Once more, this highlights the connection to the learner’s strategy skills. Having a variety of strategies could have a positive effect on vocabulary learning as the learner has the flexibility to choose “from a wide range of possible strategies and apply them to different learning tasks and contexts” (Zhao et al. 2016: 229).

Motivation was the only feature which did not seemed to influence vocabulary learning and this result was rather unexpected. Learners are motivated in different ways and depending on their type of motivation, the learning process of vocabulary could be affected and thus the retaining of the word. According Zhao et al., the measurement used for motivation might have failed as it did not capture “the dynamic and complex nature of motivation” (2016:236) and the learner might have interpreted it as a static quality. Nevertheless, the results of the studies (Laufer & Paribakht 1998, Zhao et al. 2016) show that internal factors, such as linguistic, affective and cognitive features, can affect the choice of strategies, cognitive processes and thus vocabulary acquisition.

4.4.4 Vocabulary Acquisition through Reading
Children attending school learn thousands of new words per year and it has been discussed whether that this increase in vocabulary comes from the exposure to written language (Nagy et al. 1985: 233). This section covers what the current field of vocabulary acquisition through reading has discovered through research.
Amount of Word Families Needed for Comprehension

Laufer (1992) tried to answer the question how many words are needed for comprehension, with regard to SLA in a study where the aim was to “explore the relationship between passive vocabulary and the comprehension of academic texts” (1992: 127). The participants were 92 EFL university students, and to measure reading comprehension, two standardized tests were taken by the participants. The first 60 students took one test that consisted of two texts and multiple choice comprehension questions. The other 32 students took a subtest, the Israeli university psychometric test, which included several texts with multiple choice comprehension questions.

In addition, the learners’ vocabulary level was measured by two different tests. Sixty students took Nation’s Vocabulary Level Test, which defines students’ current amount of vocabulary through the amount of word families they know. The other 32 students took the Eurocentres Vocabulary Test, a less advanced version of Nation’s test. The learners were then organized into five different reading groups based on their vocabulary level: those below 2000 word families, those that had 2000 word families and those who had up to 5000 word families. The results of Laufer’s study showed that the minimum vocabulary level where the majority of the group scored 56% or more on the comprehension test was 3000 word families. In other words, if a learner is to pass a reading comprehension test in school and to read texts relatively well, he or she needs to have at least 3000 word families in his or her vocabulary knowledge.

However, Hirsh and Nation’s (1992) study suggests that 5000 word families are needed for pleasurable reading. In their study, they looked at novels aimed at young readers, *Alice in Wonderland, The Pearl* and *The Haunting*. The vocabulary of these books was checked against frequency, i.e. how often the word appeared in the text, to achieve vocabulary size figures of 2600, 5000 and 7000 word families. The results showed that a learner with a vocabulary of 2000 word families would only be familiar with 90-92% of the words present in the novel, meaning that “one word in every line would be unknown” (Hirsh & Nation 1992: 3). The results also showed that the learner would need roughly 5000 word families to be able to read an unsimplified novel with “reasonable ease” (Hirsh & Nation 1992: 693), since 5000 word families would allow the reader to understand 98% of the text. However, Laufer (1992:129) states that poor vocabulary size does not automatically means
poor reading skills. In other words, vocabulary and reading scores do not have a direct correlation, since there are other factors at play to affect reading comprehension.

The Coverage Rate Needed for Incidental Vocabulary Acquisition

According to Laufer (1989), learners need to know at least 95% of the targeted text to be able to guess the meaning of a word from the context and to be able to read well. In 1989 Laufer conducted a study that included 100 EFL university students and the aim of the study was to see how much lexical coverage, i.e. knowledge of word families in a given text, is the absolute minimum for the learner to comprehend a text. The participants took two tests: one reading comprehension test and a lexical coverage test. The first test consisted of two texts of a general academic nature followed by a standardized multiple choice test. The second test was a test with open-ended questions. The learners were asked to underline the words they did not comprehend in the texts and the results showed that the learners who had a high score of reading comprehension also had a high score of lexical coverage. Laufer (1989:320) concluded by saying that it is precisely this solid vocabulary knowledge that will provide the learner with enough context for successful guessing, since misconceptions are the result of guessing without comprehension. In addition, the main goals for academic purposes would be to focus on vocabulary expansion for learners so that they have a higher chance to comprehend texts.

Hu and Nation (2000) made a study to investigate what “percentage coverage of a text is needed for unassisted reading for pleasure, where the learners are able to read without the interruption of looking up words” (2000:403). Their participants consisted of 66 adults, pre-university English L1 students who were chosen according to their scores in Nation’s Vocabulary Level Test. The participants had to read a 673 word-long text, which was divided into 4 different versions; all but one had different percentages of low frequency words replaced with nonsense words. All the versions were also simplified to ensure that there was no vocabulary difficulty except for the nonsense words. The participants were given one of the text versions depending on their scores in the vocabulary test, ensuring that they got the right level of difficulty. Two comprehension tests were used, one multiple choice and one cued written recall test, which gave the participants the opportunity to show their understanding of the main ideas.

The results of these two tests showed that the amount of unknown words has a deep
impact on the comprehension of the text. These findings showed that even though the text was reasonably easy, most learners still needed around 98% coverage to be able to read it without assistance. However, Hu and Nation (2000: 423) also state that the results did not mean that 98% coverage is the only way to understand a text when it comes to skills and knowledge. They point out that the participants of the test were first language students and had considerable knowledge of English grammar and were experienced readers. Nevertheless, Hu and Nation also point out that “readability studies show, vocabulary knowledge is a critical component in reading” (2000: 423).

**Incidental Vocabulary Acquisition through Reading**

Several studies in the field have set out to answer the question, how much vocabulary can be learnt from reading. Table 1 shows the focus on vocabulary acquisition through reading in a second language. The methods used for the majority of the groups of students are very similar and involve participants being exposed to the target text/video, whereas other participants were part of control groups and were not subjected to the target texts/video. All groups completed a multiple choice vocabulary test (Pitts et al. 1989, Day et al. 1991, Hulstijn 1992, Dupuy & Krashen 1993). However, Horst et al. (1998) and Zahar et al. (2001) approached this question in a different manner. They did not have control groups but gave their participants a pre and a post test which were identical; a multiple choice vocabulary test. Horst et al. (1998) also gave the participants a word association test. The participants were exposed to the target text after some time of them having done the pre test to ensure they could not retrieve the target vocabulary with ease. In fact, Horst et al. (1998) even noted that their participants had no idea that the test was about vocabulary, as they had forgotten about the pre test by the time they did the post test.
<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Subjects</th>
<th>Exposure</th>
<th>Material</th>
<th>Test Used</th>
<th>Vocabulary Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitts et al. experiment 1</td>
<td>1989</td>
<td>35 ESL</td>
<td>6700 words</td>
<td>Two chapters of <em>A Clockwork orange</em> with 123 nadsat words.</td>
<td>Multiple choice</td>
<td>6.4%</td>
</tr>
<tr>
<td>Pitts et al. experiment 2</td>
<td>1989</td>
<td>16 ESL</td>
<td>6700 words</td>
<td>Two chapters of <em>A Clockwork orange</em> with and two scenes from the video.</td>
<td>Multiple choice</td>
<td>8.1%</td>
</tr>
<tr>
<td>Day et al.</td>
<td>1991</td>
<td>92 High School EFL</td>
<td>1032 words</td>
<td>A short story.</td>
<td>Multiple choice</td>
<td>1/17 words (5.8%)</td>
</tr>
<tr>
<td>Day et al.</td>
<td>1991</td>
<td>200 University EFL</td>
<td>1032 words</td>
<td>A short story.</td>
<td>Multiple choice</td>
<td>3/17 words (17.6%)</td>
</tr>
<tr>
<td>Hulstijn</td>
<td>1992</td>
<td>65 EFL learners</td>
<td>907 words</td>
<td>Advertisement in Dutch.</td>
<td>State the meaning of 12 words.</td>
<td>1 of 13 words (7.6%)</td>
</tr>
<tr>
<td>Dupuy and Krashen</td>
<td>1993</td>
<td>42 ESL</td>
<td>15 pages of text</td>
<td>French text and a video.</td>
<td>Multiple choice</td>
<td>6.6 words above controls.</td>
</tr>
<tr>
<td>Horst et al.</td>
<td>1998</td>
<td>34 EFL</td>
<td>21,232 words</td>
<td>A read aloud novel.</td>
<td>Multiple choice and a word association test.</td>
<td>20% on the MC test and 16% on the word association test.</td>
</tr>
<tr>
<td>Zahar et al.</td>
<td>2001</td>
<td>144 ESL</td>
<td>2383 words</td>
<td>Short novel - <em>The Golden Fleece</em></td>
<td>Multiple choice</td>
<td>7.8%</td>
</tr>
</tbody>
</table>

Table 1. Results of Incidental Vocabulary Acquisition Tests (Source: Personal collection).

It is clear from looking at this table that vocabulary acquisition through reading does occur, although the results are quite low. One of the most interesting findings shown in this table is the varying results. Some results show an uptake of words as high as 20% while others show it as low as 6.4%. The reason behind these results being so varied has been discussed by Zahar et al. (2001). They discussed that the difference in prior vocabulary size of each target group before undertaking the tests of the different studies made thus far could be a contributing factor. That is to say, if a group has a higher prior vocabulary size, that group would require fewer encounters with a new word to acquire it. In other words, the relationship between test group’s prior vocabulary size and text difficulty plays an important
role for the outcome of the study. Several researchers (Nation 2001, Horst et al. 1998) in the field have pointed out the design flaw in these studies, saying that the way the tests were constructed lack control regarding the consideration for other factors of knowing a word: use, form and meaning, which in turn can explain the varied results.

Studies with the Focus on Other Factors of Knowing a Word

Waring and Takaki (2003) and Pigada and Schmitt (2006) have taken the factors of knowing a word (use, form and meaning) into consideration when conducting their studies. Waring and Takaki (2003) focused on answering a number of questions regarding the quantity of words acquired from reading: how many of those words are retained over time, the importance of frequency and whether different test formats give different gain results. Their study consisted of 15 Japanese EFL learners at low intermediate level. They were asked to read a target text and then proceed to fill out three types of tests; a word-form recognition test, a multiple-choice test and a meaning translation test. After 7-10 days, they repeated the three tests to measure retention levels.

Waring and Takaki emphasise the importance of having the right difficulty of texts for their participants and considered the factors of the 95-99% coverage rate of known words as well as the importance of frequency. They used graded readers, which are usually novels that have been modified with simplified text and come in various levels but essentially tell the story of the original novel. The text they used was a grade level 1 reader, *A Little Princess*, that scored 96% on the coverage rate and then added test items (differently spelled words) to the texts. For example, one of the words could be *Smalt* instead of *Sun*, where the context would help the learner guess the meaning.

The results were very clear on the point that different types of tests can show vast differences in the quantity of words considered to be learned. For example, only a few words were learnt but the vast majority were not. However, the majority of the words learnt were later forgotten. The results did show that frequency was important as the words learnt were words that appeared more frequently in the text although half the words learnt were forgotten after three months. From these results Waring and Takaki stated that the participants learnt one new word from one hour of reading in general (2003).

Pigada and Schmitt (2006) conducted a case study where they followed a 27-year-old French as a foreign language learner for one month. They also focused on the 95% coverage
rate and thus and decided to use graded readers. In the graded readers chosen for the test, the participant would encounter around 30,000 words, and the target words were divided into two groups: 70 nouns and 63 verbs, 133 words in total. Moreover, Pigada and Schmitt wanted to focus on more than just word meaning when conducting their study, so they tested their participant on meaning, spelling and the word’s grammatical behaviour. This was tested through one on one interviews where the participant performed three tests measuring the different aims, and these were conducted before and after the reading was done.

Their results showed that a vast quantity of target words were learnt through extensive reading. However, the results were not uniform throughout the three types of word knowledge measured. When it came to spelling, there was a strong increase but there was only a slight improvement in understanding of meaning. There was also an improvement in the grammatically mastery of nouns. Overall, the results showed that there was a 6% increase in all three types of word knowledge. The participants acquired some degree of learning in 87 words out of the 133 target words.

Comparing Pigada and Schmitt’s (2006) results with those of Waring and Takaki (2003), the former stated that their learners acquired around (least one feature of) 14.5 words per hour, which is vastly more than those of Waring and Takaki. However, Waring and Takaki (2003: n/a) go on to say: “these figures, stemming from broader and more sensitive testing than many earlier studies employed, seem to indicate that there is more lexical learning occurring during reading than many of those studies previously suggested”.

The subject of frequency has been mentioned already in this research review, but it is interesting to see what these studies (Nagy et al. 1985, Waring and Takaki 2003, Zahar et al. 2001, Pigada & Schmitt 2006) say about its importance regarding vocabulary acquisition through reading. Frequency is the number of times a word appears in a text and studies have shown that it is a factor in new vocabulary acquisition. However, the results of the studies vary from 6 encounters of the word to 10 encounters and Zahar et al. (2001) state that it seems clear that weaker learners, i.e. learners with a smaller vocabulary size, depend more on frequency than stronger learners do.
5. Discussion
In this section of the literature review, the results from the empirical studies are discussed and connected with the theories presented and they provide answers to our research questions:

- What cognitive processes and strategies are used when learning vocabulary?
- What does research say regarding incidental vocabulary learning through reading?
- What relationship does vocabulary have with reading comprehension?

Furthermore, conclusions are made and suggestions for future studies regarding this area is also discussed in the end.

5.1 What Cognitive Processes and Strategies Are Used When Learning Vocabulary?
To answer our first research question, our findings show that when discovering new vocabulary, which can happen both incidentally and intentionally, words go through cognitive processes that determine where in our knowledge system they should belong (Laufer & Paribakht 1998, Ender 2014, Zhao et al. 2016).

Vocabulary Fields
Laufer and Paribakht (1998) investigated how words are allocated within the three fields of vocabulary in Palmbergs’s (1987) continuum of vocabulary knowledge: passive, controlled active and free active vocabulary knowledge. Results show that words can be organized within the three different fields of vocabulary depending on how well learners know and use the words. One can argue that this way of organizing words regarding learners’ use is connected to Nation’s (2005) criteria for knowing a word, where the learner must fulfil three criteria in order to be able to know and use words: its form, its meaning and its use. Results also show that the larger passive and controlled active vocabulary knowledge the learner has, the greater free active vocabulary he or she has. In connection with these three fields of vocabulary, learners cognitively process incoming words by trying to organise and adapt words with their existing knowledge. When the learner has established and understood the meaning of the new word, this is placed in one of his or her mental fields. Furthermore, one can conclude that the processes described in these studies are well connected to Piaget’s
(cited in Woolfolk 2014) basic tendencies in thinking.
According to Piaget, cognitive processing of organisation and adaptation is used when perceiving new information, and when doing so, the brain is always in search of equilibrium. In other words, learners want new vocabulary to make sense in order to understand it and that is why learners place different types of vocabulary into different fields or “schemes” (Piaget cited in Woolfolk 2014: 55). Thus, it is possible to suggest that words in the passive vocabulary field are words that have not yet achieved a hundred percent clarity by the learner and therefore remain in the status of disequilibrium.

Based on these results, we have concluded that learners process vocabulary cognitively, i.e. in order to understand and make sense of it, learners use their prior vocabulary knowledge to reach the goal: to understand and allow vocabulary to become anchored in our memory. Therefore, it is important that the learner meet the right level of new vocabulary when learning a language, because new information must be able to consolidate and create an equilibrium with already existing knowledge. Balancing new information and the prior vocabulary knowledge contributes to a better development of vocabulary, thus excluding disequilibrium and other uncertainties.

Internal and External Factors for Processing Vocabulary
Another interesting finding regarding cognitive processes is how internal factors can impact on learners’ mental activities and thus affect vocabulary acquisition and language learning. In Zhao et al. (2016) study, results showed that L2 proficiency level, anxiety and having a mastery of learning strategies have a significant influence on learners’ cognitive processes during learning, but that motivation did not. The importance of L2 proficiency level and having a wide range of learning strategies to choose between was expected to be correlating factors. However, what is interesting is that anxiety was a correlating factor while motivation was not, a result which we find quite illogical. Due to the fact that these are affective factors, it is arguable that they can impact on our cognitive system. It is logical that cognitive ability may be impaired if the person in question is in a physically and/or mentally poor condition. This result was also unexpected for Zhao et al. who suspected that their measurement might have failed, because the participants might have interpreted motivation as a static quality in their scale questionnaire.

Based on the results of Zhao et al. and due to the fact that the features are all internal,
one can suppose that they all link to each other and thus can affect cognitive processes and 
vocabulary and language learning. We have also concluded that a higher L2 proficiency level 
and a wide range of learning strategies are only positive aspects as they constitute knowledge 
that the learner utilizes when facing new vocabulary. However, regarding strategies, it also 
means that it is essential for the learner to know what strategies there are to be able to use 
them in different contexts. Therefore, one can argue that it is important to demonstrate 
different learning strategies and give learners the possibility to practice them during their 
education.

**Vocabulary Acquisition Strategies**

Laufer and Paribakht’s (1998) took other internal factors into consideration when 
investigating learners’ processing strategies in vocabulary learning and one of them gave 
unexpected results. Their results showed that having a knowledge of other foreign languages 
did not prove to be of importance for vocabulary learning. The same result appeared in 
Ender’s (2014) study where processing strategies for incidental vocabulary acquisition were 
investigated among Germans learning French. The majority of the participants chose to 
ignore unknown words even though they had studied at least four other languages. Due to the 
fact that a large vocabulary also means a larger passive vocabulary (Laufer & Paribakht 
1998), it is arguable that other language knowledge can be an assisting linguistic tool when 
interpreting the meaning of new words. However, Ender has pointed out that the choice of 
ignoring a word could depend on whether or not the ignored word was interfering with the 
comprehension of the context. This can also connect to Piaget’s (cited in Woolfolk 2014) 
explanation of ignoring data when it is too familiar for the learner. However, as the result was 
unexpected, further research into vocabulary learning in languages within the same language 
family is interesting as there are different patterns in both grammar and structure.

Our research review has also found that based on the vocabulary learning strategies in 
Schmitt’s (1997) taxonomy, learners mostly use memory and determination strategies when 
encountering new vocabulary (Ender 2014, Yazdi & Kafipour 2014, Asgari 2016). It is rather 
clear that all the strategies mentioned can be connect to Piaget’s (cited in Woolfolk 2014: 55) 
basic tendencies in thinking, as the learner tries to make sense of the word while processing it 
to reach an equilibrium, i.e. an understanding of the word. Some learners try to organize and 
adapt vocabulary to their existing knowledge by making mental images or connecting words
to personal experience, while others use practical language tools such as dictionaries.

Nevertheless, to summarize, all learners use different strategies in order to find the meaning behind new words and to make sense of them. We conclude that the choice of strategies depends on how our existing knowledge tries to adapt with new information. In other words, vocabulary which is totally unknown might not always be organized and adapted to our mental system and this requires the learner to use another strategy or simply ignore it. If we have knowledge which could help the adaptation, it is less likely that we would use other aids.

As the participants in Asgari’s (2016) study were ESL learners, they made use of social and metacognitive strategies and this was also expected by the researchers. The learners live in an English-speaking environment which means that it is natural to interact with English speaking people as well as receive input from English media. Asgari also mentions other external and internal and factors that may affect the choice of strategies, such as the context in which vocabulary is learnt, culture and educational traditions, and/or the language proficiency level of the learner.

Based on the results, we have come to the conclusion that learners choose between different strategies when learning vocabulary and that the choice of these strategies depends on both internal and external factors. However, in order to be able to see and study specifically what strategies are used among learners, we suggest that it is important to take into consideration factors that may seem to influence results regarding vocabulary acquisition. Moreover, Asgari (2016), and Yazdi and Kafipour (2014) use data from interviews and personal journals with very vague instructions as to what the participants were to write or say. It is therefore difficult to know if these results are specific to reading and not just to language acquisition in general, since what the participants based their answers on is not known.

General Learning Methods, Strategies and Instructions
Looking closer at vocabulary acquisition outcomes from general methods, i.e. using reading and listening as input, Brown et al. (2008) have found that learners think that reading and reading while listening are good strategies for learning vocabulary. Compared to only listening, these methods also proved to give the best results in vocabulary learning. When testing learners’ vocabulary acquisition, Brown et al. (2008) also measured this through two
different types of tests; a simple translation of target words and a multiple choice test, where the latter gave better results.

Due to the fact that reading and reading while listening had good results for vocabulary learning it can be argued that Brown et al. (2008) study results connect to Krashen’s (1985) Input Hypothesis. Krashen stresses that learning occurs during the input process, i.e. through reading and listening, and the result of what we have acquired is shown through production of language, i.e when writing or speaking. When reading, more contextual data is provided for the learner to interpret, which in turn initiates cognitive processes when trying to understand and retain new vocabulary. Additionally, one can state that using more than one input when learning is an advantage as it provides additional information to process, which allows learners to use multiple cognitive processes in order to understand and retain vocabulary. We draw the conclusion that learners perform better when the learning and test settings provide more context for the learner to process. This makes the perception and retention of words easier as they are put in a context and appear more frequently.

Research has shown that there are different strategies within the method of reading. This means that the method of reading can be used in different ways depending on what the aim and goal is. We have found that learners prefer direct instructions to indirect instructions (Naeimi and Chow Voon Foo 2015) when using reading as a learning method, because direct instructions are easier to follow. Based on their results, we conclude that vocabulary acquisition takes place through reading, but students should receive some sort of structure or guideline in order to acquire vocabulary better.

One can argue that this is connected to Piaget’s (cited in Woolfolk 2014) basic tendencies in thinking and his theory of equilibrium. If learners get continuous direct instructions, it keeps their processing of new information through organisation and adaptation in balance, where the brain is in a harmonious state between perceived information and existing knowledge. We have also come to the conclusion that indirect approaches might instead profit learners of higher level of language proficiency, because indirect instructions are considered to be more diffuse and not completely clear, although the use of these type of instructions may be good for older students who are expected to learn more independently. In order to make a proper measurement, the learners age should be considered.
5.2 What Does Research Say Regarding Incidental Vocabulary Learning through Reading?

Our findings show that learners’ prior vocabulary knowledge and the level of the target text is essential to the outcome of vocabulary acquisition. Kintsch's (1988) Construction-Integration Model illustrates this relationship well. During the integration process, where context is applied to the learners’ proportional text base, prior vocabulary knowledge is essential, since it is through this prior knowledge the learner tries to create coherence in what is being read. If the learner does not have adequate prior vocabulary knowledge, the proper association connections cannot be made and coherence not completed. In other words, the learner cannot comprehend the text. Moreover, as Hu and Nation (2000), and Laufer (1992) have shown, without 95-98% coverage rate of the words in the target text, the learner will not be able to understand the text, as well as not be able to guess new words from the context. This shows that without enough vocabulary knowledge, comprehension cannot be achieved and without comprehension new vocabulary knowledge cannot be acquired.

Incidental Vocabulary and the Importance of the Right Text Difficulty

Several studies also showed that learners do acquire some levels of new vocabulary incidentally through reading (Pitts et al. 1989, Day et al. 1991, Hulstijn 1992, Dupuy & Krashen 1993, Horst et al. 1998, Zahar et al. 2001), but as the results showed, the scope of how much they learnt varied greatly. Zahar et al. (2001) pointed out that this can also be tied back to the importance of prior vocabulary. They brought up the importance of having the target text not being too hard or too easy, but just within the range of what is needed for comprehension. This connects back to Piaget’s (cited in Woolfolk 2014) basic tendencies in thinking, where the state of equilibrium is required for the learner to make sense and understand vocabulary and context. If the task to be learnt is too hard or too easy, learners are in a state of disequilibrium where the learning becomes a difficult task.

Waring and Takaki (2003) showed that frequency also plays a part in vocabulary acquisition as they noted that the words that were acquired during their tests were the words that had the highest frequency throughout the test. Zahar et al. (2001) made it clear in their conclusion when they said that weaker learners with a smaller vocabulary size depend on frequency more than stronger learners. We feel that it is quite clear that it is important to know learners’ prior strategies and level of vocabulary knowledge, as well as being able to give the learners individualized texts in order to maximize their incidental vocabulary
learning through reading.

**Internal and External Factors Affecting Vocabulary Acquisition**

A concern brought up by several studies (Zahar et al. 2001, Laufer 1992, Nation 2001, Horst et al. 1998) is that the majority of the studies regarding how much vocabulary is learnt have not considered different factors that come into play when learning new vocabulary through reading, such as the ones we have previously discussed: prior vocabulary knowledge, difficulty of the text, frequency of words and learners’ choice of strategies. Similar factors, both internal and external factors, were also mentioned in studies investigating cognitive processes and strategies (Laufer & Paribakht 1998, Zhao et al. 2016, Ender 2014, Asgari 2011, Naeimi & Chow Voon Foo 2015) where some factors were taken into consideration meanwhile others were excluded.

One can argue that internal and external factors: affective and cognitive features, the environment in which the language is taught or what the teaching tradition is could be an influence on learners’ cognitive processes and strategies, and thus vocabulary learning. This means that many of the tests for vocabulary acquisition through reading do not measure all aspects of vocabulary learning, and thus the results might be essentially considered skewed.

Many of the studies focus on meaning only (Pitts et al. 1989, Day et al. 1991, Hulstijn 1992, Dupuy & Krashen 1993, Horst et al. 1998, Zahar et al. 2001) and if we look at Nation’s (2005) criteria of knowing a word, there are three groups to be considered; 1) form, spelling, sound and different word structures, 2) meaning, know its concept and association with other words, and 3) use, how to use it in context, written and orally. This shows that the majority of the studies have only focused on one third of the meaning of words, when assessing how much vocabulary can be learnt through reading. Laufer (1992: 129) also states that poor vocabulary size does not automatically mean poor reading skills, but that there are other factors at play that affect reading comprehension.

**5.3 What Relationship Does Vocabulary Have with Reading Comprehension?**

Since we now know that some vocabulary acquisition does happen incidentally through reading, it is obvious that they have some sort of relationship. When reading, one does not comprehend a text without adequate vocabulary and one does not learn new vocabulary without comprehension. The relationship between the two is strong as vocabulary knowledge
and comprehension go hand-in-hand. Laufer (1989) stated that one cannot guess the meaning of a word from context if one does not know at least 95% of the words in a text. Laufer (1992), Hirsh and Nation (1992) also stated that without 3000-5000 word families, i.e. vocabulary knowledge, comprehension is impossible. This proves that comprehension is needed for incidental vocabulary acquisition, and vocabulary is needed for comprehension. Reading has an abundance of context, easily accessible at the learner’s own pace as well as it being retrievable whenever the learner needs to refresh his or her memory regarding the context in question. Brown et al. (2008) emphasised this when they stated that reading is a good method for learning vocabulary. Compared to listening, this method proved to give the best results regarding vocabulary growth.

The relationship between reading and vocabulary acquisition is also strengthened by Krashen’s (1985) view about reading as a learning method. This method provides a bigger foundation of context for learners to aid them in their integration process, which in turn leads to comprehension and vocabulary growth. It is safe to say that vocabulary is a strong predictor for comprehension of text, and that vocabulary can be learnt from reading. Comprehension of text, prior and new vocabulary knowledge acquisition go hand in hand; they are a continuous loop of mutual benefit as illustrated by the figure below and their relationship could not be more evident or stronger.

![Figure 1. Loop of Comprehension and Vocabulary Acquisition](image.png)
5.4 Conclusion
This study has reviewed incidental vocabulary acquisition through reading: how vocabulary is learnt, how vocabulary is acquired through reading and the relationship between vocabulary and reading comprehension.

We have found that there is a strong relationship between reading comprehension, vocabulary and vocabulary growth. They are mutually beneficial and one does not grow without the other. The results have also shown that vocabulary is an essential part of not only text comprehension but also communication through language, which is usually the aim of language learning. We conclude that vocabulary should play a bigger part in language acquisition as a whole and that reading is one way to achieve vocabulary growth. We have answered our research questions and conclude that vocabulary can indeed be learnt from reading incidentally.

The studies of vocabulary acquisition through reading showed such varied results as well as not considering the many different factors, both external and internal, regarding vocabulary acquisition. Moreover, the studies did not take into consideration the criteria of knowing a word (Nation 2005), when measuring their results of vocabulary acquisition. This leads us to believe that there is more to learn when it comes to vocabulary acquisition through reading.

Additionally, second language learners should receive a more direct approach to vocabulary acquisition since the uptake of incidental vocabulary through reading is so small. Vocabulary acquisition is critical for second language learners since they need to achieve lexical independence in a short period of time. However, we stress that vocabulary is learnt incidentally through reading and that the relationship between reading comprehension and vocabulary is evident. This beneficial relationship is best stated by Krashen himself: “Free voluntary reading results in better reading comprehension, writing style, vocabulary, spelling, and grammatical development” (2004:12).

As future teachers of language in Sweden, we have to take into consideration the Swedish national exam that showed poor results for students’ reading comprehension. Furthermore, the Swedish curriculum emphasizes that comprehension of text is one of the requirements to pass English. It is then clear that we need to focus more on helping students to strengthen their vocabulary growth through reading, thus improving their comprehension of text.
5.5 Future Research
We want to strongly encourage future research on incidental vocabulary acquisition through reading, but with a greater focus on other factors that can affect the cognitive learning process while taking into consideration all of the criteria of knowing a word, not only focusing on meaning. As we stated in the aim, we intend to use the results gained from this study to advance our future research. We are interested in conducting a more direct approach to vocabulary acquisition through reading, using direct strategies and also taking in the different factors of knowing a word when measuring vocabulary acquisition, such as age, gender and prior language knowledge other than the target language.
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Appendix

Initially we chose a subject and we took time separately to read up on studies first encountered through our gathering method. We then met to discuss our findings and made a first selection of data, which showed the gaps we had in our data. This lead us to continue our search for more studies to fill these gaps as well as literature to build on our theoretical background. When we had our first meeting with our supervisor, Pamela Vang, she gave us the greenlight on our chosen thesis questions and topic.

At this point we began our production of the literature review. We worked through one chapter at a time where we produced half of each chapter separately. Regarding the research review, we were individually drawn to separate parts of it. Tina wanted to cover the cognitive processes and strategies of incidental vocabulary acquisition, which she did. Whereas I, Sara, wanted to cover the comprehension and incidental vocabulary acquisition through reading part, which I did. Since we both live in different cities from one and other, we worked on the bodies of text separately in Google Drive and met twice a week to compare our work and compile this work into a finished product. The days we did not meet, we spoke through skype to go over ideas or directions of our review.

Even though we worked on entire sections separately, during our meetings we still worked with each piece together making the text coherent and also educating one another. When it came to the planning of our workload, we followed the writing schedule provided by Nigel Musk. However, we moved the schedule forward one week, giving us an additional week to work on our research review. Overall, we worked in a systematic way, by finishing up a section of the literature review to almost completion before moving on to the next section, i.e. data and method, background, etc. We had weekly deadlines set up by ourselves, to ensure completion of this work.

Since the field of vocabulary acquisition through reading is a vast research area and therefore difficult to investigate, even with set search limitations, we thought that we did not have enough time to get a fair and accurate view of what is considered up to date and who or what is considered relevant to the field regarding theories or empirical studies. However, all things considered, we think that we have a good representation of data and think that this literature review has better equipped us for our future study in vocabulary acquisition through reading.
I, Sara Gutierrez Wallgren, felt that during our work processes Tina and I have added different strengths and qualities to the finished product. When we had our moments of struggle we were there for one and other and it felt like we worked as a team. Whenever we worked apart, it wasn’t hard to get a hold of one another for a chat or someone to bounce ideas off with. Tina has provided a lot of the drive and structure, which is something I need while working on something as big as this and without her I don’t think I would have completed this task. However, I do feel that I added a much-needed critical eye on the project, where I would question the validity of much of what we wrote which in the end, resulting a better product. I felt that the way we chose to work was a good method, where we produced text on our own, and then met up to review the text produced, working to make it into a coherent piece.

I, Tina Erlandsson, feel that our cooperation during this process has been good. Due to the fact that this has been our first big project together, I felt that we both sometimes struggled to interpret the guidelines properly. However, through discussing the issues together and with the help from our supervisor, Pamela Vang, I felt that we solved any uncertainties that came our way. During our writing process, I felt my weaknesses have been complemented by Sara’s strengths and I have complemented her weaknesses with my strengths. In other words, I feel that we would not have been able to complete this body of work separately.