Thousands of words.

A comparative study on the functions of pictorial illustrations in English language textbooks

Master's thesis

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Tiedekunta – Faculty	Laitos – Department
Humanistinen tiedekunta	Kielten laitos

Tekijä – Author
Mikko Laitinen

Työn nimi – Title
Thousands of words. A comparative study on the functions of pictorial illustrations in English language textbooks

Oppiaine – Subject	Työn laji – Level
Englanti	Pro Gradu - tutkielma

Aika – Month and year	Sivumäärä – Number of pages
Maaliskuu 2014	79

Tiivistelmä – Abstract

Länsimainen kulttuurimme on kuvien rikastama; Sosiaalinen media, mainonta, tv ja elokuvat käyttävät kuvia ohjaamaan ajatuksiamme, tunteitamme ja motivaatiotamme eri konsepteja kohtaan. Kuvien voima ei kuitenkaan rajoitu kyseisiin tunnepohjaisiin vaikutuksiin: Kuvat ja kuvallinen ajattelu mahdollistavat uuden informaation luokittelun, käsittelyn ja prosessoinnin tavoilla, joihin sanalliset muodot eivät pysty. Tästä syystä oppikirjojen kuvitus voi potentiaalisesti tarjota vahvaa visuaalista tukea oppikirjojen tekstien sekä niiden teemojen sisäistämiseen. Tämän tutkimuksen tarkoituksena on selvittää, sisältävätkö oppikirjojen kuvitukset kyseisiä syvempiä oppimisfunktioita, vai onko kuvien käyttö rajoittunut sivujen koristeluun ja visuaaliseen miellyttävyyden parantamiseen.

Tutkimuksen materiaalina toimi kymmenen englannin kielen eri luokka-asteilla oleville oppijoille suunnattua oppikirjaa kahdelta eri kustantajalta. Kirjojen kuvitus analysoitiin ja kategorisoitiin aiempien tutkimuksien pohjalta omaksuttujen kategorioiden mukaisesti sekä yleisten havaintojen pohjalta. Tutkimus vertaili kirjojen kuvitusta löytääkseen eroavaisuuksia ja yhtäläisyyksiä kirjojen välillä sekä osaltaan määrittelläkseen kuvituksen tarkoitusta kielten oppikirjoissa.

Tutkimuksen tulokset osoittivat että kuvituksilla on kaksi pääfunktiota suomalaisissa englannin kielen oppikirjoissa: Kuvat toimivat koristeina, jotka tekevät tekstistä helpommin samaistuttavan ja vaikuttavat lukijan tunteisiin ja asenteisiin tekstiä kohtaan sekä ohjaavat lukijan huomion tekstiin. Kuvat myös heijastelivat usein tekstien ja kohdekulttuurin pääkohtia ja tapahtumia tarjoten lukijalle visuaalisen version tekstin teemoista. Tutkimuksen toinen päähavainto oli huomio siitä, että alakoulun kirjasarjat sisälsivät yläkoululaisille ja lukiolaisille suunnattuja kirjoja enemmän oppimiseen vaikuttavia kuvia.

Asiasanat – Keywords Illustrations, language textbooks, imagery, pictures

Säilytyspaikka – Depository Kielten Laitos

Muita tietoja – Additional information

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1 Introduction

Think of your favorite place in the world. Do you see it? If it is outdoors, can you see birds sitting on tree branches or the reflections on the water surface? Where is the sun? If the place you are thinking of is inside, what color are the walls and ceiling? What objects can you see around you? Now that you have visualized that image, try to describe it with words, in full detail. The proverbial thousand words may not be enough to capture the richness and complexity of the mental picture that you just retrieved from your memory with ease. Therein lies the power that images carry within the human cognition: Images allow us to structure and store knowledge in ways verbal processes cannot. Visuals are used to form large mental structures and models that can be recalled through either visual or verbal stimuli. Moreover, images help us to compartmentalize, organize and interpret new concepts and information as well as affect our attitudes and emotions towards them. Therefore, the pictorial illustrations we see as adjuncts to texts should be seen as more than decorations or simple eye-candy.

Our western culture is saturated with images. Advertisements, billboards, magazines and online content are a hive of visual information with flashing and colorful imagery that guides and shapes our emotions and attitudes towards political issues, different cultures, or entertainment. In a struggle to stay relevant, schools have had to adapt their teaching to the ever-increasingly visual world around us. For years, textbooks, the core of most teachers' curricula, have been text-based entities where images have been negated to a secondary role but recently textbooks have developed into magazine-resembling entities with large, eye-catching pictorial illustrations accompanying the texts and exercises. The question that the present study is concerned with is that is this development done to further the educational qualities of the books or to make them more visually appealing, and therefore more marketable.

The fact that textbooks feature more illustrations than before does not, however, automatically entail that textbooks now offer material that supports visual strategies of learning. The present study bases its views on images as learning tools on the research done in the field of cognitive psychology, more specifically dual coding theory (DCT) by Paivio (1986, 2007), which argues that cognition involves two active subsystems: verbal and non-verbal (imagery). The theory states that people process information in two separate subsystems: the visual channel and the verbal channel. The premise of DCT would suggest that image-rich textbooks advance learning as they provide more opportunities to encode information in the visual subdomain. However, the strength of images is dependent on their quality, as according to Carney and Levin (2002: 9), images that have a purely decorative purpose might even hinder learning. Therefore, a study that analyzes the pictorial illustrations found in textbooks in order to find out if they carry educational value is arguable and can benefit teachers who value images as tools for learning.

Imagery in education has been the topic of extensive research. Learning effects of different images in various educational settings have been studied, and the body of research has resulted in multitude of categorization models and insights towards the utilization of imagery strategies and illustrations in education (see, e.g., Carney and Levin, 2002). On the other hand, there seems to be to be few studies that examine how well illustrations are utilized in day-to-day use in classrooms, outside artificial learning settings that are created for testing purposes. The present study addresses this question and aims to provide a comprehensive view on the nature of illustrations in English textbooks used in Finland.

The present study examines if there is a deeper function to the pictorial illustrations found in English textbooks than a decorative one. The study examined ten English textbooks in order to find out if illustrations are only decorative elements or if they assist learning from the text. It will observe and compare the illustrations found in textbooks intended for students in primary school, secondary school and upper secondary school. The data was compiled by categorizing all of the textbooks' 1 299 illustrations by utilizing models for categorizing created by Levin (1981) and to Levie and Lentz

(1982). The study then discussed the illustrations according to which extent different cognitive-affective functions were present in the books and presented general observations on the characteristics of the illustrations in order to find general patterns or preferred illustration categories and to distinguish differences between the illustrations in the books.

2 The visual aspect of cognition

 The present study, as well as the field of study regarding imagery strategies in learning, relies on the study of human cognition. The theories put forward by cognitive psychologist Allan Paivio and neuropsychologist Alan Baddeley during the 1970's argued for a model of cognition where nonverbal strategies act as equals in regards to verbal forms when processing and storing new information.

2.1 Dual Coding Theory

According to Paivio (1986), until the 1960's, the field of cognitive psychology viewed cognitive tasks such as performance in memory and memory retention as mediated in a verbal or linguistic domain. This singular view of the human mind was later challenged, and subsequently replaced with more complex models of cognition, most prevalently Dual Coding Theory (DCT) (Paivio 1986, Clark and Paivio 1991, Paivio 2007).

Paivio's theory argued for a dualistic cognitive model where nonverbal processes work in cooperation with verbal processes. In essence, The Dual Coding Theory states that people process information in two separate subsystems: verbal representations and mental images. According to DCT, presenting information through both subsystems benefits learning. As Paivio (1986:54) states, these two systems are structurally and functionally distinct.

The subsystems' structural difference stems from the different representational units that are used and hierarchically structured within the systems to symbolize reality. The representational units in the verbal domain are referred to as *logogens.* Logogens represent phrases, idioms, words, syllables, phonemes, letters and symbols, i.e. the underlying information behind our use of words, either visual or auditory. These verbal codes are representations for concrete objects and abstract ideas. According to Paivio (2007: 37), the term *logogen* can be seen as a variant of the well-known

concept of lexical representation. Respectively, the representational units in the nonverbal domain are referred to as *imagens*. They are representations that generate mental images and can consist of different sensorial perceptions of natural objects or pictures. Units in the visual subsystem can encode information in parallel or simultaneously, whereas verbal processes occur sequentially. This means that mental images can contain a large amount of information that would require complex verbal structures to convey. For example, one can think of the front yard of their own home; the mental image that comes to mind is filled with detail, all interconnected within the framework of the front yard. Thus, as stated by Clark and Paivio (1991), the separate identities of individual objects become "blurred" and become spatially nested in the larger structure. As mentioned, in order to describe the structure verbally, one would need to form complex and long sequential verbal structures thus making the information harder to remember. The aforementioned difference between the subsystems in encoding information alone argues for the use of images alongside verbal structures in education.

Even though the present study focuses mainly on visual inputs due to textbooks' content, it is important to note that DCT, as stated by Paivio (1986, 2007) addresses the effects of other sensorial modalities as triggers within the symbolic subsystems as well: Tastes, "feel" of objects, smells, sounds or even felt emotions can be seen as units in the nonverbal domain, whereas verbal units can consist of visual, auditory or even haptic (handwriting, braille) inputs or outputs of language.

 According to Paivio (2007: 33), the verbal and visual subsystems can work either functionally independently or interconnected. They can be interpreted as independent due to the fact that either subsystem can function without the other being activated, or they can both function at the same time. The systems' interconnectivity comes from the fact that activity in the nonverbal subsystem can trigger activity in the verbal system or vice versa. Therefore, the dualistic connections in the cognitive processes can be referential (between-system) and associative (within-system) interconnections, as seen in Picture 1. Paivio (1986:62-63) stresses that the interconnections that are triggered between the subsystems are not one-to-one connections or flow of

information from one system to the other. They should rather be seen as more complex, one-to-many, interconnections where a word can trigger a multitude of images or vice versa.

The relationship between these connections depends on the functional strength of the referential interconnections, i.e. logogens and imagens. Which images are connected with verbal forms depends on the individual's prior, objective experiences and associations. Clark and Paivio (1991:155) tie the concept to education and suggest enforcing functional strengths by presenting pictures to students in order to prime the imagery system and to make activating mental images from words more probable.

Picture 1: Structural model of Dual Coding Theory. Adapted from Paivio (1986:67)

VERBAL STIMULI   NONVERBAL STIMULI

SENSORY SYSTEMS

REPRESENTATIONAL CONNECTIONS

VERBAL SYSTEM

ASSOCIATIVE STRUCTURE

Logogens

REFERENTIAL CONNECTIONS

Imagens

ASSOCIATIVE STRUCTURE

NONVERBAL SYSTEM

VERBAL RESPONSES   NONVERBAL RESPONSES
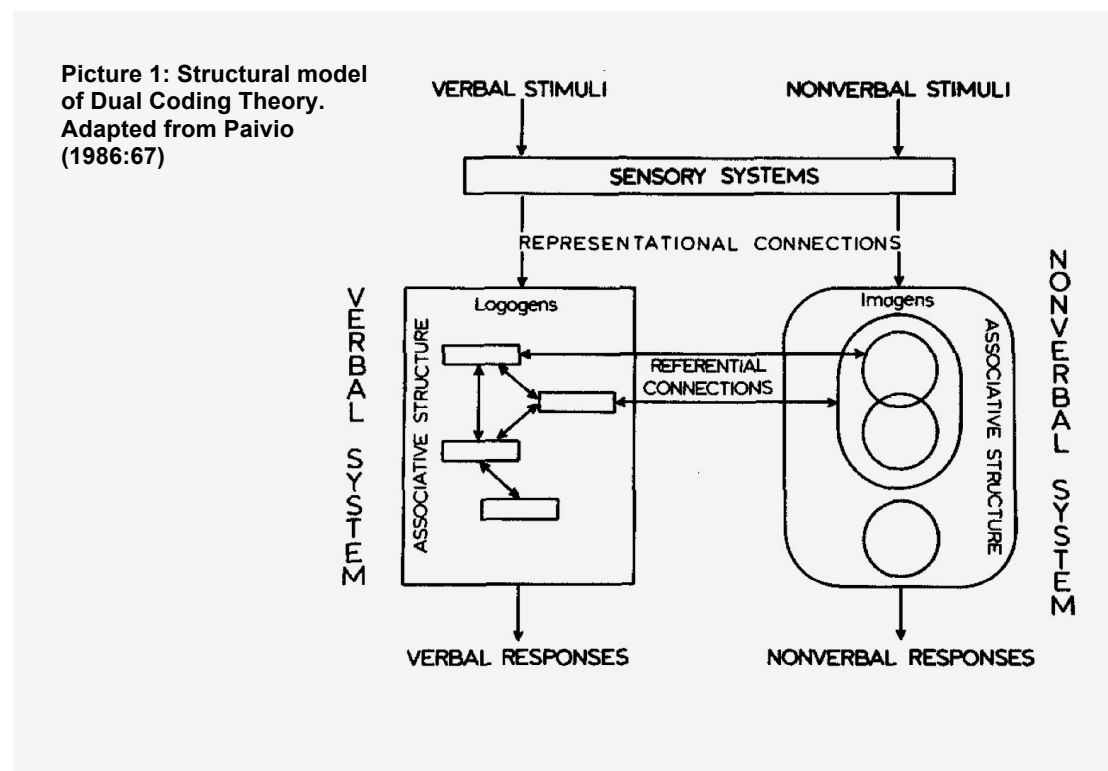
DCT and its application to education and learning materials has been subject to much research, much of which has been done by presenting students with illustrated and non-illustrated texts and then comparing the results of text recall tests. For example, Mayer and Sims (1994) concluded that inexperienced students were able to apply information they received to solve a related problem when they received the information simultaneously both

visually and verbally. Mayer and Anderson (1992), on the other hand, after conducting two experiments comparing the learning effects between a group that received images supporting learning as animations and a text-only group, suggest it should be instructed to use pictures and words proximately in time or space for the material to be most effective. Anderson and Bower (1980:197) state that the use of images, either mental images or pictorial illustrations, enhances a person's memory for the verbal material and vice versa. Furthermore, more specifically connected to the present study, Arndt and Gentile (1986) discussed DCT's role in language learning and discovered that bilingual students and teachers retained vocabulary information in a translation task better by labeling pictures in English when compared to tasks involving directly translating words from English to French or directly copying English nouns.

2.2 Theory of Working Memory

Dual Coding Theory's perception of cognition and memory retention as a process of two separate subsystems involving a visual and a verbal channel has been supported by Baddeley's model of working memory (Baddeley and Hitch, 1974). Baddeley and Hitch (1974) suggest that working memory acts as a three-part system: content is stored short term in two slave systems called *the visuo-spatial sketchpad* and *phonological loop.* The visuo-spatial sketchpad maintains and manages visual images and objects as well as their spatial relationships. Similarly to DCT's verbal channel, the phonological loop stores and rehearses verbal information. The flow of information from and to these visual or verbal slave systems is mediated by *the central executive,* an attentional core system that focuses attention and engages in problem solving tasks*.*

 A revised model of working memory, as illustrated in Picture 2, (Baddeley, 2003: 836) introduced a component called *the episodic buffer.* The episodic buffer addresses the problem in the initial mechanism, which does not allow for interaction between the phonological and visual subsystems (DCT: referential connections). Furthermore, the episodic buffer also functions as an

interface between working memory and long-term memory (LTM). The episodic buffer acts as a linking device between the other slave systems and creates visual, spatial, and verbal units of information with chronological ordering, which could for example be the memory of a story or a scene from a movie.

Picture 2, The multi-component working memory revision. Adapted from Baddeley (2003: 835)
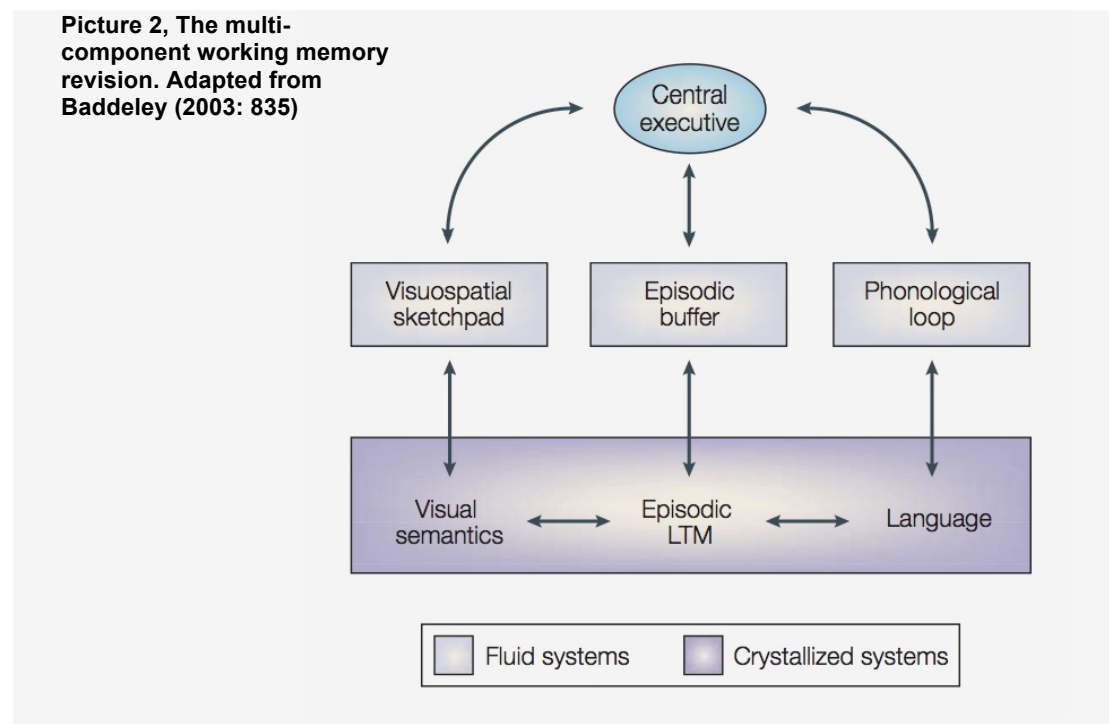
As evidenced above, one cannot deny the positive effects of a multi-modal approach in presenting information in instructional materials. It is important to remember, however, that the strength of using visual material to aid the learning process does not come from numbers. On the contrary, a study material with overly excessive visual material, or verbal for that matter, might even hinder learning due to the limitations of size in the working memory.

According to Baddeley (2003: 833), the visuo-spatial sketchpad's capacity is typically limited, like its verbal equivalent's, to about three to four objects. If that capacity is exceeded, the working memory is loaded heavily and the learner experiences what Mousavi, Low and Sweller (1995) describe as cognitive load. Cognitive load theory (e.g., Sweller, 1988,1994) suggests that many instructional procedures are not effective due to the fact that they overload the learner's working memory with too much new information.

Also, Mousawi, Low and Sweller (1995:332) conclude by stating that taking limited working memory into consideration is the key to a successful instructional design. While they state that a dualistic approach helps to reduce cognitive load (Mousawi et al., 1995:332), they emphasize the risk of split-attention effect when using visual materials. Split-attention effect occurs when information is presented in a way that is poorly integrated and requires cognitive effort to connect. For example, in a task, where both the use of an image and written statements are required, and the components of the task are presented sequentially, the working memory is purposelessly loaded, when the learner must shift his or her attention between the components to gain understanding of them. Mousawi et al. (1995) suggest physically integrating such tasks to a table form, for example, or to provide the information multi-modally (in both visual and auditive forms). As previously mentioned, Mayer and Sims (1994) support the notion, as they concluded that learning was most effective when verbal and visual information was presented simultaneously, as opposed to sequentially. If it is not possible to present visual and verbal information simultaneously, then, according to Verdi and Kulhavy (2002:41), the visual information should be presented first as images do not load the working memory as heavily as text does. Therefore, an image → text-sequence enables the working memory to retain information in both channels. In addition, Baddeley (2003:834) describes a similar disruptive effect, where a learner's performance forming word pairs through imagery can be disrupted by visual noise or colors, i.e. images with no functional connections to the issue at hand.

The implication of CLT and the limits of working memory for textbook illustrations is that the main focus in providing visual materials to go along with text should be on quality, the strength of referential connections and general usefulness of the images. Images should focus on building upon already existing knowledge, structures and connections, much in line of the concept of scaffolding or Vygotsky's (1978) Zone of Proximal Development, which Vygotsky defined as the gap between what the learner has already learned and what they can achieve through adult or peer guidance.

3 Imagery

When DCT discusses the visual channel, it must be noted that it does not only mean the physiological concept of vision but a vast array of cognitive nonverbal inputs that are referred to as imagery. The study of human imagination and creativity is important to bring forward, even though the concept reaches beyond the scope of the present study. Imagery not only covers pictorial illustrations, but it also encompasses descriptive language, mental images, and the whole human imagination. Imagery allows us to organize and conceptualize information creatively through mental models and images. The ability and knowledge of how to use imagery as an effective tool in learning is a valuable tool for teachers and learners alike, as described by DCT and Baddeley's model of working memory, and methods to improve these abilities should be given the same attention as verbal learning methods. The following sections will provide a short insight to the development of nonverbal thinking in western education and look into the implementation of imagery strategies in education today.

3.1 History of imagery in education

The study of imagery in education and the benefits of nonverbal learning and teaching methods has been the topic of wide research and discussion for hundreds of years. In education, imagery is, even in today's visually saturated learning environments, often seen as a secondary source of information in a world ruled by texts and sequential structures. Stripping nonverbal thinking of its merit as an equal and effective method of learning can partly be explained through the massive paradigm shift education undertook during the protestant reformation, as described in Speidel and Troy (1985).

Already in the classical age, according to Speidel and Troy (1985), Aristotle considered memory to be a collection of mental images created by the senses. These image imprints, according to Aristotle, are the basic source of all knowledge and thought. In Aristotle's view, the intellect refines and

abstracts knowledge, but there would be no knowledge to cultivate without perception.

Speidel and Troy (1985) and West (1912) go on to explain how the classical age also brought forward visual mnemonics and allegories as important tools to facilitate memory, which in turn had an effect on how learning was perceived in the middle ages and even during the renaissance.

The classical orators practiced rhetoric thorough visual mnemonics, i.e. transforming information that they needed to remember into visual objects and placing them in the same visual space in their minds. The orators would then during their speeches mentally walk through that space and see all the objects that would in turn trigger the needed information. When scholars in the middle ages started to create their concept of learning, they modeled it according to the principles created during the classical ages and presented in 5th century A.D author Martianus Capella's highly allegorical book *De Nuptiis Philologiae et Mercurii. De Nuptiis* illustrated, as seen in Picture 3, the seven liberal arts (Grammar, Rhetoric, Logic, Arithmetic, Geometry, Music and Astronomy) as maidens with different qualities to them. Capella's style had a great influence on the highly allegorical and imagery rich style of teaching in the middle ages.

Picture 3: Lady Rhetoric, as depicted in Capello's *De Nuptii:* Lady Rhetoric carries weapons with which she wounds her enemies. *Image in public domain*

The use of imagery dwindled down after the protestant reformation, when the Catholic Church's concepts were challenged, and imagery was deemed by education reformist Peter Ramus, as quoted by Speidel and Troy (1985:19), as *commentitia,* meaning deceitful or irrelevant. Ramus advocated for learning and retention to be done through the means of categorization and hierarchical arrangement. This dramatic re-evaluation of imagery denoted mental images, illustrations and pictures to something of lesser, or even meaningless value in education. Even though, according to Schnotz (2002:11), education reformist John Amos Comenius encouraged imagery thinking and introduced pictorial textbooks, verbal and hierarchical processes were, according to Sheikh and Sheikh (1985), considered the basis for information up until the 1960's, when cognitive psychologists started to pay attention to imagery's effects on learning and memory retention, which eventually led to the emergence of DCT and the study of imagery in education.

3.2 Imagery strategies today

Even though the strengths of imagery in education have been the topic of research for the past 50 years, imagery strategies are still foreign to a large percentage of students due to the fact that mental strategies are not systematically taught in schools. Suzuki (1985:179) quotes a survey by Greer (1978), where 38% of learners from grades 6, 8 10, and 12 say that they had received instructions from their teachers on how to utilize imagery strategies to aid memory. The results are interesting, when compared to the results by Majors (2006), who surveyed 67 elementary and middle school teachers in the United States about their use of imagery. According to Majors (2006:99), 90% of the surveyed teachers state that they use imagery strategies always, often or sometimes. The discrepancy between the results of the two surveys can perhaps be accredited to two factors: Either (1) imagery strategies have become more prevalent in the classroom in the past 30 years, or (2) teachers do not have deeper knowledge of imagery strategies that they could pass on to their students. Even though the first factor could also be rationalized, option

2 seems, unfortunately, most likely. Majors' (2006) survey also indicated that a majority of teachers reported mild or no exposure to imagery knowledge. Furthermore, said teachers seemed to attain knowledge of imagery strategies from peer sharing and academic publications rather than from their teacher training. Also, the frequency of using explicit imagery techniques was lower than using basic text visualization. In other words, teachers have not reached beyond the surface with imagery strategies.

In the framework of the present study, the fact that imagery strategies are somewhat of a mystery to both teachers and students is important to note, as DCT indicates that priming the imagery system through practice is important in order to strengthen the ability to form referential connections between the subsystems. Hence, it could be argued that learners mostly lack the tools to meaningfully utilize the benefits provided by well-designed textbook illustrations. Therefore, in order to gain the most from textbook illustrations, educating teachers about different imagery strategies is needed in addition to illustrations that are beneficial towards learning.

Imagery strategies and pictures prove important for teachers when their aim is to shift the students' focus from merely reading the words on the page to gaining deeper understanding from the text. For example, visual imagery, such as illustrations, video, animation or mental images, can be helpful in reading and comprehending prose in a deeper level. Hibbing and Rankin-Erickson (2009) discuss the effects visual imagery can have with struggling readers in elementary school. They conclude by presenting an eight-point instructive list for practitioners, where they instruct teachers to, for example, prompt students with imagery skills to use imagery and teach imagery skills to those who have not yet learned them, remember that visual imagery need not be elaborate to work; even crude drawings will get the point across, and to keep in mind that especially poor readers rely on illustrations more than good readers.

4 Pictorial illustrations

As established above, using imagery in education is beneficial in helping students to retain new information as well as creating more complex mental models of situations. As the present study concerns pictorial illustrations in textbooks, the following section will examine and present key issues and studies on the use of illustrations in texts and study materials.

4.1 Prose illustrations

A great deal of the studies on text illustrations have revolved around how children utilize pictures when reading prose passages. As picture books are the generally preferred format of children's books, interest has placed on the multitude of effects illustrations can have on the reader and on whether or not the pictures can help young readers to process the text.

Peeck (1974) studied 71 9-10 year old students' retention of a story. 50 percent of the students read the story as an illustrated version (text + pictures) and the other half (control group) read a text only-version of the story. The results indicated, as predicted by DCT, that the group that read the illustrated text faired better in the retention test when compared to the control group. Both groups finished the text in the same amount of time, which means that the group that read the illustrated text spent less time reading the text, as they also had the images to examine. Therefore, Peeck suggests that illustrations may have motivational effects, i.e. they make reading more fun, or that they help make the text easier to understand, thus reducing the time needed to read the text.

Peeck's study also included contradictory text-image pairs, where the illustrations did not match the story. When presented with multiple choice questions based on the incongruous text-illustration pairs, the students chose the answer based on the illustration more frequently, even though the retention test was specifically worded to: "see what you remember of what you have read." (Peeck, 1974:886). The aforementioned fact could be explained by *the Picture Superiority Effect;* a theory, derived from DCT, that is

often used in market research, which states that people generally retain information they saw as pictures better than text-based information (See Childers and Houston 1984, Mintzer and Snodgrass 1999 or Whitehouse, Maybery and Durkin 2006).

Liu (2004), on the other hand studied images' effects on reading comprehension in an ESL setting: The study divided 107 students into high- and low-level proficiency groups. Each group was then presented with either a high-level text or a low-level one. Half of the texts were illustrated with comic strips whereas half of them only contained text. The results of a subsequent recall test indicated, in line with DCT, enhanced performance by low-level students who read the illustrated text when compared to the non-illustrated text- group: The low-level group who read the high-level text showed significant increase in text retention when the comics were present. The high-level L2 learners did not notably show increased performance when the comics were present. The results seem to go in line with the notion brought forward by Mayer (1989:245) and Hibbing and Rankin-Erickson (2009:45), among others, that "less talented" learners both spend more time looking at, and rely more on illustrations.

The benefits of a dual coding approach when discussing illustrations accompanying prose passages and stories have been extensively studied and argued for (see, for example, Levin et al. 1985 or Gambrell and Jawitz 1993 for further research), but text illustrations also have other, mainly affectional and motivational uses. According to Fang (1996), prose illustrations serve 6 important functions: they **(1)** establish setting, **(2)** define and develop characters, **(3)** extend or develop the plot, **(4)** provide a different viewpoint, **(5)** contribute to textual coherence, and **(6)** reinforce text. Therefore, images greatly affect the moods, interpretations and emotions readers elicit from the text. Fang also argues that illustrations encourage and motivate children to read and interact with text, predict events or find hidden meanings or objects. Fang further points out that illustrations stimulate and promote children's creativity.

4.2 Illustrations in instructional texts

Scientific and instructional texts also benefit from illustrations. Tables, graphs, and maps, specifically, are types of educational illustrations that studies have shown to aid learning through creating clear mental model. This occurs when, as summarized by Schnotz (2002), **(1)** the verbal and visual information are coherent and overlap, **(2)** verbal and visual information are presented simultaneously, **(3)** the semantic processing of visual and verbal information is activated through prior thematic knowledge, and when **(4)** visual elements are easily distinguishable. Also, both Mayer (1989) and Carney and Levin (2002) state, supported by the results of Reid and Beveridge (1990), that illustrations benefit learners who struggle with the subject matter and that the more complex the text is, the more likely it is that pictures are helpful. If the text is easy, or the learner highly knowledgeable, additional illustrations are not needed. David (1998:182) labels these illustrations that aim to make the text more coherent and organized as *information graphics* to differentiate them from text illustrations in prose or journalism.

According to Mayer (1989), illustrations help students form mental models of information that they can successfully apply in problem solving and transfer tasks. In Mayer's study, 34 students who had no prior knowledge of cars were introduced with an explanation on the inner workings of braking systems. Students who received labeled illustrations that showed the step-by-step phases involved in braking not only recalled the information better than student who only received the verbal information in the labels, but they outperformed their text-only counterparts even more in transfer and problem solving tasks that required adapting the information they received. Notable in Mayer's study was also the fact that when tested for verbatim recognition of the texts in the labels, students who received no illustrations remembered the text passages verbatim better than the group who received illustrations. This suggests that the text-only group had trouble forming a meaningful mental model of the information, even though they read and remembered the text, and that illustrations guide the students' selective attention towards a more coherent, interconnected understanding of the system.

Verdi and Kulhavy (2002), on the other hand, argue how structural images, especially maps act beneficially within the working memory when reading educational texts. They state, citing previous research on the topic that maps provide the learner with both *feature information* and *structural information.* Feature information in maps can be define shortly as "what happened here" (Verdi and Kulhavy 2002:31). Elements within the map, be it images, symbols or text, give the student a way to activate and store verbal information in a visuo-spatial way for later recall. On the other hand, learners can use the structural information contained in maps to create images of the map within their working memory, which they can then use to create associative links between the associated text passage. This process is achieved without overloading working memory, as images and image chunks do not load working memory as much as text passages do.

Even though illustrations, such as graphs, tables, and maps aid learning, it is important to remember that educational illustrations should be age-appropriate, as learners need to acquire the cognitive skills needed to facilitate the illustrations in a meaningful way. As explained by Schnotz (2002:113), children do not attain visual literacy, which includes understanding graphs and tables until after primary school.

According to the body of evidence presented above, it can be safely argued that illustrations serve a multitude of purposes when accompanying texts. For a teacher, the array of different ways to use illustrations in their work may seem overwhelming. Carney and Levin (2002:20-22) examine recent research on the topic and conclude with a helpful ten-point list for educators regarding pictorial illustrations, or in their words: "The ten tenets for teachers". The tenets, for example, remind teachers that pictures should be chosen carefully while keeping in mind the learner's abilities and pre-requisite reading skills, the illustration's desired function and the difficulty of the text passage. Also, the tenets instruct the teacher to consider different learning styles and guide the students' attention towards the illustrations.

Luckily, there are also ways to categorize and inspect illustrations through the functions they hold in relation to the text. The present study will utilize Levin's

(1981, as well as Carney and Levin, 2002) model, which divides illustrations into five functional categories with varying cognitive effects The individual categories will be examined in the following section.

4.3 Illustration categories

Previous research has, in addition to examining the effect of illustrations, also observed the different ways they can be utilized in teaching. Levin (1981, Carney and Levin 2002) examined pictorial illustrations, the predominant examples of imagery in textbooks, in detail and divided text illustration into five cognitive-affective categories. Levin's five categories are: Decorational, representational, organizational, interpretational and transformational. Other categorizations have also been made (see Carney and Levin 2002: 9-10), but the present study places its focus on Levin's categories, as they have been the basis of much subsequent research (see Carney and Levin (2002) for examples).

The text-learning effects of each of the categories vary, as visualized in Picture 4. Decorational illustrations have little or no effect, whereas the effects of other categories vary from moderate (representational illustrations) to substantial (transformational illustrations).

Picture 4: Average effect size by picture function, across all units. Adapted from Carney and Levin (2002:8)
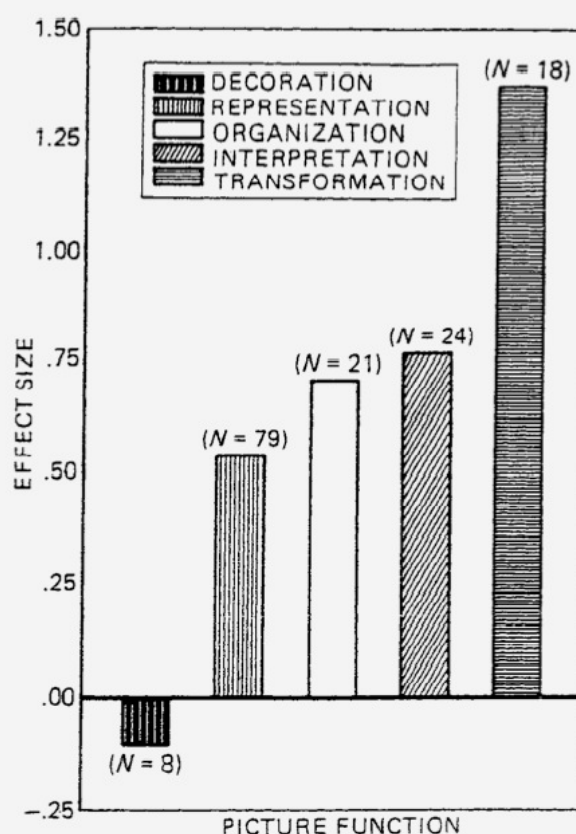
The present study utilizes Levin's model of taxation with the addition of dividing the decorational category into two subcategories. According to Boerer (2004), Levin's decorational category can be differentiated to two subsections: affective and attentional, which are categories introduced by Levie & Lentz (1982). Levie & Lentz (1982) introduced a functional framework consisting of four categories in their review of research: Affective, attentional, cognitive and compensatory. The present study does not discuss Levie and Lentz's other categories as, according to Boerer (2004), Levin's four other categories cover them more thoroughly. The following section will introduce the categories used in the present study in more detail.

4.3.1 Decorational illustrations

Levin (1981:216) describes decorational pictures as the only text-irrelevant forms of illustrations, meaning that they do not enhance the learning experience, as also stated in Carney and Levin (2002:8). Levin (1981:216) includes decorational pictures as an illustration category only as a courtesy towards those, who believe that illustrations should be applied only to increase the texts attractiveness. Carney and Levin (2002:20) further expand the rationale behind the use of decorational pictures and explain how their aim might also be to make the book more marketable. Bell and Gower (1998:125) also touch upon the use of non-usable material from the perspective of course book writers and describe how publishers are often most concerned with "the flick test", or in other words, the first impressions books give to potential buyers.

Furthermore, even though they can create attention and interest towards the text, the use of decorational illustrations should be carefully considered as they can also be considered as hindering learning. As Cognitive Load Theory suggests, needless images, or what Baddeley (2003:834) describes as "visual noise", can cause unnecessary strain to the working memory, which is limited in size. Decorational pictures can also be misleading if they represent a mismatch between the text content. Keeping in mind the fact that poorer learners tend to rely more on and spend more time looking at illustrations, as

discussed in Mayer (1989:245) and Hibbing and Rankin-Erickson (2009:45) and that pictorial information is recalled better than verbal information (See discussion on *picture superiority effect* and the results of Peeck (1974) in section 4.1 of the present study), it can be argued that illustrations that are not properly connected with the subject matter can disrupt learning. The notion is particularly important in lower level textbooks and learners who are still developing basic reading skills, as stated by Levin (1981:227), who discovered that the text recall of 4-year-olds suffered when the illustrated information contradicted with the text. Furthermore, after evaluating recent studies on the topic, Carney and Levin (2002:20) share the concern of disruptive imagery.

A decorational picture has, at best a superficial connection to the content of the text it illustrates. For example, a photo of a Buddhist statue illustrating a text passage on religious texts would be considered decorational in its nature.

As mentioned, the present study will divide the decorational illustrations into two subcategories, as proposed by Boerer (2004): Affective and attentional illustrations, which are categories introduced by Levie & Lentz (1982). Attentional illustrations attract attention to the text whereas affective illustrations have a purpose to influence the reader's emotions and attitudes.

4.3.2 Representational illustrations

According to Carney and Levin (2002:11), representational pictures are by far the most popular type of text illustrations. Representational illustrations overlap or cover sections or the entirety of the text content and are considered as visual representations of text. They capture the actors, events and objects in the text. For example, an illustration of a scene in a story is considered as a representational picture. A representational picture adds to the concreteness of the text, as, according to DCT, images enhance the memory process when accompanied with text.

As David (1998:182) states, the role of representational pictures is not to make the text more coherent or comprehensible. Their goal, however is to

reinforce the text and make it more concrete. David (1998) studied the use of representational illustration in news articles, using DCT as a theoretical background, and discovered that representational illustrations facilitated recall better when they were added to concrete news stories instead of abstract ones.

Much of the studies done on prose illustrations and using illustrations to aid text recall, and presented in section 4.1 were conducted using representational illustrations. This can be attributed to the fact that out of Levin's functional categories, representational illustrations are the simplest representative of the visual channel of Paivio's Dual Coding Theory; Representational illustrations are essentially the visual representations of the information received through the verbal channel, whereas other categories, excluding decorational images, aim to create more complex mental models of the ideas and structures present in the text.

4.3.3 Organizational illustrations

Organizational pictures aim to provide a useful structural framework of the text. They help the reader to form a macrostructure of the text and therefore visualize important relationships between different aspects of the text content.

An organizational picture can for example show the necessary steps needed

Picture 5: An example of an organizational picture. Adapted from Morrison et al. (2010:191)
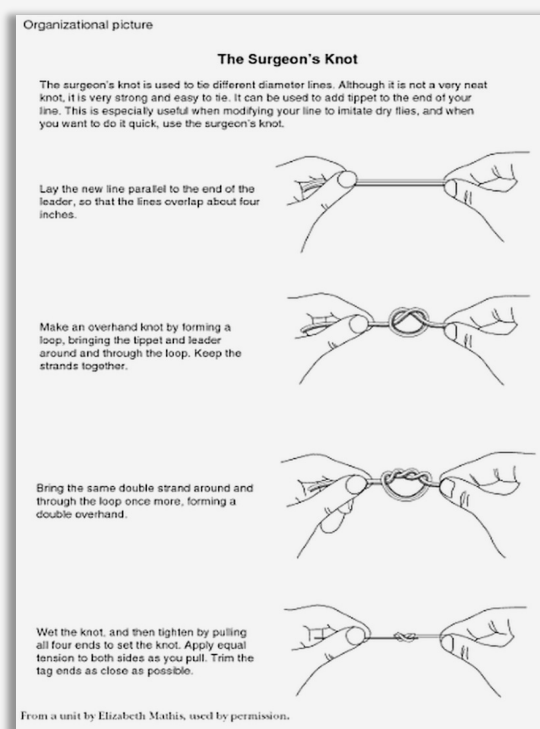
to form a knot, as illustrated in Picture 5. Tables, charts, graphs an diagrams are also often seen examples of organizational pictures.

4.3.4 Interpretational illustrations

An interpretational picture illustrates a text that the reader might have trouble understanding. They are often visual metaphors or analogies made in order to explain cause-and-effect systems, such as depicting the blood pressure system with an illustration of a pump system or an illustration depicting the water cycle as is done in Picture 6. Interpretational illustrations normally accompany texts in science subjects textbooks. According to Carney and Levin (2002:13), interpretational illustrations are by far the most researched area of illustrations due to their ability to visually aid in the comprehension of difficult scientific concepts.

Picture 6: Interpretational illustration: Water Cycle. Adapted from VanDeVort (2007:50)
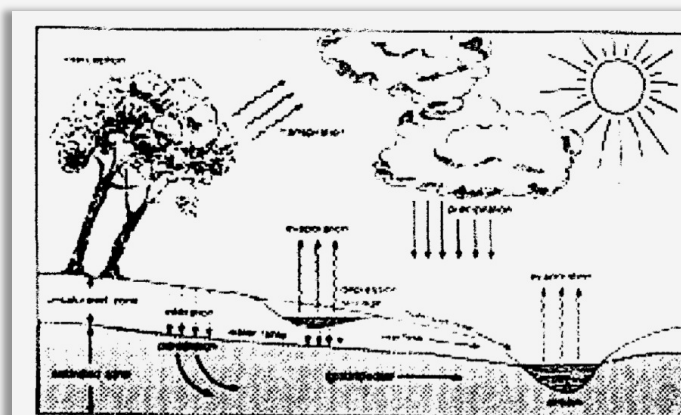
Cook (2008) studied the use of an interpretative picture illustrating the process of meiosis and concluded that including an interpretative illustration enhanced a higher level of cognitive processing than a simple color photograph would have. In addition, Weidenmann et al. (1999), Mayer (1989), and Reid and Beveridge (1990) have used interpretational pictures as basis for their studies.

4.3.5 Transformational illustrations

Levin (1985: 64) states that transformational or mnemonic (memory enhancing) pictures provide the most substantial results in facilitating memory. They are specifically designed, meaningful and interactive illustrations that help the reader to recall text components. Levin (1985: 73) gives an example of a mnemonic illustration that could be used in learning to read: When learning the letter *f*, the accompanying illustration was a flower, whose initial sound represents the letter. However, for the illustration to be mnemonic, the pictured flower must resemble the letter's shape. As a result, the sight of the letter *f* should evoke the image of the illustrated f-resembling flower in the learner, from which they could recall the sound associated with the letter.

Transformational illustrations are especially useful when it comes to information that is traditionally difficult to remember. Rummel, Levin and Woodward (2003:327) state that mnemonic images can aid in the memorization of for example the following information chunks: "unfamiliar vocabulary items; numerical information (e.g., the names and dates associated with important events); hierarchical and matrix classification systems; geographical, historical, and zoological facts; and introductory psychology concepts".

Rummel et al. (2003) studied how pictorial mnemonic strategies used integrated with an informative text influenced students' performance on effectively retrieving and applying text-relevant information in an essay. In the study, college students were assigned texts revolving around a central theme of theories of human intelligence. Some students (control group) received a traditional text passage without illustrations and others read a text passage with the addition of a keyword, which is a familiar word resembling the theorist's surname. Also, the text contained an interactive illustration, seen in Picture 5, where each keyworded name was linked with the essentials of the theorist's views. As expected, participants in the mnemonic conditions generally outperformed the control group in concurrent essays in regards to remembering names and major facts.

Picture 7: The text passage and mnemonic illustration accompanying a text passage on Alfred Binet and his contributions to the measurements of intelligence. Adapted from Rummel, Levin and Woodward 2003:329

Not all psychologists interested in individual differences agreed with Galton and McKeen Cattell about the importance of physical-sensory testing. Among them was a Frenchman, Alfred **Binet**, who believed that an adequate test of mental ability should measure the higher mental processes, such as imagination, attention, and comprehension. In 1904, a practical problem arose that increased interest in mental testing. A commission was established by the French minister of public instruction in Paris to develop tests that would identify children who had learning disabilities and who could not, therefore, benefit from regular public school instruction. To assist in identifying "mentally retarded" children between the ages of 3 and 13, in 1905 Binet and a physician coworker constructed a test consisting of 30 problem-type tasks arranged in order of difficulty. In accordance with Binet's assumptions about how mental ability should be measured, the test was heavily weighted toward the "higher mental functions," such as judgment, comprehension, and reasoning. It consisted of such tasks as memory for digits and sentences or identifying objects and parts of the body. The test was intended to measure the so-called "mental age" of children, which was determined by how many items the child passed on the test, and thus to distinguish children who needed special educational assistance from those who did not.
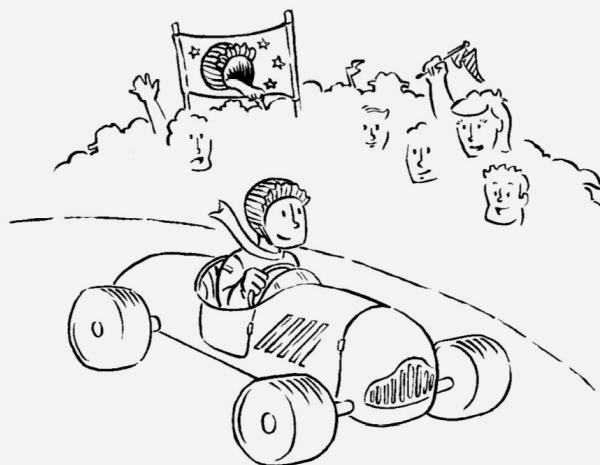
Binet _ bonnet

This race-car driver is competing in a race while wearing a special <u>bonnet</u> to protect his brain, to remind us of the place that <u>Binet</u> believed higher mental processes existed and should be measured.

The method applied by Rummel et al. (2003), is an adaptation of a mnemonic technique known as the keyword-method developed by R. C. Atkinson. Atkinson (1975) developed and refined the keyword method as an aid towards effective vocabulary learning. Atkinson (1975) divides the keyword method into two stages: The first stage, referred to as the *acoustic link*, requires the learner to quickly associate the foreign word with the keyword; a word in their native language with acoustic similarities to the target word. The second stage, or *the imagery link,* consists of an image where the formed keyword and the target word's translation interact. Using Atkinson's (1975:822) example, the keyword method functions in the following way: The Spanish word for "duck" is "pato". The keyword contrived from "pato" could be the English word "pot". Using this acoustic link, the next phase is to integrate a pot and a duck interacting in the same image, resulting in an image of a duck with a pot stuck on its head, as illustrated in Picture 6. Atkinson suggests that upon hearing the word "pato", the keyword "pot" will be triggered, and

consequently the interactive image, thus enabling the correct recall of the meaning of "pato".

Picture 8: Using the keyword method as an aid in foreign language vocabulary learning. Adapted from Atkinson 1975:822

PATO — pot — DUCK
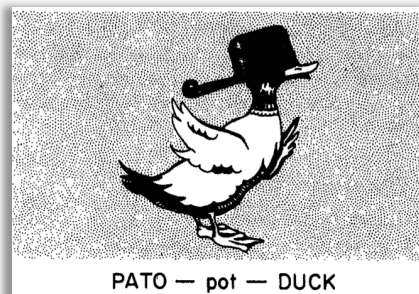
Subsequent research, as listed in Levin (1985:70), has concluded that mnemonic vocabulary learning is nearly twice as effective as traditional vocabulary learning methods and it an applied to language learners from as young as three-year-olds to adult learners.

4.4 Categories as basis for textbook analysis

Levin's categories have recently been utilized in analyzing education materials similarly as in the present study. Romney (2012), VanDeVort (2007) and Codone (2005) all base their review of study materials on Levin's five categories. Hill (2003) also studied illustrations in language textbooks. His taxonomy did not, however, follow Levin's categorization, but a simpler model of either 'useful' or 'decorative'. The results of these studies provide insight towards the approach and hypotheses of the present study.

As mentioned, Hill (2003) studied the function of illustrations in language textbooks. His study applied a simpler model of categorization, where pictures were either deemed 'useful' or 'decorative'. Hill examined four British course books and the illustrations within. He decided to examine only color photographs and color drawings, as they constituted a large majority of illustrations. Hill then categorized the illustrations on the basis of whether they were specifically used in the text or only used for decorative purposes. Hill's (2003:176) results indicated that a total of 55 percent of illustrations were used for only decorative purposes. According to Hill (2003:176), the results raise the question of the priorities of ELT publishers, editors and authors

regarding illustrations. Do they see them as tools for learning or merely as aesthetically pleasing, space-filling ornaments?

Codone (2005) studied the visual aspects of technical communication textbooks with the help of Levin's categories. Codone examined the illustrations of two technical communication textbooks and discovered, contrary to the hypothesis that illustrations would be prevalently either decorational or representational, that in one of the textbooks 149 of the 280 illustrations were either organizational or interpretational images, which stimulate higher levels of learning. While Codone (2005:761) acknowledges the difficulties of projecting from a small sample size, she predicts that further study of technical communications textbooks will exhibit results that indicate that most illustrations are there to support the text in some way and that illustrations fall into a wider spectrum of Levin's categories than hypothesized.

VanDeVort's Ph.D. dissertation (2007) examined three of the most adopted social studies textbook series intended for second, fourth, and sixth grade students across the U.S. The aim of VanDeVort's (2007) study was three-fold: It set out to discover what were the most common graphic print functions, as described by Levin (1981), and graphic print types, meaning either iconic or noniconic images. The concept of iconic and noniconic images was introduced by Levie and Lentz (1982) and it is used to determine if an illustration conveys meaning by means of visual resemblance (iconic) or by other means (noniconic). The study also set out to determine whether the illustrations grew more complex as grade levels advanced.

Applying both qualitative and quantitative methods of statistical analyses, VanDeVort first, in Phase one, visually examined a total of nine social studies textbooks for which type of graphic print, iconic or noniconic, was most prevalent and conducted three separate chi-square tests of independence to determine if type of illustration (iconic or noniconic) was independent of grade level. The results of Phase one indicated that (a) iconic images were used more than noniconic pictures in all of the textbooks, consisting of nearly 63 percent of all illustrations and (b) as advancing in grade level, the proportional amount of noniconic illustrations grew larger. Phase two of the study, which

provided more insight in regards to the themes presented in the present study, divided the illustrations into the qualitative categories created through Levin's (1981) taxonomy and attempted to determine if the function type of the illustrations increased in complexity with grade level, and as in Phase one, conducted three separate chi-square tests of independence to determine if the type of illustration was independent of grade level. The results indicated that on average, across all grade levels, representational illustrations was the most prevalent functional category within iconic illustrations whereas organizational illustrations were the most popular noniconic illustrations. The complexity of iconic and noniconic illustrations increased as grade levels advanced throughout all textbook series. The result was highly apparent in noniconic illustrations, but also somewhat distinguishable in iconic illustrations.

Romney's (2012) study resembles the present study closest. Romney's case study inspected three common Japanese ELT course books to find which pedagogigal functions, if any, the images in these texts had. Instead of using Levin's five-part taxonomy presented above, Romney included an additional category: re-iteration, which Levin (1981) introduced, but in later revisions merged to the representational category. Romney's survey of the three books included a total of 1640 images. Of the images a majority of 82% served one of Levin's five learning-enhancing functions (re-iterative, representational, organizational, interpretational or transformational) with 18% serving a decorational function. Furthermore, Romney (2012:394) concluded that the representational function was most commonly represented in the illustrations as 47% of the illustrations fit into this category. Organizational and interpretative illustrations each accounted for 6% of the total, whereas none of the books contained transformational illustrations.

4.5 Other functions of illustrations

While the present study places its main focus on examining the learning functions illustrations enable, it also acknowledges the design aspects of textbook creation that are based on theories of art and design that aim towards eye-catching and appealing materials and illustrations rather than educational or cognitive theories. It can be argued that pictures play a factor

as motivational or engaging elements within the books. Harmer (2001), as quoted by Hill (2003:177) argues for the use of images, even if they are not cognitively effective, stating that interesting pictures will appeal to some students and engage visually oriented students. Morrison et al. (2010:189) state simply that using images is advantageous because a full page of text seems threatening to a reader. Moreover, the aspect of textbooks being essentially commercial products has an effect in the choices made regarding illustrations.

 The principle of a proper graphical layout of a page or a spread in print is discussed by, among others, Mendelson and Darling-Wolf (2009:814). They argue that a well-balanced page that is aesthetically well structured creates interest towards the text and images, and that images break up the text to less intimidating chunks without confusing the text's narrative.

Many of the challenges in the design of teaching materials stem from the duality of the intention of textbooks. On one hand the books aim for a certain standard of quality as educational tools, which must be reflected in the books' content. On the other hand, the books are, as brought forward by Harwood (2010:15), first and foremost commercial items with intent to attract as many teachers as possible. Large decorational images that fill the page and overlap with the text give the book a layout that resembles magazines and other publications that students are used to reading and, as Carney and Levin (2002:20) state, make them more marketable. In order to pass "the flick-test" described by Bell and Gower (1998:125), textbooks need to grab the readers' attention. Textbooks are essentially products, and their main purpose is to make money for their publishers. Therefore, there are bound to be illustrations in books that reflect this purpose. Levin's (1981) first model of functional categorization addresses this need. Levin (1981:216) included a category referred to as remuneration, meaning illustrations that aim to make the text more commercially desirable and increase the sales of the book. The function was later dismissed, as it fell under the umbrella of decorational illustrations. Furthermore, it would be difficult to differentiate remunerative illustrations by inspecting the material; one would need to interview the graphic designer and

the editor of the books in order to know their motives for using decorational illustrations.

5 The present study

The aim of the present study is to explore the role of pictures in language learning and, more specifically, language textbooks. Textbook analysis was quickly chosen as a point of focus for the study, as textbooks serve as an integral part of learning materials in language learning. The importance of textbooks in the classroom is supported, among others, by the results by Luukka et al. (2008), who conducted a questionnaire for 324 L2 teachers and discovered that 70 percent of them state that textbooks are the most important means in their teaching. Luukka et al (2008:68) also state that textbooks can be considered as a type of "hidden curriculum" for teachers, which underlines their status as a guiding force behind lessons.

Even though textbooks have been analyzed through different viewpoints, there are not many studies that analyze textbook illustrations. Some previous studies, which were presented in section 4.4, have addressed the functions that images serve as learning devices, but only few of them analyzed language textbooks. Furthermore, no studies analyzing illustrations in textbooks used in Finland could be found, which validates the usefulness for the present study.

Personally, the reasons that guided me towards the topic can be attributed to my experiences as a visual learner, who as a student found great value in the illustrations in textbooks as well as my professional status as both a future language teacher and a photographer. I believe images to be of great value as communicators of ideas, concepts and emotions in a way words are not capable of. In the present study I set out to examine whether the value I attribute to the power of illustrations was reflected in textbooks, i.e. the basis of much of my future work as a teacher, or if illustrations were only regarded as ornaments decorating the material.

5.1 Research questions

Utilizing the theoretical background of images as learning tools, the present study will discuss the following research questions:

(1) *What functions do textbook illustrations serve in English textbooks?*

(2) What are the differences between the illustrations used in books for primary, secondary, and upper secondary school students?

(3) Are there differences between the books intended for the same age group by different publishers?

Examining the results of previous studies on the topic, suggest that certain patterns could be expected. First, two functions were hypothesized to emerge as ones with a majority of illustrations. Representational illustrations were expected to be the most popular type of illustrations, as Levin has repeatedly stated that to be the case (see Carney and Levin 2002 or Levin 1985). Also, the results in Romney (2012) indicated that nearly 50% of illustrations analyzed in a similar study were representational. Secondly, the present study expected a large number of decorational illustrations to appear. The hypothesis is supported by the results in Hill (2003) and the discussion by, among others, Harwood (2010) on textbooks and, hence, the illustrations in them as commercial items aiming to make the book seem more appealing and marketable. The present study also expected very few, if any, transformational illustrations to be found.

5.2 Data and methods

The data for the present study was gathered in January 2014 through examining the illustrations in a total of ten English text- and activity books widely used in Finland. Every illustration was examined, subjected to questions, that were formed to evaluate their function, and marked down as a representative of one of Levin's 5 categories. The questions are presented in Table 1 below. As the present study anticipated that there would be a large number of decorational illustrations, the decorational category was divided into two subcategories introduced by Levie and Lentz (1982), as suggested by Boerer (2004).

Furthermore, while categorizing the illustrations, two additional pieces of information were also marked down: whether the image was a photograph or a drawing, and if the image was used in adjunct to a grammar section.

Table 1: Categories and questions			
Category		**Question**	
Decorational	Attentional	Does the image make the content more appealing to the reader?	Does the image direct the reader's attention towards the text?
	Affective		Does the image affect the reader's emotions?
Representational		Is the image a visual representation of the events or themes presented in the text?	
Organizational		Does the image provide a structural framework for the contents of the text or aspects of it?	
Interpretational		Does the image explain concepts or ideas presented in the text that are difficult to understand?	
Transformational		Does the image act as a mnemonic device in order to make the text or aspects of it more memorable?	

Items excluded from the analysis were recurring symbols that usually indicated the type of task or text at hand, such as a drawing of a cd to point out that the text could be listened to on the accompanying cd. Simple geometrical shapes that were often used to box in text or arrange it in table form were also not considered as illustrations. Clusters of similar images used in the same context, similar in content and within close proximity of each other were considered as one illustration. Counting said image clusters as one illustration ensured that if single instances where several images of a certain category were used would appear, the results would not be skewed. Image clusters counted as one were, for example, illustrations in a vocabulary list, where every word was illustrated with a representational drawing or a series of portraits next to each other in adjunct with a narrative text.

The study utilized the most recent English textbook series by the two largest publishing houses in Finland: SanomaPro and Otava. The target group for the

textbooks are: Fifth grade students in primary school, eighth grade students in secondary school and the students on the fourth mandatory English course in upper secondary school. The books, as presented in Table 2, were selected in order to gain a comprehensive view of images in language textbooks in use that is not reliant on the work of a single publisher. The publishers, upon request, provided the books used in the study. The selected books also enabled the present study to examine if the role of images changes as the language user's proficiency level advances.

Table 2. Books used in the present study and their target audience

The reader		Books (by publisher)			
Level	Age (average)	Sanoma Pro		Otava	
Primary school	11	*Let's Go! 5 – Storybook (2013)*	*Let's Go! 5 – Activity book (2013)*	*All Stars 5- Reader (2011)*	*All Stars 5- Activity book (2012)*
Secondary school	14	*Spotlight 8- Textbook (2013)*	*Spotlight 8- Workbook (2013)*	*Top 8- Texts (2012)*	*Top 8- Exercises (2012)*
Upper Secondary school	17	*Profiles – Course 4 (2012)*		*Open Road- Course 4 (2013)*	

The method that the present study utilizes in examining the data is content analysis, which Neuendorf (2002:2) defines as the examination of communication characteristics through quantitative, objective and systematic methods. According to Leiss, Kline and Jhally (1986), content analysis aims to observe patterns of differences and similarities while allowing qualitative data to be examined through quantitative terms.

The present study takes both a qualitative and a quantitative approach towards content analysis. It analyzes categorized, numerical data in order to find observable patterns and analyzes illustrations based on their occurrence frequency in the data. According to Seitamaa-Hakkarainen (n.d), quantitative content analysis is more cyclical in nature: The data analysis is started already during the data gathering process and allows the forming of new categories during the analysis process, making the analytical process rather flexible and reflective in nature. In addition to the predetermined categories, the present study created new categorizations and models within and across the predetermined categories and reflects upon the new perspectives that it found. The combination of both quantitative and qualitative content analysis methods allows the present study to comprehensively analyze the illustrations found in textbooks.

6 Pictorial illustrations in English textbooks

The following passage introduces the results the aforementioned method of study produced. The data of the present research is based on a combined total of 1 299 illustrations found in the ten books observed, which were each placed into one of the described categories. Additional observations were also made, pertaining to the visual nature and relevance of the illustrations.

Of these 1 299 images, roughly half, 628 illustrations, or 49% served one of Levin's four learning functions, while 671 illustrations, or 51% were deemed decorational, i.e. not enhancing learning. Of the 671 decorational illustrations, the majority, 357 illustrations were affective, meaning that they affect the reader's emotions and attitudes towards the text and make it more relatable. Attentional illustrations, whose main focus is to direct the reader's attention towards the text, accounted for 314 images. The most prevalent category that aids learning was the representational category, with 581 illustrations. 41 organizational images were present in the textbooks. Furthermore, there were only 6 interpretational illustrations in the ten books. No transformational illustrations were found. Table 3 shows the findings in more detail.

As the present study examines the different qualities of illustrations, the distinction between drawings and photographs was made. There were 370 photographs in the ten books, which accounts for 28% of the 1 299 illustrations. 929, or 72%, of the illustrations were drawn.

Images that illustrated grammar sections were included in the original categorization, but they were also marked down separately to give insight for the relation between illustrations in text and grammar passages. Examination of the books' grammar sections discovered that there were 125 images illustrating grammar points and exercises, 54 of which, or 42% were attentional, 24, or 19% affective, 44, or 36%, representational and 4, or 3% interpretational. No organizational or transformational images illustrated grammar sections.

	Decorational Attentional Affective		Representational	Organizational	Interpretational	Transformational	Total
Let's Go! 5 -Story Book	0	18	107	8	1	0	**134**
Let's Go! 5 - Activity Book	49	46	87	2	0	0	**184**
All Stars 5 -Reader	11	27	81	3	4	0	**126**
All Stars 5 -Activity Book	63	46	79	2	0	0	**190**
Top 8 -Texts	49	52	75	14	0	0	**190**
Top 8 -Exercises	44	22	23	0	0	0	**89**
Spotlight 8 -Textbook	51	60	72	10	0	0	**193**
Spotlight 8 -Workbook	24	27	7	0	0	0	**58**
Open Road -Course 4	11	23	26	1	1	0	**62**
Profiles -Course 4	12	36	24	1	0	0	**73**
Total	**671** **314**	**357**	**583**	**41**	**6**	**0**	**1299**

Table 3: The amount of illustrations per category in each studied textbook.

The resulted categorized data was then used to analyze and interpret the illustrations and their role in order to discuss as well as to shed light on the study questions. The following section will present the discussion and analysis of the procured data.
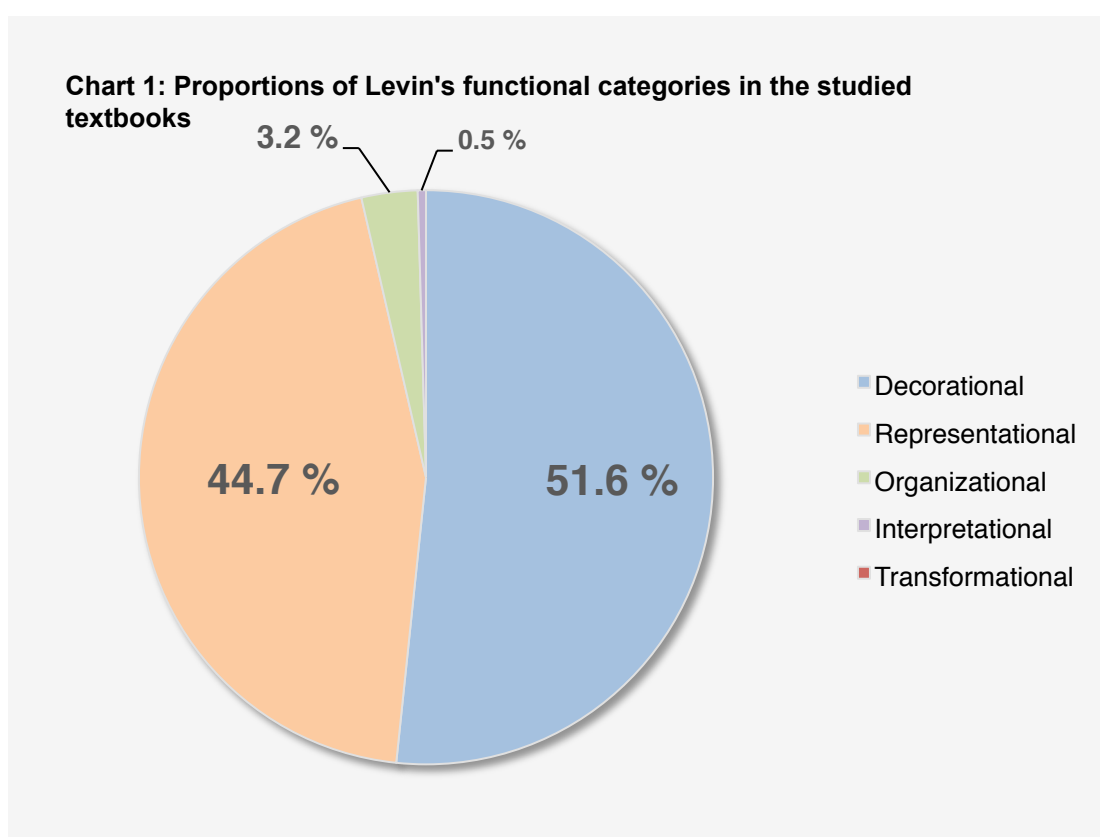
7 The functions of textbook illustrations

The results indicated certain similarities between the illustrations in all of the ten books but differences and patterns were also observed. The succeeding sections will examine and discuss the findings through each of Levin's five categories adjusted with Levie and Lentz's (1982) categories. The present study will also examine the books and their illustrations individually in relation to different age groups. In addition, the present study at times discusses the surface structure of the use of illustrations in the books and presents general observations on the differences found in them regarding topics not directly relating to their categorization such as layout, illustration types and quality, cohesion, conflicting imagery and relatibility to the reader.

7.1 Categories

When observing all the images present in the ten books, as proportionally visualized in Chart 1, two aspects of the nature of illustrations in these textbooks are notably visible: Firstly, the majority of illustrations in the books are decorative in nature. Keeping in mind Levin's notions on the learning effects of images, previously visualized in Picture 4 on page 19 of this study, the results suggest that over 50% of the illustrations in English textbooks used in Finnish schools do not aid the reader to gain a deeper understanding of the topic at hand. Even though decorational illustrations may have motivational effects or they can make the text and topics seem more relatable, which are factors that the present study will also discuss in more detail in following sections, one must keep in mind that they do not provide any measurable results as regards to the retention, understanding or applying the content. Secondly, the results of the present study indicate that representational images make up for the vast majority, over 90%, of the images that have an influence in the learning process. The result is in line with Carney and Levin's (2002:11) notion that, when discussing pictures with learning effects, representational illustrations are by far the most common text adjuncts. The result is explainable through the nature of the text contents in English

textbooks. The texts are generally stories or narratives, which include aspects of language and culture such as nationalities or foreign cultures and cities. The narratives are then relatively easy to illustrate with visual representations of the text or some of its aspects. Other educational images, meaning organizational or interpretational illustrations are generally better suited for more scientific texts, where blocks of information need to be condensed or organized in a way that helps the reader to understand the underlying concepts and theories discussed in the text.

Chart 1: Proportions of Levin's functional categories in the studied textbooks

- Decorational
- Representational
- Organizational
- Interpretational
- Transformational

3.2 % 0.5 %

44.7 % 51.6 %

The nature of the images within the categories varied to an extent. The following sections will address the individual categories' general characteristics and discuss the types of illustrations within them as regards to their context and effect on the learner.

7.1.1 Decorational illustrations

Picture 9: An example of a decorational illustration. Adapted from *Open Road – Course 4,* **p. 13.** The photograph was used to illustrate a translation task where the sentences revolved around the topic long-distance running.

Decorational illustrations, exemplified in Picture 9, as well as being the largest of the studied illustration categories also displayed the largest variance in the pool of images, as regards to the type of image, that were included in the category. One cannot point out a single archetype of a decorational illustration, but many types of illustrations repeated throughout all studied books. Generally decorational illustrations included: **(1)** images that bore a slight resemblance to the theme of the text, such as a photograph of an airplane adjunct to a text that contained a narrative of what generally happens in an airport, **(2)** photographs of a person or a group of people smiling or interacting in some way, having at best a superficial connection to the text content, **(3)** images displaying cultural content that is relevant to the culture discussed in the text, but is not mentioned in the narrative, such as a photo of two kangaroos illustrating a section listing facts of Australian culture, or **(4)** drawn illustrations in activity books intended to direct attention to exercises or grammar points, such as a drawing of a telephone next to a fill-the-gaps vocabulary exercise concerning a telephone call or a drawing of a smiling face and a speech bubble where instructions to tasks or grammar issues were introduced. Furthermore, many other variations of a decorational image were

found, but they did not appear as frequently as the previously mentioned types of images.

Seeing that a total of 671 pictures, the majority out of the pool of images, analyzed fit into the decorational category, which does not directly affect the acquisition, retention or applying of knowledge, it would be counter-productive for the purposes of this study to dismiss 52% of the acquired data as meaningless ornaments and only focus on the 48% that offer benefits in terms of learning. The books are the result of a process utilizing the expertise of professionals in the fields of education, publishing and graphic design. Therefore, it can easily be argued that there has been a distinct thought process and different factors that have motivated the book creators to use these images. Motivational and aesthetical factors undoubtedly play a part in the decision to use these images. According to Harmer (2001), as quoted by Hill (2003:177), as previously mentioned, even the use of cognitively ineffective images is acceptable, as interesting pictures appeal to and engage visually oriented students and therefore increase their motivation towards the subject. From an aesthetical point of view, the principles of design suggest that, generally, a full page of text seems threatening to the reader. This aspect of graphic design has been echoed for example by Morrison et al. (2010:189) and Mendelson and Darling-Wolf (2009:814) who argue for a well-balanced page in which images break up the text to less intimidating chunks and direct attention toward it without confusing the text's narrative.

One can relate this motivational and aesthetic rationale behind the use of specific images to the categories of affective and attentional model proposed by Levie and Lentz (1982), which, according to Boerer (2004), can be seen as subcategories of Levin's decorational category. According to Levie & Lentz (1982), affective illustrations aim to enhance the reader's enjoyment or affect their emotions and attitude thus helping the retention of the material. Attentional images, on the other hand, work on the premise that they attract the reader's attention or direct it towards the material. As mentioned, the books contained a total of 357 affective and 314 attentional images.

7.1.1.1 Affective illustrations

Affective illustrations constituted the majority of decorational illustrations. They were most often used in adjunct to the narrative text passages and accompanying materials in the textbooks of book series. In fact, in the 4 activity books studied, affective illustrations were in the minority with a 44% stake of the decorational illustrations whereas when the 6 textbooks were observed, affective illustrations accounted for 62% of the decorative illustrations. There were two main types of affective illustrations that repeatedly showed up: Firstly, portraits or color drawings of people who are about the same age as the students for whom the books are targeted were common. Secondly, a multitude of pictures that represented scenes, buildings, objects or wildlife of the culture or location presented in the text was found. Some humorous illustrations aiming for comical relief were also present, especially in the primary school textbooks.
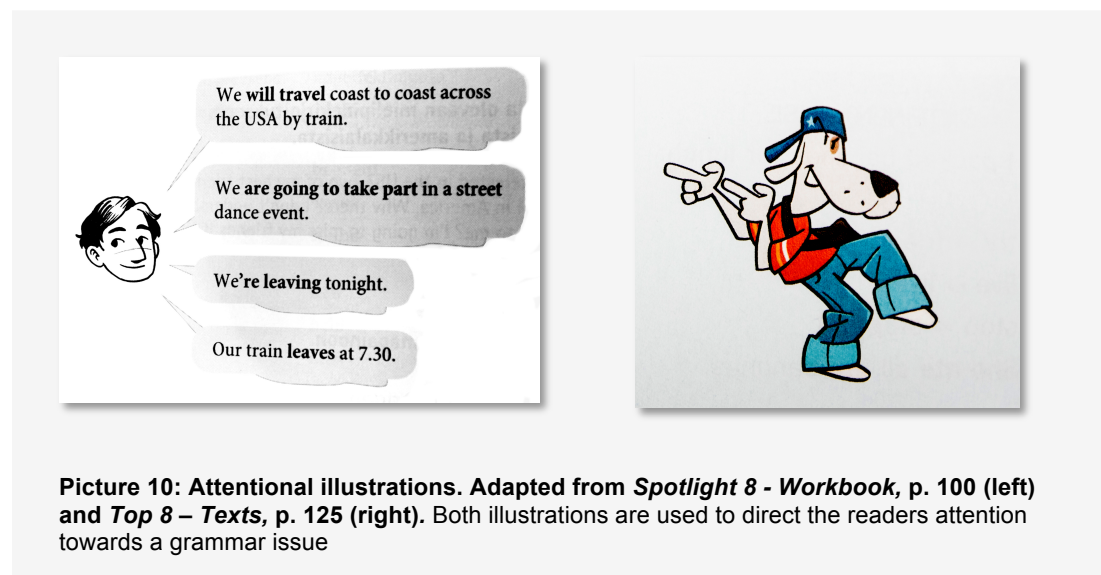
Images portraying people of the same age as the readers obviously seem to have been paid attention to: The primary and secondary school textbooks all featured recurring characters who appeared throughout sections or even the whole book. The effort that this requires suggests that relatability is an important theme in the book making process: Main characters who are very much in the same point in their lives, although from a different culture, and face similar issues as the students reading the text are easy to relate to and their constant presence throughout the book helps the reader to form an emotional connection towards the characters, which in turn creates interest and a positive attitude towards the text even though their actions in the images do not directly represent aspects of the text.

Affective illustrations featuring cultural content, the other staple of affective illustrations, aim to bring the target culture to life: Seeing the architecture, scenery or recreational activities linked to the specific culture engages the students to learn more of the country, city or subculture in question and helps them form a wider, more tangible and thorough view of the target culture. Even though the images are not referred to in the text, thus making them useless in the point of view of retention of the material, they do support the

goals set by national core curriculum for both basic education and upper secondary school (Perusopetuksen opetussuunnitelman perusteet 2004, Lukion opetussuunnitelman perusteet 2003), which both emphasize cultural knowledge and understanding alongside linguistic knowledge. One must keep in mind, however, that according to the principles of DCT cultural illustrations that reflect the text content, i.e. representational images, are much more likely to be remembered by the learner. It is easy for a student to glance over the decorational images, as there are no prompts in the text that would help them to form the referential connection between the image and the subject matter.

7.1.1.2 Attentional illustrations

Attentional illustrations, on the other hand, served the purpose to pull the readers attention towards the text. Most often they were connected with tasks and grammar points. As mentioned above, they were most frequent in activity books where they generally indicated tasks or grammar points and featured recurring drawn characters, either people or animals, who in different ways pointed towards the issues at hand, as visualized in Picture 10.

Picture 10: Attentional illustrations. Adapted from *Spotlight 8 - Workbook,* p. 100 (left) and *Top 8 – Texts,* p. 125 (right). Both illustrations are used to direct the readers attention towards a grammar issue

Attentional images illustrating texts and narratives were generally simple photos or drawings of objects, such as signposts, license plates, animals or other simple objects, interlaced with the text to create a dynamic and interesting layout for the page. The majority of the textbooks also featured full-page photographs, over which the text contents were then overlaid. These

types of illustrations generally make the text more pleasing towards the eye and break into more manageable chunks. Attentional illustrations also enabled the addition of smaller chunks of text or nuggets of information alongside the main text content by incorporating and framing said text within them.

Even though it can be argued that there are some non-cognitive functions for decorational illustrations that can be beneficial to the readers, the fundamental function of books as commercial products must be taken into consideration when discussing the motivation behind decorational images. Textbooks' main purpose, essentially, is to appeal to the language teacher in order to persuade them to choose the book series as the basis for their teaching. To achieve these sales, the books naturally need to reach high standards as educational materials and comprehensively cover the themes set forth by the national core curriculums, but appealing visual and aesthetical layout choices also play a big part in the process. The images in the books have to essentially pass what present study has previously described as the "flick-test". In essence, the flick test is the quick skimming through the contents of the book done by the teacher in order to determine the quality of the book at hand. Being such a short operation, the flick test does not allow the teacher to examine the deeper relations that the images hold towards the text or if they aid in the memorization of the materials. Large colorful illustrations and photos look appealing and give a sense of a thought-out visual design regardless of whether or not the illustrations hold any educational function.

7.1.1.2 Distracting imagery

According to Levin (1981:227) and the concepts of *visual noise* and *Picture Superiority effect,* as discussed in section 4.3.1 of the present study, images that do not reflect or even contradict the text or parts of it can disrupt learning. Many of the decorational illustrations in the textbooks purposelessly loaded the working memory with visual noise that has no bearing towards the topic. Furthermore, some of these images, exemplified in Pictures 11 and 12, were

either needlessly confusing or even blatantly misleading in relation towards the text.

Don't forget to show enthusiasm for your subject.

Picture 11: Adapted from *Profiles – Course 4,* p. 81. This photograph from the Finnish parliament was used to illustrate instructions on how to give a presentation, which should be on Finnish society. Even though the photo reflects the theme of the text, the caption, which reads: "Don't forget to show enthusiasm for your subject", is not related to the image in any way and confuses the message. In order to create an illustration with a caption that is not as confusing, either the caption or the image should be changed to a more suitable one.

Picture 12: Adapted from *Spotlight 8 – Textbook,* p. 118. The stock photograph was used to illustrate a narrative, where a teenaged girl is upset after she discovers that a boy had uploaded a picture of her online without her permission. The text's major theme was net security and how to protect oneself online. The illustration, however, features a group of people enjoying themselves and having fun while looking at something the girl's phone. The message conveyed in the image contradicts the text's message and might mislead weaker readers to misunderstand the text's main point.

Texts and narratives with deeper meanings and themes seemed the most problematic to illustrate. Distracting imagery occurred most often in situations where the text concerned a theme that implied a meaning beyond the words in the text. The images illustrating these texts were often very literal in nature and nearly always photographs. For example, the lyrics for Bruce Springsteen's song *Streets of Philadelphia* presented in *Profiles* (2009:33) reflect the story of a man whose physical and mental health is fading. The song is inspired by the movie *Philadelphia,* which deals with the struggle of a man dying of AIDS in the late 80's. The song, as well as the film, uses Philadelphia, also known as "the city of brotherly love", as a metaphor for feeling solitude and hopelessness under a devastating illness with an attached social stigma. The task accompanying the lyrics asked: "Using your imagination, suggest what the man's situation in life might be. What makes him feel the way he does?" The illustrating photograph showed a scene from a sunny street in Philadelphia. This decorational illustration has probably been found from a photo agency with the search terms "Street" and "Philadelphia". The image does not, however, represent the theme of the text in any way. It may rather distract the poorer readers from the deeper theme of the lyrics, as, like mentioned in section 4.3.1, poorer learners spend more time looking at the images. The aforementioned example highlights the need for carefully thought out visual text adjuncts and argues against the purely decorational use of illustrations.

7.1.2 Representational illustrations

The hypothesis of the present study was that representational illustrations would be the most popular type of illustrations. This was not, however, the case in present study when illustrations in all 10 books were taken into account: The results of the study showed that the representational illustrations totaled 583, or 44.7% of images in all books. However, the proportions reverse if the four activity books are excluded; They feature overwhelmingly decorational illustrations, in part due to the difficulty to meaningfully illustrate

their text contents when compared to narrative texts. In this scenario, where only the six books that feature narrative text passages are observed, representational illustrations form the largest category with 216 images, or 49% of the total of 778 images and the relative size of the decorational category diminishes to a minority of 44%.

The present study observed four major trends in regards to representational images. Firstly, representational illustrations, often drawn, generally reflected the narratives or stories in the texts. Comics, drawn illustrations and photographs were used in presenting the actions described in the text. Secondly, representational images were often used in representing cultural content. Photographs, and occasionally drawings were used to visualize the scenery, people and actions of a culture the text dealt with. Thirdly, simple representational illustrations were used to illustrate vocabulary lists and exercises. Fourthly, several tasks in the exercise books drew from representational images in various ways.

Illustrations that visually represent aspects of the text or narrative can be considered the archetype of representational illustrations. The goal of these images is to make the text more concrete to the reader as well as make the narrative more memorable. The use and benefits of said images were greatly dependent on the themes presented in the texts. Simple stories and narratives, where the focus of the text was in the actions and dialogues of the characters, benefit greatly from these types of representational illustrations. These images provide a supportive structure for the text through providing a visual representation of the verbal material, in line with the principles of DCT. Even though, as suggested by the Dual Coding Theory, these images benefit all learners as they make the text easier to remember, in the scope of language learning they also provide an additional benefit to the weaker learners: If students do not fully understand the text, they can deduce the meaning of the words or passages they do not understand from the illustrations.

The aforementioned advantages of representational illustrations diminish accordingly when the themes in the texts advance from simple narratives to

more conceptual ones, where the texts revolve around underlying topics of culture and society. The increasing complexity of the text topics might provide insight as to why representational illustrations are the clear majority in primary school textbooks whereas in the secondary and upper secondary school textbooks they comprise less than 50% of illustrations. It is arguably far easier to illustrate a story of a camping trip (*Let's go! 5 –Storybook*) with representational images than it is to find or create images that meaningfully illustrate discussion on the ethics of forced marriage (*Open Road- Course 4*).

Representational images displaying cultural content functioned much in the same way as the affective, decorational illustrations with the same theme, which are discussed in section 7.1.1. Recapitulated, cultural knowledge and understanding are, according to the national core curriculum for both basic education and upper secondary school (Perusopetuksen opetussuunnitelman perusteet 2004, Lukion opetussuunnitelman perusteet 2003), an essential goal in foreign language subjects alongside linguistic competence. Images help bring these cultural contents to life in appealing and engaging means in which text is not capable of. The factor separating representational and affective cultural images was that the contents in the representational images were referred to, either directly in the text or in a caption below the image. Referring to the image directs the reader's attention towards it and elevates the image from an interesting ornament to a fundamental part of the learning material.

Captions in particular had an interesting effect towards the learning effect of images: Series of captioned images often created their own image-based narratives alongside the text and provided deeper insights towards the history or peculiarities of a culture. For example, a text in *Spotlight 8 – Textbook* (2013:10) told the story of what life was like for a young girl growing up in Belfast in the 1980's. The illustrations combined historical photographs and photos of murals and street corners in Belfast. The captions, although simple in nature, opened up the historical background of Northern Ireland's problems during the 1980's. While the text provided an anecdotal account of the era, the images presented the history and advancements of the society in a larger scale thus enforcing the learners understanding of Northern Ireland's past.

Without captions, the reader can glance through the photos and not grasp the subtle meaning that for example a photo of a modern day, safe, street corner in Belfast with stores and billboards conveys. Captions can also easily trigger emotions and attitudes towards the narrative, while the image represents the actions in the text, as seen in Picture 13.

**Picture 13: Adapted from *Spotlight 8 – Textbook,* p. 38*.* This photograph of a cave would on its own serve as a representational illustration for the narrative on exploring a cave. The caption both drives home the point and encourages the reader to mentally visualize what it would feel like to actually be inside a cave. The simple prompt: "Would you like to go down there?" triggers a mental image that contains a multitude of nonverbal information therefore making the narrative as well as the image more palpable.

Simple representational illustrations occurred often, in both the primary and secondary school textbooks, illustrating sections where new words were introduced as vocabulary lists. The effects of, for example, a word list of body parts with corresponding illustrations after each word, is supported by Paivio's (1986) Dual Coding Theory. In a way, these images represent the notion of

coding information both in the verbal channel and in the visual channel through referential connections in the simplest and purest sense. Providing a visual representation alongside the text allows the learner to structure and compartmentalize new information in a non-sequential manner and allows for the strengthening of referential connections between subsystems. Vocabulary tasks in the activity books, for example crossword puzzles and other translation tasks, also applied representational images in the same way with similar benefits.

The different tasks in the textbooks had several individual approaches towards using representational images. The instructions for the tasks for example asked the reader to verbally describe the interests and hobbies of a person by using a picture of their room as basis, to find the differences between two images or mime the sport presented in the picture for their partner. Several of the image-based tasks were verbal in nature and aimed towards creating natural, non-constricted scenarios of language use. This can be explained through the non-sequential nature of images: The information they carry is parallel, and chunks of information are often nested within each other and as parts of larger structures. A single image can trigger dozens of connotations in the viewer, which they can then utilize and process into verbal sequences of their own choosing. Therefore, as the trigger has been nonverbal, the created verbal L2 structures are creative and natural as opposed to more rigid translation based tasks.

Representational images seem to reside in a type of sweet spot as far as textbook illustrations go: The images benefit the understanding, processing and retention of the material while being applicable to a wide assortment of aspects in learning materials ranging from texts to cultural information, grammar and tasks. Furthermore, applying representational illustrations to materials is relatively straightforward and easy, whether they are drawn illustrations or photographs, as long as the text is created with the illustrations in mind already during the writing process. This raises the question as to why representational images are not used more, especially in the textbooks for secondary and upper secondary school students. The present study addresses this question further in section 7.2.

7.1.3 Organizational illustrations

The 41 organizational illustrations found in all of the textbooks can be divided into two distinct varieties with few exceptions: Firstly, maps constituted for many of the organizational images. They were often the first illustrations used when a new section or text was introduced. Secondly, vocabulary items were often introduced with the help of organizational illustrations. The two types of images offer very different effects on learning, which will be discussed in the following sections

Most of the textbooks structured their text contents through geographical means. One section often focused on a single country or region, and the title page of these sections often contained a large map of said country. Maps, although constituted as organizational and therefore learning enhancing images, are fairly trivial in the scope of language learning, but have an effect in portraying cultural topics. Their effect lies in their ability to provide geographical information in an organized spatial display. Maps of target countries and regions undoubtedly provide the reader a sense of scale and geographical knowledge, which strengthens their cultural knowledge. The maps are, however, not utilized in the books in ways that would maximize their potential. Maps are never used as illustrations for texts, nor are they referred to after their introduction in the title page. Their use in tasks and activities are limited to games in the books *All Stars 5- Reader* and *Top 8-texts*, where the target country's map is used as basis for a board game that includes tasks and questions of the culture. Although the maps provide a structural framework towards the geographical aspects of a country or region, they do not help the reader understand or structure large chunks of information.

Organizational images illustrating word lists do, however, provide a useful structural framework towards vocabulary learning. By incorporating every word in the word list in a single image, the information is organized into a single memory enhancing entity. Therefore, it is more likely that word lists that

apply organizational images will be retained better than word lists with representational illustrations or especially word lists without illustrations. Picture 14 shows an example of the difference that can be achieved in vocabulary learning by using organizational illustrations. Other examples of organizational illustrations for vocabulary lists included cityscapes, images of airports, markets or jungles, all of which incorporated appropriate vocabulary within the images.
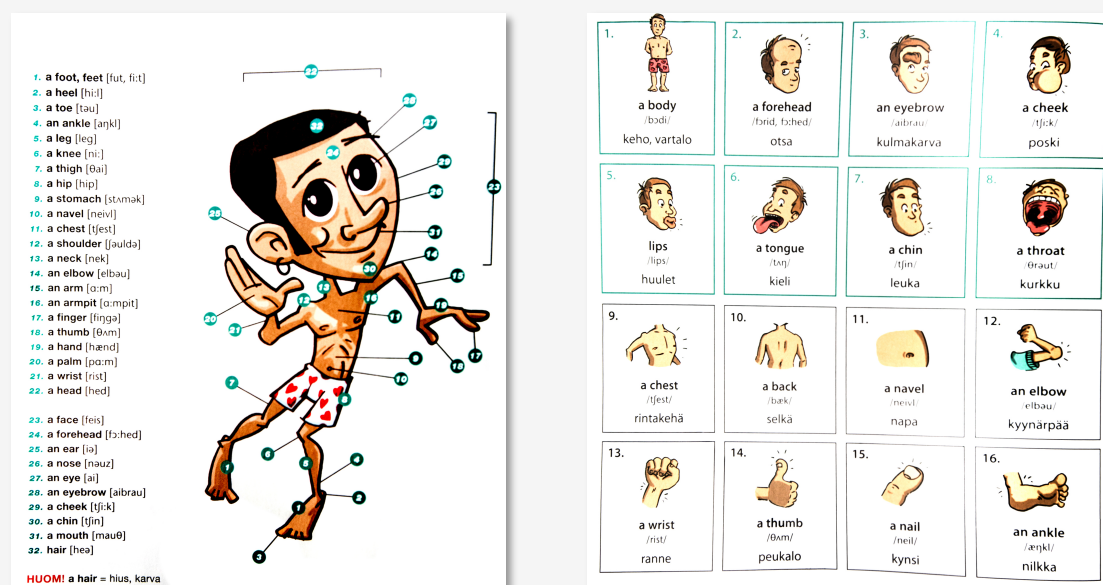
Picture 14: Adapted from Top *8 – Exercises,* p. 106 (left) and Let's Go! 5 - Storybook, p. 58 (right) Both images present a vocabulary list on body parts. The organizational image on the left, however, incorporates the words in the list into one image, which enables the learner to incorporate the structural information (e.g. the proximity of body parts) within the image in order to learn and retain the vocabulary. The image cluster on the right lacks this benefit and provides the reader with only representational visual ques.

Charts and mind-maps were types of organizational illustrations that did not appear as regularly as one would have assumed: both types of illustrations appeared only once in the ten books studied. Both charts and mind-maps have the potential to activate students to process information, especially sequential processes in a concise and structured manner. For example, the only instance where a chart was used was a task intended to aid the retention

of a biographical text (*Profiles 4)*. The task instructs the student to, in their own words, go over the main events of Ned Kelly's life using the illustration, a simple drawing of a timeline with integrated dates, as a guideline. When the reader finds the events that correspond to the dates in the timeline, this simple image forms a microcosm of the two-page verbal narrative, and stores it visually into the working memory. To retain the same amount of information verbally would be far more laborious. The one instance where a mind-map was used is nearly identical, as are the aforementioned learning benefits: In a task in *Top 8 – Texts,* the reader is instructed to paraphrase the contents of a text by using a mind-map as guidance.

The mental process that the timeline and mind-map incites can be explained by inspecting Baddeley's (2003) model of working memory: Both visuo-spatial and verbal information are intermediated by the episodic buffer into a crystallized item in the long-term memory containing visual, spatial, and verbal units of information with chronological ordering (see Picture 2. on p.9). These two images flash the potential that organizational images have in regards of text retention and act as proof that their use in language textbooks should be encouraged and not be limited to only illustrating scientific subjects.

7.1.4 Interpretational Illustrations

Interpretational illustrations were previously referred to as "visual metaphors". They are analogies in pictorial form that are created in order to simplify concepts that can be difficult to understand if only presented verbally. It is no wonder then, that four out of the six interpretational images found were used to illustrate grammar rules.

As grammar is a fairly structural, and rigid aspect of language learning with certain rules that one often must learn by heart, verbal presentation of grammar points can be difficult to understand at times. Interpretational illustrations can bring some concreteness to these intangibles through analogies, and therefore make them easier to learn.

All four instances of interpretational images applied to grammar rules were found in the same book, *All Stars 5 – Reader.* The images illustrated topics like the possessive "'s", as shown in Picture 15, abbreviating verb forms that contain "be" and "have", and forming questions with the help of the verb "do".
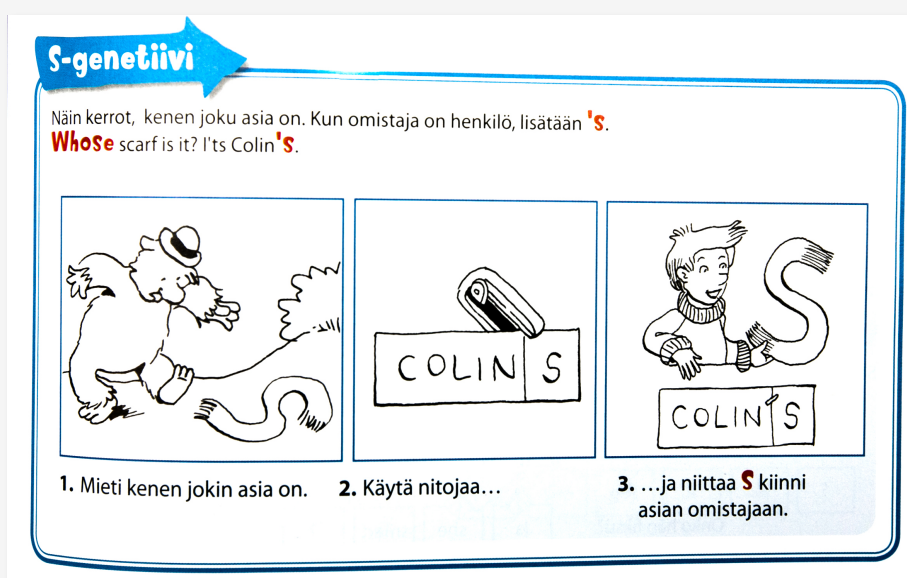
Picture 15: Adapted from All Stars 5 – *Reader,* p. 83

Picture 15 creates clever, tangible analogues for both the apostrophe and the letter "s". Furthermore, the visual tie between the images and their representative verbal forms is strong, thus making the connection easier to remember and be triggered on sight: A scarf not only bends easily into the physical shape of an "s", the beginning of the word itself also contains the letter. The staple also bears visual resemblance to an apostrophe while its function is also to tie two elements together. Creating and applying visual representations for the two key elements that are needed in the process of writing a correct form turns the grammar rule into a story that is easy to remember. Reciting the story presented in the three images invokes the images of stapling an "s" into the "owner" which in turn results into a correct written form.

The examples of transformational images illustrating grammar rules in *All Stars 5 – Reader* evidence the successful results are achievable with carefully thought out illustrations that open up and simplify abstract concepts. However, the scarcity of these illustrations in other textbooks raises questions. Why are interpretational images not used to illustrate grammar aspects in other learner levels? Visual representations and analogies benefit learners regardless of their proficiency levels and even simple drawings could be sufficient in invoking imagery thinking. One can only speculate the reasons and thought processes behind the book editors' illustration choices, but the lack of meaningful illustrations seem to reflect the notion that images and non-verbal materials are considered peripheral to text-based information. Lack of information about imagery processes may also play a part: Majors (2006), as mentioned in section 3.2, discovered that a majority of teachers reported mild or no exposure to imagery knowledge. Also, the majority of those who use imagery strategies only reported using basic text-visualization methods, i.e. mental representational pictures. Teachers, and therefore textbook creators, simply seem to be unaware of the possibilities of imagery strategies that provide stronger effects on learning.

The remaining two interpretational images provided insightful approaches towards enforcing text themes and vocabulary learning. They are presented in Picture 16.

Picture 16: Adapted from *Let's Go 5 – Storybook*, p. 57 (right) and *Open Road – Course 4*, p. 49 (below) The image on the right is used to explain the idiom "going bananas". The image below is a poignant illustration of a text where the author expresses the suffocating feeling of growing up as a teenager in an American suburb.
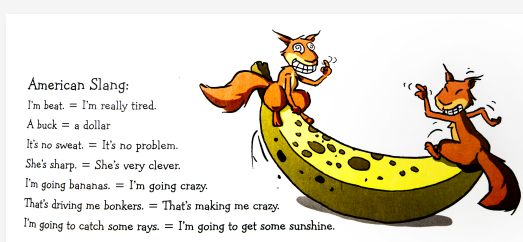
7.1.5 Transformational illustrations

The present study did not discover any transformational, i.e. mnemonic images in the studied textbooks. Although transformational images, according to Carney and Levin (2002), among others, are clearly the most beneficial towards learning and they can specifically help in language learning and learning new vocabulary, their absence was expected. There are a few reasons, relating to the nature of transformational images, to this: Firstly, it requires time and effort to create transformational illustrations and, secondly, the information they help to retain is limited to small pieces of information.

Theoretically, transformational illustrations can be seen as highly advantageous text adjuncts in language learning due to their effectiveness in vocabulary learning. However, realistically, textbooks cannot be expected to contain large numbers of transformational illustrations, as their cost-effectiveness is rather low, when compared to a, for example, representational illustration or a photograph. The creation of a mnemonic image requires a far greater effort from the illustrator due to the work that the book creators would have to do to come up with proper, connecting keywords that would connect the image and the text material. Even by doing so, the illustration would only aid in the learning of a small chunk of information: e.g. a single word, a piece of numerical information or a single geographical or cultural fact. When a vocabulary list for a single text in the books contains dozens of words, a single transformational illustration, no matter how effective, would not be very beneficial in a larger scale. In comparison, multiple representational images or an organizational illustration, as discussed previously, could provide larger, more comprehensive visual units of vocabulary information.

The present study, however, views the benefits of mnemonic images in vocabulary learning far too great to pass on even though the images are not practical as pictorial illustrations. Every book series included in the study has sections on strategies regarding language learning; Why not include a section

on the keyword method as a vocabulary learning device illustrated with an example or two to further clarify the method? This would equip the students with a powerful tool of imagery thinking that they could apply as they best see fit, which teachers could then occasionally trigger by instructing them to create their own mental images. Again, the lack of imagery strategies in the textbooks can be attributed to the inexperience on imagery strategies that a majority of educators have (See Majors, 2006).

In conclusion, observation of the gathered data, through Levin's (1981) categories, as a whole suggests that images in English textbooks in Finland serve two major functions: **(1)** Illustrations are used as decorative elements that do not directly enforce learning They do, however, aim to motivate the reader and affect their attitudes and emotions towards narratives and cultures as well as to make the text seem more visually appealing and structure it to manageable chunks. **(2)** Illustrations are used as visual representations of the themes presented in the texts. They mirror the aspects of texts and aim to make the narrative or target culture it more concrete and therefore easier to remember. More than 96% of the studied illustrations carry either one of these functions. However, the variance in the data suggests that there are differences between the approaches that different textbooks have applied towards their illustrations, which warrants further, more detailed discussion in order to cover the research questions set forth by the present study.

7.2 General discussion

As discussed above, the 1 299 illustrations that were spread out between all the studied books portrayed a view of textbook illustrations as divided into two categories: decorational images without distinct qualities that aid learning and representational illustrations that make the text contents more concrete. The situation changes, however, if the illustrative content in each book is observed individually. A detailed breakdown of the functions in each book is visible in Chart 2.

Chart 2: Percentage of illustrations in each category per book.
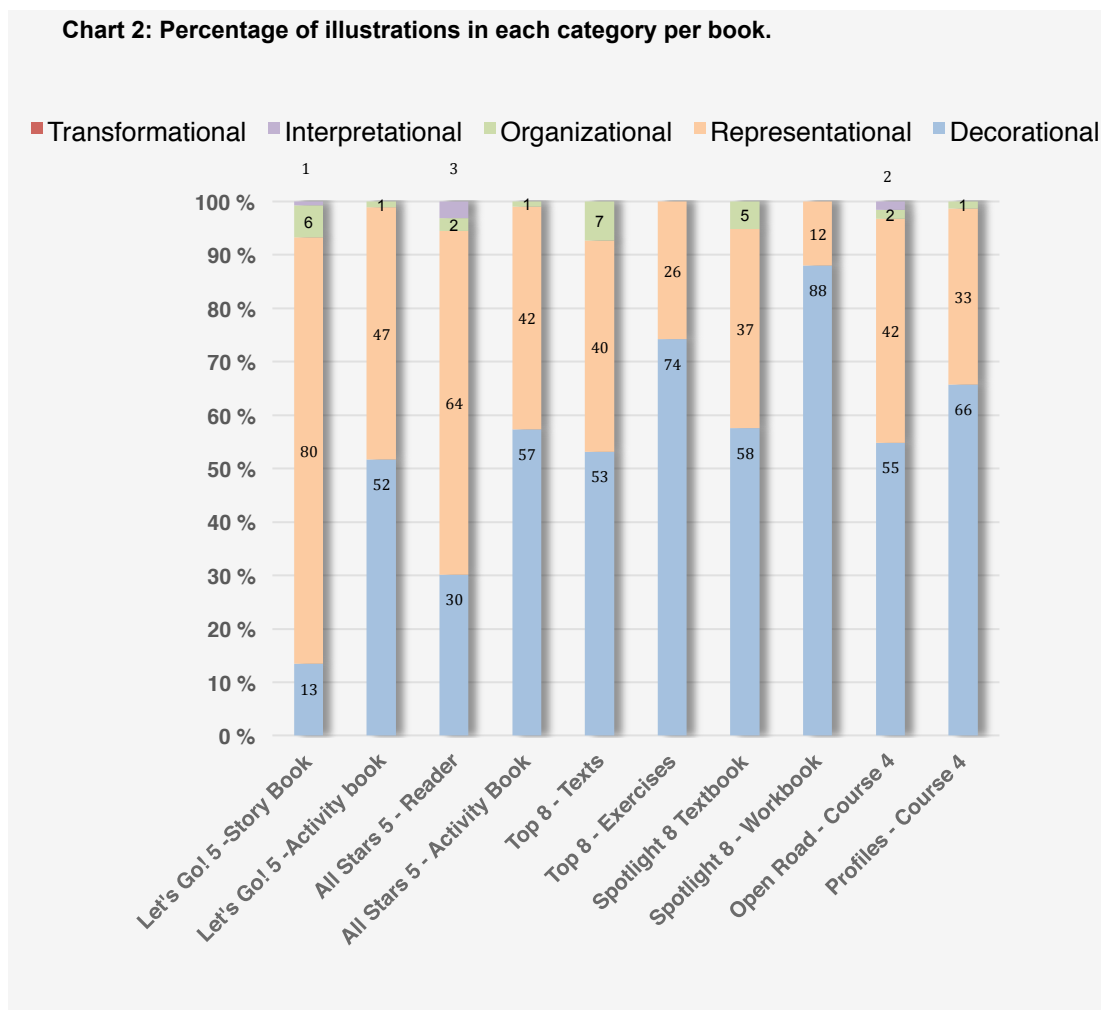
By examining the proportion of images in each book it is evident that there are variances in the books to a large degree. For example, the percentage of decorational illustrations per book varies from only 13.4% in Let's Go! 5 – Story Book to 88% in the workbook of Spotlight 8.

The results clearly indicate that there is not a general pattern to the textbook illustrations across the board, but rather that the function of illustrations varies according to both the proficiency level of the target audience and the primary function that the books and the text passages within them hold. Therefore, an isolated analysis per learning level, which also addresses the differences in the choices that the individual publishers have made as well as an analysis of image use per language learning context, is warranted. The interpretations made in the following sections also discuss the nature of textbook illustrations

beyond the boundaries in Levin's (1981) categories and analyzes their function through aspects that cannot be directly addressed through Levin's (1981) model of categorization.

7.2.1 Illustrations in activity books

As illustrated in Chart 2 above, the four activity books included in the study feature relatively the most decorative illustrations. Furthermore, the activity books contained the smallest amount of illustrations per page at 0.9 (*Let's Go! 5 – Activity book, All Stars 5 – Activity book),* 0,4 (*Top 8 – Exercises)* and 0.2 (*Spotlight 8 – Workbook)* images per page*.*

The effect that illustrations have on learning in the activity books is minimal, virtually non-existent. Representational illustrations appear fairly regularly in vocabulary tasks in the primary school activity books, but otherwise, the use of meaningful illustrations in the activity books is erratic and suggests that the role for images is limited to being purely decorative or, at best, being the basis for representational vocabulary tasks.

Activity books in general, cannot be held to the same standards as textbooks: They are supplementary to the textbooks and contain very few, if any, original pieces of texts or concepts to explain. Therefore, it would be difficult to illustrate the tasks in the activity books meaningfully. It is also arguable, whether illustrating a 200-page book that mainly goes over themes presented in the textbook is cost-effective; creating a textbook entails working with limited resources and focusing them in such a way that benefits the reader the most. Textbooks with original narratives that introduce concepts are, and in the view of the present study rightly so, the focus point of illustrative content in the studied English textbook series.

7.2.2 Grammar

The studied textbooks showed perhaps the greatest degree of variance in regards to their illustrative content in sections regarding grammar. Only 39% of images that illustrate grammar content fell into Levin's four categories that

benefit learning whereas 61% were decorational. The data suggests that this is a slight drop in using images that affect learning, as 45% out of all images were beneficial towards learning.

The results do not indicate that images that benefit grammar learning are represented more in one of the learner levels than the others. The data does, however, imply that one publisher has succeeded in illustrating grammar points with meaningful content better than the other: Otava's three books: *All Stars, Top,* and *Open Road* featured illustrative content in adjunct to their grammar sections that was mostly useful towards learning with 55% of illustrations being either representational or interpretational. The grammar sections in Sanoma Pro's books: *Let's Go!, Spotlight,* and *Profiles,* on the other hand, featured illustrations that were decorational with a majority of 84%. Therefore, it can be concluded that Otava has placed more conscious effort in establishing meaningful visual content to go along with aspects of language learning that are often difficult to comprehend. The books repeatedly used representational illustrations in the forms of comic strips and image-based tasks. *All Stars* even implemented interpretational illustrations in adjunct to its grammar sections, as discussed in section 7.1.4, which is commendable and perhaps the clearest indication of educative images in the studied books that have been created with the intention to effectively present integral information simultaneously in a visual and verbal manner. Sanoma Pro's books, on the other hand, demoted images to a decorative role, where images were mainly used to visually structure verbal information and thus improve the layout of the page.
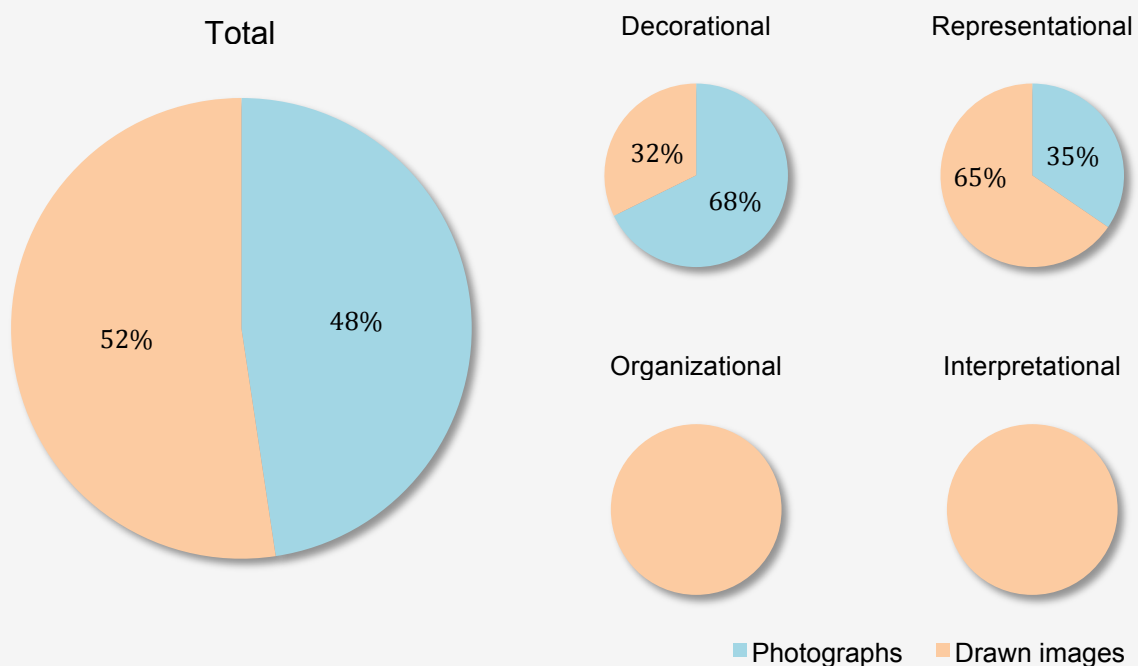
7.2.3 Drawn illustrations and photographs

When the present study observed the types of illustrations, i.e. drawn images and photographs, it noted two possibly correlating patterns: Firstly, the proportional amount of beneficial illustrations dropped significantly after primary school textbooks. Secondly, a majority of illustrations in said primary school textbooks were drawn images while a majority of images in the secondary and upper secondary school textbooks were photographs. In fact,

out of the illustrations in the primary school textbooks, 78% were images that benefit learning while 77% of all illustrations in the books were drawn. In the secondary and upper secondary school textbooks, learning-enhancing illustrations accounted for 38% of all images, while only 40% of illustrations in the books were drawn.

The aforementioned pattern suggested that drawn illustrations are more beneficial towards learning. Upon further inspection, of all textbooks across learner levels, the present study discovered that out of all drawn illustrations, the majority, 72%, represented one of Levins four categories that benefit learning, while only 28% were decorational. Moreover, corresponding data regarding photographs indicated that only 36% of all photographs aided learning while 64% were merely decorational images. Charts indicating proportions between image types across different categories are visible in Chart 3. The presented data would suggest that drawn illustrations generally benefit the learner more than photographs and therefore specifically illustrated, drawn content should be preferred.

Chart 3: proportionate amount of drawn images and photographs in different categories

If drawn illustrations, as the results of the present study seem to indicate, generally enhance learning more often than photographs, what factors could then explain the difference of 37% percentage points that occurs when moving on from the lower level of L2 learners to intermediate and advanced levels? The present study is of the opinion that the use of photographs over drawn illustrations in secondary and upper secondary school textbooks is motivated by reasons that suggest that images are not valued as learning tools.

One of the primary motivations for all the books to use images, despite what the categorization model above suggests, seems, according to the blurbs of the book series on the publishers' websites, to be to motivate the reader by making the texts easier to relate to. Even though 78% of all illustrations within the primary school textbooks support learning through the visual channel, the publishers do not use the fact in their advertising. In fact, the only characteristics attributed to illustrations in the blurbs for the books refer to affective qualities: "*colorful and cheerful illustration*" (Blurb for *Let's Go!,* in Sanomapro.fi (n.d.)) , *"[illustrations] are from the children's own world*" (Blurb for *All Stars,* in Otava.fi (n.d.)) and " *[illustrations] pull [the reader] in into the town of Foxwood*" (Blurb for *Let's Go!,* in Sanomapro.fi (n.d.)). The blurbs for *Top, Spotlight, Profiles* or *Open Road* do not mention illustrations. Therefore, if one were to interpret the primary motivation of the publishers for image use as motivational, i.e. affective (Levie & Lentz, 1982), as established by the blurbs, the shift from drawn images to photographs can be explained through the general themes of the texts and the maturity of the reader. The narratives in the primary school textbooks are rather simple in nature and the stories are illustrated as picture books intended for children usually are: Large, colorful illustrations reflect the scenes presented and make the story more appealing. However, as the learner matures, the texts shift their focus from simple stories to larger, more conceptual themes that also focus heavily on cultural aspects. Photographs are perhaps seen as more tangible types of illustrations for these situations: Photos that visualize aspects of culture and society as well as characters who are the same age as the readers are considered more

mature and easier to relate to in the magazine article-like texts. Focusing on motivating the reader with relatable images comes with a price, however, as often these photographs offer nothing in the way of enhancing learning whereas a drawn illustration would, albeit being less eye-catching, support the message of the texts. Picture 17 illustrates how a meaningful drawn illustration can reflect the text's theme better than a generic photograph
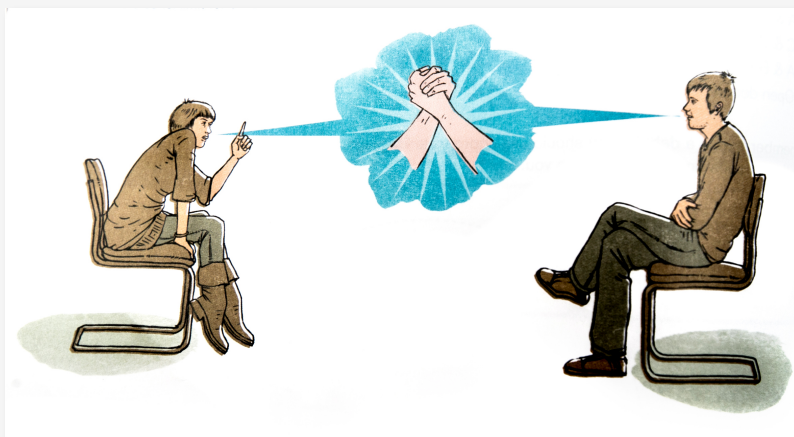
Picture 17: Adapted from *Open Road – Course 4,* p. 54 (above) and p. 60 (below) The stock photograph above is used as the header image for a section that introduces the structure of a formal debate. The photo is a rather weak representation of a debate with mostly decorational and affective qualities. The drawn illustration below, however, which is used later in the book, is a creative and truthful visual representation on how a debate works. Therefore, one could argue that the second illustration should be the preferred initial visual cue of the two when the topic of debate is first brought up.

7.2.5 Primary school textbooks

Primary school textbooks were generally speaking the most visually oriented ones. Not only were the textbooks the only ones with majorities of learning enhancing illustrations with shares of 87% (*Let's Go! 5 – Storybook)* and 70% (*All Stars 5 – Reader),* they also feature the most useful images per page, both at 1.0 illustrations with cognitive functions per page.

The illustrations in both books were generally large and colorful, mostly drawn, often filling out more than one page of a spread. Their approach towards illustrating the book has been to hire a professional illustrator to draw the bulk of the illustrations. Furthermore, they both featured recurring characters whose presence in carried over individual texts. Seymour the squirrel in the *Let's Go!* –series and the humorous mouse characters in *All Stars* provide comical relief, interact with other characters and appear in texts, vocabulary lists, and grammar sections. This alongside a uniform style of illustrations throughout the books creates unity between different units of language learning and makes the book series visually cohesive and inviting to the student. The books intended for primary school students also frequently featured tasks, specifically vocabulary exercises that took advantage of illustrations.

Notable differences between the book series were in their approach to grammar section, as discussed in section 7.2.2, as well as in their use of educational images: *Let's Go! 5 – Storybook* featured an overwhelming majority of educational illustrations, with 87% of images being representational, organizational or interpretational. Also, *Lets Go! 5 – Reader* did not feature any attentional images, all of the 18 decorational images were affective. If the strength of *Lets Go! 5 – Storybook's* illustrative content lies in numbers, the benefits of *All Stars 5 – Reader* come from its creative and varied use of illustrations: Interpretational images are used to clarify grammar rules that are otherwise difficult to understand and organizational illustrations appear in the forms of both maps and integrated picture vocabularies. Therefore, the learner is presented with a wide assortment of visually

implemented imagery strategies that undoubtedly enhance his or her comprehension of the presented information.

7.2.7 Secondary school textbooks

Coming from the primary school textbooks, a shift can be seen both in the functions of images and their nature when secondary school textbooks are observed. Photographs from stock agencies interlaced with illustrated content have become the preferred route illustrating the books and decorational illustrations form the largest functional category, especially in the activity books. Even though both books feature around one illustration per page, *Spotlight 8 – Textbook* with 0.9 and *Top 8 – Textbook* with 1.1, the amount of useful images per page in both textbooks falls down to 0.4, which is a drop of 60 percent when compared to the primary school textbooks.

As established, one is likely to come across an image that enables learning only twice every five pages. Rest of the time, the observed images generally featured young people amidst a multitude of activities and scenes from a culture or society that was being discussed at the time. Both books feature similar cultural content such as photos of buildings, scenery, and wildlife. The difference in approach to these images is that *Spotlight* has included captions to the images; therefore guiding the reader's attention towards them and creating nuggets of information that are presented both in a visual and a verbal form. Both books also feature recurring characters whose storyline overarch over several texts with varying degrees of success. *Spotlight's* approach into creating central characters revolves around three different groups of people residing in different parts of the world (Ireland, the U.S.A and New Zealand). For example, the texts discussing the U.S feature a street dancing crew, "The L.A Street Lions", that travels across America from Los Angeles to New York. The illustrations feature photographs of performing street dancers, all acquired from photo agencies, and featuring different sets of people. The Street Lions- photographs are often not connected to the text in any way, and the storyline feels forced and contrived due to the lack of effort to tie the photographs to the themes of the texts. The same issues are

present in the two other themes in *Spotlight 8. Top 8*, on the other hand, features three sets of recurring characters, as there are three major topical themes in the books. The characters are boys and girls, aged 14 to 15, who go on an adventure and travel in different parts of the world (Australia, Canada, and the Caribbean). The characters have been photographed as commissioned work in situations that are loosely connected with the situations presented in the text. For example, a text on going polar bear watching shows the two recurring male characters dressed for cold weather looking surprised. Furthermore, said characters have been shot against a white background, which underlines the staged nature of the photographs. The photos are used extensively and they take up large chunks of the page and diminish the role of culturally representational illustrations, which could provide the reader benefits as regards to learning about a culture that the simple portraits cannot. The recurring characters in the secondary school textbooks, which are featured rather prominently, are rather poorly executed and, frankly, seem like half-hearted and bland attempts to create cohesion within the books with characters that students can relate to. Properly done, drawn characters would have beyond question worked better in reflecting the text contents. The only explanation for using photographs instead of drawn illustrations in this instance seems to be that photographs are seen by the book publishers as more mature illustrations that motivate adolescent learners and reflect their world better.

Both books have also used the services of a professional illustrator. The drawings created seem to be used for different purposes: The drawn illustrations in *Top 8 - Texts* popped up throughout the book in many instances. There were representational images illustrating tasks, comic strips in adjunct to grammar points, and picture-vocabularies that incorporate large vocabulary lists into single images. *Spotlight 8- Textbook*'s illustrative efforts seem to have been focused on creating a lengthy comic strip to the beginning of each unit. These comics are used to introduce the topic and possibly shed light on some cultural intricacy of the target culture. The comics are always accompanied with an audio narrative of the scene, which is in line with the

suggestions by Mousavi et al. (1995) that the learner benefits if verbal information is presented in audio form while also receiving visual input.

7.2.7 Upper secondary school textbooks

The structure of upper secondary school textbooks is fairly similar to that in the secondary school ones: Decorational illustrations form the majority with shares of 55% (*Open Road – Course 4)* and 66% *(Profiles – Course 4).* They do, however feature less images per page with only 0.4 (*Open Road)* and 0.6 *(Profiles)* images per page resulting in only 0.2 beneficial images per page in both textbooks. Again, compared to the primary school textbooks, this is a significant drop and implies that the appreciation towards images diminishes as subject matters become more difficult. The books mainly featured, similarly to secondary school textbooks, vivid color photographs that have been acquired from both international and domestic photo agencies.

Upper secondary school textbooks were the only textbooks in the present study that did not feature recurring characters. However, the repeating layout of the pages with a large header image at the start of the text with one to three smaller supplementary images sprinkled amongst the texts creates a sense of a carefully structured, cohesive visual design in both books. The books were also the only ones that did not use images to illustrate vocabulary lists in any way.

Drawn illustrations are, again, the differentiating factor between the two books: *Profiles* featured far less drawn illustrations and they appeared sporadically and, all in all, failed to establish a presence within the textbook. *Open Road,* on the other hand, featured illustrations regularly, spanning across the board from text illustrations, basis for tasks to grammar sections. The illustrations were of high quality, insightful, and most often beneficial towards learning; there was one interpretational illustration among these illustrations (See Picture 16 on page 55 of the present study), the others were strongly representational, many even borderline interpretational. Oddly though, these illustrations, however, were never used as the prominent

header illustrations for texts, even though they were more beneficial towards making the topic more concrete (see Picture 17 on page 63).

In conclusion, individual inspection of the textbooks showed that: **(1)** Illustrations, considering both all illustrations as well as only those beneficial towards learning, are most prominent in primary school textbooks and their proportional amount diminishes when advancing to secondary school textbooks and even more so when moving on to books used in upper secondary school. **(2)** The books for the same learner levels by different publishers are largely similar in structure and approach towards illustrations, but notable differences in their approach towards topics such as vocabulary lists or grammar points were found. **(3)** The publishers seem to place larger importance towards the relatability and motivational factors of illustrations more then the initial categorization suggests. **(4)** Drawn illustrations are generally more tied to the content, being therefore more valuable towards learning and should be favored instead of stock images. **(5)** Activity books feature far less images and larger proportions of decorational illustrations than the textbooks they supplement.

8 Conclusion

The aim for the present study was first and foremost to examine the nature and educational applications of pictorial illustrations in present day English textbooks. Additionally, the study also set out to examine if the approaches and attitudes towards illustrations change when different learner levels or books by individual publishers are observed. The results indicate that pictorial illustrations are mainly used as decorative elements, which aim to affect the reader's emotions and attitudes, and as visual representations of the text or aspects of it. Images with other, deeper learning effects account for only a fraction of the 1 299 studied illustrations.

As with any comparative study with quantitative and qualitative elements, the present one is not without limitations that need to be acknowledged. The model of categorization used, albeit universally used in illustration studies, leaves room for subjectivity; for example, there were several instances where it was debatable whether the image was representational or decorational.

Furthermore, the present study did not have the resources to evaluate the interactive multi-media contents included in the book series. Smartboard contents, online contents and e-books include interactive elements that are visually rich and use multi-modal contents such as animations, videos and games in ways that printed books are not capable of. These contents are arguably the future of language learning materials and enable ways to engage the visual subsystems in newfound ways. A study on the use of visual elements in the multimedia contents of learning material packages would be a natural continuation for further study.

The results of the present study can be used to suggest approaches towards textbook illustrations to both teachers and textbook creators. Teachers can rely on the educational qualities of pictorial illustrations in primary schools, but in more advanced levels, images take on a more decorational role and

teachers should be more active in guiding their students' attention towards them in order to prime their visual channels by creating and strengthening their abilities to form and trigger referential connections between visual and verbal subsystems. In general, the images in textbooks are rather passive in nature, and students might easily overlook them, as they are often not prompted to utilize them. Hence, the role of the teacher is important in order to engage students into using images and different imagery strategies. Textbook editors should, on the other hand place more attention towards the possibilities that educational illustrations can offer and consider using more commissioned illustrations instead of stock photographs, as the tend to be more beneficial towards learning. The motivation to use illustrations in textbooks seems most often to be in creating visuals that the reader can relate to, and therefore be motivated to read the text, instead of focusing on the effect that images can have on progressing, understanding and retaining new information. All in all, teachers, editors and students alike could benefit from learning about imagery strategies.

The course of advancing imagery strategies and knowledge on the power of images can be seen as a question of which should come first; The chicken or the egg? The inclusion of active educational images, which creatively organize, interpret or structure information in ways verbal progresses cannot, as well as instructions on how to utilize imagery strategies such as text visualization and especially, transformational techniques in textbooks would educate both students and teachers on the strengths of nonverbal processing of information. However, the people behind most textbooks are teachers themselves, and the books that they create reflect the methods they have found useful in their own teaching. Hence, one could argue that in order to improve the quality of textbook illustrations, focus should be placed on educating teachers and teacher trainees on the power of imagery strategies.

All in all, pictorial illustrations are still generally viewed, mostly due to lack of information, as childlike, ornamental objects whose power resides in non-academic effects such as affecting emotions and attitudes. This line of thinking, however dismisses a fundamental building block of how our brains process and store information. The biggest step on the road towards

encouraging non-verbal thinking, to which the present study hopefully contributes, is to bring forward and encourage the discussion within professionals in the field of education on using visual information alongside verbal processes.

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