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Studies and Education**  
15 Credits, First Cycle

**Vocabulary learning with flashcards**

*Vokabulär lärande med bildkort*

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# Preface

Before we showcase our research we would like to give our sincere thank you Alexander Brauer, our supervisor. Who has given us support and encouragement throughout the project.

Overall the following research paper was constructed and formatted via cooperation during work sessions, a minor number of aspects within the contribution was different between the two participants. Namely, Anica worked more on the structure and the learning theories while Wilma adjusted the language and grammatical construction.

We hereby certify that all parts of this essay reflect the equal participation of both signatories below:

The parts we refer to are as follows:

- Planning
- Research question formulation and selection
- Article searches
- Presentation of the findings, the discussion, and the conclusion

Authenticated by:

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# Abstract

In this study we researched varying aspects of using flashcards to increase vocabulary, these aspects include method variations, as well as variations to the flashcards themselves. Through this text it is conveyed that vocabulary is important for communication. The aim of this research is to reflect upon the various flashcards variances and understand their effects upon vocabulary teaching. To research both writers searched for relevant articles together, these articles were agreed upon together. Each researcher read and summerized half of the articles each. Afterwards, the other researcher read the same article and inspected the written summaries. The results of the various research papers generally agreed with theories of learning. Multiple different learning theories were used as basis for this research, and the findings of the research articles are overall in agreement with these theories. The different drill methods, altering the flashcards themselves and the introduction of digital flashcards were found to be in agreement with the relevant learning theories. The different flashcard alternatives were found to have positive results, however these positive results were in different aspects. Some results found the students had larger vocabulary, some other results found the students had longer retention of the vocabulary learnt, and some had increased motivation.

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# 1. Introduction

One of the most basic aspects of every language is words. Words could be written, where it is important to have good spelling to understand them. Words could be verbal, where it is important to have good pronunciation to understand them. Words could even be pictorial. Pictorial words are images that can represent words and actions but are not read via letters, thus it is important the image is well crafted to be understood. Pictorial words are often found on flashcards. Words can represent actions, objects and creatures. They could describe colors, shapes and feelings. Words are the foundation to sentences, questions and grammar. Learning words is a necessity when learning languages. How many words does one need to learn, does a learner need to know every word to communicate? One does not need to know the word papyrophobia, the fear of paper which may induce panic when seeing or writing on paper (Cleveland Clinic, 2022), while one is speaking to a neighbor about the weather. To form a rough estimate of how much vocabulary one may need, according to Müller (2018), a reader needs to, on average, know roughly 8,000 words to read a newspaper in a foreign language. To speak a language, pupils must learn a large amount of vocabulary.

Due to how important vocabulary is, and how much vocabulary is needed, we have researched vocabulary learning through the methods of flashcards. Specifically we have researched differing flashcard aspects while learning vocabulary and what results they bring. The methods of flashcards include different drill methods IR, SIR and folding in technique. The different mediums of flashcards are student drawn images, augmented reality flashcards and flashcards in the form of digital games.

In the book *Teaching young language learners* by Pinter (2017), there is a statement that teachers need to use different materials and approaches for different students. This combined with everyday practices can lead to stimulations for individual students. Children pick up words all the time, but that does not necessarily mean that they remember the words or use them in their language. They can recognize words and understand their meaning through context in a song or story. Students can learn words in their second language that they have not learned in their first language yet and this is a common thing in a linguistic environment. The next level for students would be knowing an item of vocabulary, spelling it accurately

and knowing the grammatical information. This will further on lead to a student knowing a word and being able to know the synonyms and antonyms (Pinter, 2017). Languages have a large number of words, the English language has 100,000 to one million words. Children can learn thousands of words in their first language, but for second language learners it is different. The difference is that the students are not exposed to big samples of the language and therefore it is harder for them to learn a vocabulary in the English language (Lightbown & Spada, 2015). Due to this lack of organic contact with L2, it is important that the vocabulary learning process is qualitative.

Children that are in the same age group are individuals with different strengths and opinions as learners. At the same time the students can be similar in a way that they share characteristics, for example the students can have a similar attention span or interest. The teachers are obligated to use different techniques and materials for different students because every student needs a different approach. With the help of conversation, language analysis and the observations of the students that the teacher has, the teacher can understand the children they are working with in a more nuanced way. With everyday practice this can lead to stimulations during the lessons for every individual student (Pinter, 2017).

Students and the activities are not the only factors when learning, it is also important to view the teacher and their ability. Vygotsky had a theory that the social environment had a great impact on students. He stated that the teachers and parents have powerful effects on students. Vygotsky had a concept, he called it *Zone of Proximal Development (ZPD)* and it describes the knowledge a student already has and the knowledge a student can achieve with help from a teacher or parent. The ZPD is seen as a way to work with children with the knowledge they already have and slowly build on that knowledge (Pinter, 2017) When the student gets the support from the teacher and its surrounding, the student will achieve the ZPD and get motivated and encouraged to learn. With the support the students do not only achieve motivation, this can lead to more accessible vocabulary development as well.

Within this paper multiple important terms are used. These terms are shortenings of longer terms or terms which we have used specifically for our paper. EL is a common term when discussing English Language learners as EL stands for English Learners (EL). Similarly, English Language Learners can be shortened down to ELL. L2 is a shortening which stands

for Language 2, it is the second language of the target, L2 learners are the learners of a second language.

The Swedish syllabus states that language is our prime utility so people can think, communicate and learn (Skolverket, 2022). With the help of several languages, students can gain various perspectives on the world. The English curriculum shall give students the opportunity to develop their knowledge and understanding of the English language. The purpose in the syllabus is that the tuition is supposed to give students a different basis to develop their multiple languages and the ability to use them. Through the lessons the students will be given the opportunity to develop their communicative ability. This means that students are supposed to understand, speak, write, formulate and adapt their language to different situations (Skolverket, 2022). The school is supposed to give students different tools for them to learn, understand, create and communicate. The central content for grades F-3 mentions that the students need to know simple words and phrases in the student close area, as well as simple words and phrases for simple conversations. (Skolverket, 2022).

## 2. Aim and Research

Vocabulary is one of the foundational bricks to the languages we speak, its importance in communication, language and daily use can not be overstated. However, people and students must learn a significantly large portion of vocabulary, such a large sum that it may be intimidating to new language learners.

As vocabulary learning is such an important aspect of English learning, the aim of this paper is to discover how vocabulary learning is affected by flashcards and how flashcards can differ in their usage. How the images are obtained, how the drills are structured and how the drills are performed. This research paper is particularly focused on students in preschool and elementary school, in the grades of preschool to third grade.

- To what extent do flashcards benefit vocabulary learning for preschool and elementary school students?



## 3. Method

This research paper used one primary method for gathering various articles and research papers which studied the effect of using flashcards while teaching English language vocabulary. Our main method of gathering articles was via electronic databases.

### 3.1 Gathering sources

The process of gathering sources started within the libsearch system, Google Scholar, EBSCO and ERIC. The restrictions which were used for all searchers were “Electronic and printed materials via the library” and “Scholarly and peer review”. The research papers were also limited to no older than the year of 2010 with the purpose of the articles being relevant to today's learning culture and research practices. However theories which are older than 2010 were used, when used in a source which are published after 2010. In the end, the articles and research papers used were found via EBSCO as they were most relevant to our research.

Terms that were used for finding sources were: English language learners, ELL, EL, ESL, vocabulary, vocabulary learning, vocabulary development, flashcards. “English language learners” and the different shortenings were used to narrow down sources to learners of the English language as we are aiming to research one aspect of the English learning process. ELL, EL and ESL were the terms we used, as alternatives to “English language learners” to ensure that research articles which used a different term weren’t missed. “Vocabulary”, “vocabulary learning” and “vocabulary development” were three terms used to narrow down the research sources to the learning aspect that we are researching. The variations of the term “vocabulary” were explored to not miss possible papers that would be lost from a slight term difference. “Flashcards” was used to specify the activity we are researching. These terms gave at one point 34 results, however these results were narrowed down to 5 when we added “elementary school” to narrow the age ranges.

### 3.2 Inclusion criteria

Some of the studies and research papers were excluded due to the age group that was used in the research. Our main aim is the age group of preschool and elementary school students who generally have a different disposition and learning abilities than older and more advanced students. The research that was based on high school and university students were thus excluded. There were five sources that were used as they filled our criteria listing and were appropriate and relevant for our research. The groups used were also not too old and in a closer age range than the research papers where the group was university students, which were left out.

<b>Inclusion criteria</b>
Demographic age elementary school
Published after 2010
Researched regarding vocabulary development
Research conducted on flashcard methods
Peer reviewed
The language researched was English

### 3.3 Summarization

After finding the most relevant and intriguing articles which aligned with our criteria for use, we divided the articles between the writers. Two articles each and one final one which both read individually. While reading, each article was summarized in a separate document. The summarization was used to describe each article to the other individual, when questions arose the summaries were filled out to compensate for any previously lacking sections. After the summaries were shared and expanded upon, the writers exchanged articles and read ones which the other writer had previously read. Through this process both writers were involved and informed on all of the research papers found. This exchange also ensured that the summaries did not miss any important aspects which one writer may have overlooked while

the other remembered. The article which was read by both writers individually, received two summaries which were compared afterwards and put together into one all encompassing summary.

## 4. Results

Due to how important vocabulary learning is, we have researched various flashcards with differing aspects. The methods researched included five variations of flashcards activities. The methods of flashcard activities included variation of drill execution, digital execution, game based execution and the prospect of drawing the images of the flashcards. Firstly, two drill variations were compared and contrasted to each other.

### 4.1 Gaming inspired flashcards

The study by Tang, Joni Tzuchen (2023) is a comparative study that took place in Taiwan. *Game based learning* (GBL) is a way for children to learn. The aim and question in this study is to incorporate a traditional way of learning with GBL and see how it affects students' vocabulary acquisition and how different situations affect the English acquisition? GBL is a learning game for students that affects the learning results and can as well be used as a motivation for students to learn and develop. With the use of vocabulary games the students can improve their vocabulary acquisition and the games can affect the students self learning. By using GBL continually, the students' vocabulary memory can improve depending on how much the game is used, it can both be effective in short term and long term vocabulary learning.

The method in this study (Tang, 2023) was to have instructional flashcards, there was a driving game and the instructions were on flashcards. The preschool students were divided into four groups and two of them used traditional flash cards with instructions. The flashcards had vocabulary words on them and the students learned them each day. These two groups were called A and C. Group A had two word flashcards and group C had three word flashcards. The other two groups, B and D, were gaming first groups. They were gaming with English instructions and learning what they mean through gaming. Group B had two words in their flashcards and group D had three words. The words changed every day.

Another game that the students played was the “fishing game”. In the game there were flashcards with different objects and one of the objects was fruit. When the teacher said a fruit in English the students would then pick up a flashcard with the correct picture. On the flashcards, beside the picture, there were words that described the picture as well in English. The students would be observed and later discussed with child developed specialists, teachers and the principals to make sure that the GBL was giving positive results (Tang, 2023).

The study (Tang, 2023) had four steps and the first step was to interview the kindergartens and to invite students who have never learned the vocabulary words to engage in the study. The second step was to have a discussion with the teachers about the words. The words were chosen by the teachers so that the words were unknown words for the students and chosen from the curriculum. The third step also included the teachers, they were given lesson plans and a vocabulary list that they would follow throughout the study. On the last step there was a posttest after all the lessons and the goal was to see if the students could remember the different vocabulary words. The teacher would then record the student's answer.

The tests showed that the students increased their vocabulary knowledge and the statistics between the pretest and the posttest (SD). The groups B and D scored slightly higher than A and C. The two word groups had higher scores than the three word groups. Another effect on the results that can be considered was the different environments in the different preschools (Tang, 2023).

Groups	Average	SD
Flashcards + 2 words	84.26	11.37
Tablet + 2 words	90.50	18.21
Flashcards +3 words	80.42	20.88
Tablet + 3 words	87.50	11.41

## 4.2 Drill methods

D. A. Klingbeil, S. A. January and S. P. Ardion (2020) researched the effectiveness of two flashcard methods to teach some of the most common English words, so called “high frequency” English words, to EL. They researched this at two elementary schools in the midwest USA. The participants were identified as EL by the schools, via means not known

by the authors, and nominated by the teachers as needing more assistance. These were the only criteria for the participants. The students performed a pretest, 90 minute intervention finalizing with a posttest. All students were tested with both methods of incremental rehearsal (IR) and strategic incremental rehearsal (SIR). The IR method consists of using a selection of known words and unknown words in a flashcard set. A word is considered known if the student reads it correctly within 2 seconds of the word being shown. The IR method uses the same set of known and unknown words through the entirety of the drill. The SIR method uses known and unknown flashcards like the IR method, however, when words advance from unknown to known words, one known word is removed and a new unknown word is added. The flashcards in the IR drill method change and alter depending on the learner's mastery of the previous set of flashcards while the SIR method changes during the drill session. Klingbeil et al. (2020) found that both IR and SIR drill methods had positive results. However the vocabulary learnt with the IR drill method was smaller than the SIR method which had significantly more learnt words.

Another study is the folding technique that was published in 2012 by Craig A. Albers and Alicia Hoffman. They researched two questions targeted at third grade English language learners (ELL). Does the folding in technique and self graphing procedures improve vocabulary sight word recognition and will increased vocabulary sight word recognition improve the reading fluency? Craig and Hoffman (2012) highlighted how there's a major lack of empirical data which investigated ELL and ELL related issues. When researching the articles published between 1995 and 2005 only 3% of the articles touched upon ELL problems. It has been observed that while reading, ELL's reading comprehension is lowered when they encounter a word which they do not recognize. To target and improve students' sight word recognition and develop the reading comprehension, one can use a variety of flashcard drills.

Craig and Hoffman (2012) researched the "Folding In Technique". The Folding In technique is characterized by having unknown words within a large set of known words. The repeated exposure to known words while also teaching new words allow the students to gain higher vocabulary retention and more fluent responding. The method in this study was to use 210 words for each student on flashcards. 63 words were not known for the students and 147 words were known. On the back of each card there was a definition for the word. The words that were used were chosen directly related to the curriculum, an example is noun words. The

unknown words were considered learned when the students could pronounce the words correctly and give a correct definition of the word.

The three ELL students who participated in the research paper by Craig and Hoffman (2012) were from the third grade, the school was located in a midwestern state of America. The method was to have reading interventions with the ELL students. Before the intervention sessions the students were reading probes for one minute and with that the researcher could see the students fluency score. Three reading probes were used and they were based on the curriculum. To help identify the reading ability of the students there were five questions for each probe. Students' instructions were to read out loud for one minute to see how many words they could pronounce correctly. For every word the students could pronounce, they got a personal score.

The intervention then started with flashcards that had three unknown words for the students and seven known. The ten words were also used previously in the probes. The unknown words were presented to the students, the interventionist pronounced them, defined them and used the words in a sentence. The students were then asked to repeat the process, pronounce the words, define them and use them in a sentence. With the known words the students were only asked to pronounce the words. The unknown words were then placed in the pile together with the known words where they got mixed together and the students were asked to read all the words for one minute. This technique gave students a new reading score.

Craig and Hoffman (2012) found the Folding In Technique to be a positive method for students. Students got a higher percentage in the reading score and that stated that the students' fluency and understanding of the words were increased.

### 4.3 Multimodality

The two flashcard methods carried a minor, albeit, notable difference in results and effectiveness. However, the process of creating their own pictures on the flashcards caused a significant difference. Ou Kuo- Liang, Tarnng Wernhuar and Chen Yi-Ru. (2018) researched the effectiveness of flashcards with pictures drawn by the students compared to the pictures on commercially available flashcards. In the study, 76 sixth grade students in Taiwan were

divided into three groups. Group one drew the flashcards and performed drills with them, group two performed drills with the drawn flashcards which group one had made, and the final group used flashcards with commercially available pictures. Before the intervention period the students performed a pretest. During the intervention period, the students performed 15 minute drills every day. After the intervention period the students performed a posttest. Both tests were multiple choice questions. Ou et al. (2018) found that the students who worked with flashcards drawn by the students had increased test results, along with teacher observations of increased motivation in the group who drew flashcards for themselves and other students. Flashcards with student drawn images were found to have a notable difference when learning vocabulary.

In the year 2019 Rou Wei Chen and Kan Kan Chan conducted a study in Macau. The study searched to find out if augmented reality (AR) flashcards would show significant improvements between the pre and post test, if there would be significant difference between AR flashcards and traditional flashcards, finally the study aimed to find out the teachers opinion on AR flashcards. The research's participants included 98 students between the ages of 5 to 6 and 4 teachers. These participants were divided into four classes before the intervention. These four classes were divided into two groups, the Intervention Group (IG) and Control Group (CG). The CG group used the traditional paper flashcards, Chen and Chan (2019) define traditional flashcards as paper which bears basic information, such as a word and the associated image. Chen and Chan (2019) explain that students typically like flashcards as a learning instrument, the flashcards allow students to associate the words with images. Traditional flashcards have under previously conducted research been found to be very beneficial for students while learning. However Chen and Chan (2019) decided to research the effectiveness of using Augmented Flashcards as opposed to traditional flashcards. Chen and Chan (2019) found that both flashcards resulted with significant improvement. The effect of AR flashcards was measured at the effect size of 2.6, while traditional flashcards were measured at the effect size of 2.1.

Prior to the intervention which Chen and Chan (2019) researched, the teachers who participated were questioned regarding their views on AR flashcards. The teachers stated that they are interested in using new technology as long as they are provided with proper materials and instructions. Post intervention interviews revealed the kids were very intrigued and motivated to work with the AR flashcards. The activities were found to be highly



enjoyable. Though the teachers were concerned with information overload as well as the flashy animations overshadowing the knowledge that the children were supposed to retain.

# Discussion

Learning vocabulary is an important foundational brick to learning a language, therefore it is vastly important to have effective ways to learn vocabulary. We have researched the usage of flashcards to learn vocabulary, however each research used a variation to the standardized traditional flashcard. Lightbown and Spada (2013) state the importance to differentiate the methodology and material so that the learning is optimized for each student, that basis is why we researched variations in drill methods, multimodality and even the usage of game based flashcards. The results found showed overall positive and favorable results with their interventions. These positive findings are overall aligning themselves with previously established learning theories, such as the benefit and importance of individualized learning, challenging but attainable tasks and the importance of meaning and meaningful learning. To clarify the findings, they will be contrasted with the theories we find relevant to the results.

Vygotsky's theory of learning claims that to learn the learner must have an environment which encourages learning. This environment is named the Proximal Development Zone. This zone is described to give the learners enough challenge to develop their abilities and knowledge, with enough support from those around the learner to assist the development (Pinter, 2017). With today's children gaming and gaming in school can lead the learning environment to high stimulations in an optimistic way, it can change the students expectations in school and the students gaming habits. Nevertheless, by using vocabulary games the students can improve their vocabulary acquisition and the games can affect the students' self learning. Together with giving students gaming tools and giving them the opportunity to explore new words through gaming, can benefit the students' self confidence with the words. Using GBL continually, the students' vocabulary memory can improve and an encouraging learning environment can be established (Tang, 2023). As stated, with GBL, the students will be motivated to learn because they will learn in a fun way and the students will be familiar with the concept since they are gaming in their free time. When the students then learn the words in the game, the teachers can change the words so that the students will have a challenge and learn new words.

When we look at the Swedish syllabus, it is stated that students should be given the opportunity to develop their understanding, speaking and writing. They should also be given tools to learn, create and communicate (Skolverket, 2022). The Folding In technique resulted in the students reading fluency was higher and the understanding of the words increased (Craig & Hoffman, 2012). With this technique that was found to be beneficial the syllabus requirements can be achieved. This is an opportunity for students to develop their vocabulary by learning the words and what the words mean with the help of flashcards. They also learn to pronounce the words and by learning new words the students can easier learn to communicate in the English language. Using this technique in school can lead to vocabulary development in students. However to learn new words the words must have meaning for the students, this can be achieved by creating meaningful interactions.

The importance of meaningful interactions is expanded on by Lightbown and Spada (2013). They express that children who are learning vocabulary must have multiple meaningful interactions with the words. These interactions must also be framed in a way which makes the meaning of the word abundantly clear. Ou et al. (2018) explored the effectiveness of flashcards when the students drew their own flashcards images. The reasoning was that commercial images may hold a minor hindrance to the students' learning capacity, considering commercial images are created by an external source. However, when the students are allowed to draw their own images they draw from their own understanding and mental image of an object. As the images are created by the students themselves they are more student focused and student adjacent, the meaning is clearer to the students who used them. Ou et al. (2018) found that the flashcards which used the student drawn images had more favorable results than the commercial images. Students who drew the images themselves had higher motivation and the most increased vocabulary learning. These findings align themselves to what Lightbown and Spada (2013) have stated in their theory of vocabulary learning. To use drills with more student adjusted material, the material the students themselves created, the students have a better chance for learning the material, which results in increased learning.

When using augmented reality flashcards the difference is measured at 2.6 which Chen and Chan (2019) states is a large effect when using Cohen's classified effect sample. The traditional flashcards effect measured at 2.1, which also is a large effect. These two variations which Chen and Chan (2019) researched showed large, positive, effects, however with a

small difference. Chen and Chan (2019) states that this difference is notable but not significant. Pinter (2017) states the importance of variation to engage as many students as possible. Students are individuals, they learn in individual ways, which is why Pinter (2017) emphasizes the need for variation in activities and materials when learning. In Chen and Chan's (2019) research article, both methods showed significant positive benefits for learning vocabulary. The results of the AR flashcards and traditional flashcards had a difference in the effectivity measure, however the authors stated this difference to not be significant. Due to Pinter's (2017) statement regarding students' individualism and the need for variation, it suggests that the difference in results found by Chen and Chan (2019) may be because of the students' own variations in learning. If the CG and IG switched methods, theoretically the results could be closer in effectiveness score, or the difference would be larger, or the traditional flashcards may have a higher effectiveness score. Pinter (2017) describes the importance for variation and to acknowledge students being individuals, the positive results in both approaches found by Chen and Chan (2019) may be an indication of this individualism within students. Augmented reality flashcards is one approach to differentiate the material of flashcards, Klingbeil et al. (2020) researched the differentiation of drill methods.

Klingbeil et al. (2020) state that English L1 speakers and English L2 learners should not be believed to have the same learning methods. What Klingbeil et al. mean by this is that L1 speakers have a large amount of research conducted to explore the vocabulary learning methods and effects of these methods. However, learning a second language is not inherently the same as learning a first language. Klingbeil et al. (2020) state that it is problematic how little research has been conducted with L2 learners. Klingbeil et al. (2020) expressed that L1 learners generally show more favorable results when using the IR method of flashcard drills. The IR method refers to when the drills are performed with a set amount of cards each drill, unlike the SIR method, IR drills use a set decision of words through the whole drill. The SIR method changes the words during the drill, when a word is considered known, a new word will be added. However, through the study it was found that L2 learners generally had improved results when using the SIR flashcard drill method. Klingbeil et al. (2020) have found that L2 learners have an improved learning when using a different method than L1, even if it is the same language which is being researched. This find aligns with Pinter's (2017) statement that children as individuals will learn differently with different methods. Klingbeil's et al.'s (2020) find shows that the difference is notable – however, there is not a

large difference between the two methods. IR and SIR both showed favorable results with students, this aligns itself even more with Pinter's (2017) statement of individualism among students. While the SIR method generally had a more favorable result when looking at the overarching test results, there were still students who showed increased development when using the IR method.

After analyzing all of these approaches, we came to the conclusion that all the approaches had positive outcomes without a significant difference in results when compared to one another. A teacher should have different approaches and materials for different students as they all need different kinds of support and different levels of support through their learning (Pinter, 2017). The different approaches to flashcards support this claim. With GBLs approach there was a positive outcome with the digital flashcards and the students were motivated to learn in a fun way. The teachers can adapt the words to the students so that the approach is more student-centered (Tang, 2023). The fold in technique used a repeating approach for the students to learn. The words that were used were not student-centered, they were taken from the curriculum and had a definition on the back of the flashcard. This way of learning also gave a positive outcome with the students' vocabulary expanded. (Craig & Hoffman, 2012). Two drill methods IR and SIR were in one article compared and contrasted against each other by Klingbeil et al. (2020), while one method had generally higher positive results in one case the student responded more positively to the "less effective" method. To review what a student or class needs most is a beneficial way to individualize the learning experience for the students. One approach which was largely positive compared to the control group was allowing students to draw the images of their flashcards as found by Ou et al. (2018). To allow the students to create their own images allowed the images to be student adjacent, allowing the word's meaning to be more clear for the students Ou et al. (2018). While in the research article written by Chen and Chan (2019), the approach of AR flashcards was compared to traditional flashcards. That's why it is important to have different materials and approaches with different students.

# Conclusion

In our findings we discovered multiple aspects of flashcards usage within teaching which bring positive results within vocabulary learning. Among these findings we have discovered the importance of allowing students to create their own material, to vary the methods and to vary the materials between traditional and digital. When students are allowed to draw their own images, they are given the chance to make their flashcards clearer from a student perspective. Allowing students to use different flashcard methods gives the students the opportunity to work in a way which aligns to their needs better, while using the same material. Teachers switching between traditional and digital materials creates the opportunity for sensory variation which allows the flashcards to remain an exciting method of learning vocabulary.

Klingbeil et al. (2020) found that using the SIR methods when conducting flashcard drills, the students learned more words however the IR method was preferred and more beneficial for a few participants. With GBL (Tang, 2023), the students were motivated to learn and had previous experience with gaming. Therefore the technique had a positive outcome where the students' vocabulary expanded. Meanwhile the fold in technique (Craig & Hoffman, 2012) had a positive outcome where the students did not only learn the words, but also their meaning and pronunciation. Ou et al. (2018) discovered that when students drew their own flashcard images, the motivation increased and the students scored higher than the group who used commercial images. Finally the usage of augmented reality flashcards was found to have a positive effect, Chen and Chan (2019) found that the effect was larger than traditional flashcards.

This study is limited by various factors which in a future research could be mended. This study is limited to the time which we have been given to conduct our research, as well as the limited amount of space we had to write and discuss our research findings in a qualitative way. Finally the study may hold minor limitations to use in the English learning classrooms of Sweden as the papers and research used were all from a different culture, a few which have different writing systems or language structures to Swedish. The different language structures may create a variation when learning English.

Our study delves into the variations of using flashcards to learn vocabulary, however we found the results challenging to crossanalyze. While the studies included a control group which could be used as an anchor to compare the results to one another, all the studies had different conditions which could affect the results. A future research article which would be interesting to explore, would be the effectiveness of the various aspects when contrasted to each other. Perhaps even researching combinations of these aspects. If the different variations were to be contrasted in a research, with conditions as similar as possible, it could show the effectiveness of each aspect clearly.

# References

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