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EMBEDDING TECHNOLOGY-ENHANCED FORMATIVE ASSESSMENT INTO THE  
LEARNING PROCESS OF SECONDARY SCHOOL LEARNERS OF ENGLISH AS A  
SECOND LANGUAGE

MA thesis

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### **Abstract**

Technology is considered to be a great support in teaching and learning. This research aims to investigate the effectiveness of embedding technology-enhanced formative assessment into the learning process of secondary school learners of English as a second language (ESL) to improve their academic outcomes in grammar. The objective of the study is to identify to what extent can the integration of technology-enhanced formative assessment influence secondary school learners' ESL academic outcomes in grammar, and whether the effects of the technology-enhanced formative assessment differ across gender. A quasi-experimental design was adopted with 42 fourth-grade students from a state school in Estonia. The outcomes of this research suggest that the integration of technology-enhanced formative assessment can be a beneficial tool for improving secondary school learners' ESL academic outcomes in grammar, and the difference across gender results is considered to be not significant.

**Keywords:** *Formative Assessment, ESL Learners, Offline Formative Assessment Tools, Technology-Enhanced Formative Assessment Tools.*

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## **1. Introduction**

Formative assessment is an important part of any learning and teaching process nowadays and is considered to be one of the most powerful elements in education. It has a deep impact on how and what students study, how effectively and how much they study. The implementation of formative assessment can help students achieve better academic outcomes if teachers use the information they gather about students' learning more effectively to plan and teach their lessons (Weeden, Broadfoot, Winter, 2002).

Formative assessment is a beneficial tool to achieve students' success in English as a Second Language (ESL). Implementing formative assessment gives teachers a better understanding of their students' content and language understanding that can not be provided by standardized summative assessment (Montalvo-Balbed, 2012).

Nowadays there is almost no area of life that technology has not influenced and education is no exception. One way that technology can be significant support in learning and teaching is by improving the ability to offer a formative assessment of the learners' knowledge and skills during the instructional process. Providing instant feedback during the formative assessment process, to improve students' achievement, is very crucial in learning and teaching (Elmahdi, Al-Hattami, Fawzi, 2018).

Although the importance of implementing formative assessment in the learning process has been well covered in many studies (Black, P., Wiliam, D. (1998), Hattie, J., & Timperley, H. (2007), Wiliam, D. (2006), few studies have examined how technology can enhance formative assessment into the learning process of secondary school learners of ESL. The choice of researching its efficacy is important because it will help develop effective strategies to improve grammar proficiency and can significantly impact ESL learners' academic outcomes, that is why technology-enhanced formative assessment can be a solution.

The theoretical findings of the research are expected to contribute to the field of formative assessment. The results can also be used to suggest recommendations for future educational policies and practices related to technology-enhanced formative assessment and its impact on ESL learners' academic outcomes in grammar. The practical implication of the outcomes of the study will benefit foreign language teaching purposes.

## **2. Theoretical overview**

### **2.1. Definitions of formative assessment**

Formative assessment is a topic of many educational conversations and nowadays is considered to be an important part of the learning and teaching process. But what is formative assessment?

The concept of “formative evaluation” was first suggested by Michael Scriven (1967) in an article related to evaluating educational programmes, their curricula, methods, and instructional materials. According to Scriven, the objective of the formative evaluation is to provide data about the adaptation of a new programme during the stages of its development and implementation. Michael Scriven also coined the terms “summative” and “formative” evaluation and highlighted the distinction between them in terms of the aims of the data they search for and how this data is used (Scriven, 1967).

Later, Benjamin Bloom (1969) integrated the idea that the same distinction may be applied to the evaluation of student learning – what today is called “assessment”. Bloom defined the purpose of the formative evaluation as providing feedback and correctives at each phase in the learning-teaching process. He admitted the traditional role that tests played in assessing and classifying students but pointed out that there was another role for evaluation. Formative evaluation can be separated from the grading process and used as an aid to teaching (Bloom, 1969).

For Scriven and Bloom, the key feature of formative evaluation is the data used somehow to make changes. An evaluation of the curriculum is formative if it shapes the development of the curriculum. An evaluation of the student is formative if it shapes the student’s learning (Bloom, 1969, Scriven, 1967).

Bereiter and Scardamalia (1989) define formative assessment as an active and intentional learning process that partners the teacher and the students to continuously and systematically collect evidence of learning to improve student achievement (Bereiter, Scardamalia, 1989). According to the “Common European Framework of Reference for Languages”, formative assessment is defined as an ongoing process of gathering information on the extent of learning, on strengths and weaknesses, which the teacher can feed back into their course planning and the actual feedback they give to learners (CEFR, 2001).

The primary objective of formative assessment is to improve learning, not to audit it. It is an assessment for learning rather than an assessment of learning. Formative assessment is an instructional tool that teachers and their students use while learning is occurring and an accountability tool to determine if learning has occurred (National Education Association, 2003). Taking into account definitions of formative assessment, it can be pointed out that the objective of formative assessment is to observe students' learning and to give feedback that can be used by educators to improve their teaching and by students to improve their learning. Formative assessment helps students identify their strengths and weaknesses and target areas that need work.

## **2.2. Formative assessment as a system**

N. Frey and D. Fisher (2011) describe a formative assessment system as an approach, where a teacher establishes learning goals, checks for understanding, provides feedback, and then aligns future instruction with the student's performance.

Hattie and Timperley suggest a formative assessment system that has three components: feed-up, feedback, and feed-forward (Hattie, Timperley, 2007).

The teacher needs an instructional framework that allows them to feed forward, not just provide feedback. Feedback is a powerful way to improve student achievements when used as part of a formative assessment. Though, feedback by itself is less helpful (Frey, Fisher, 2011).

J. Hattie and H. Timperley (2007) define that feedback has no effect in a vacuum; to be mighty in its effect, there must be a learning context in which feedback will be addressed.

Feedback ensures that students understand the purpose of the assignment, task, or lesson, including how they will be assessed. Feedback provides students with information about their successes and needs. Feed-forward guides student learning based on performance data. All three are required if students are to learn at high levels. Each of these three components has a guiding question for teachers and students:

Where am I going? (Feed-up)

How am I doing? (Feedback)

Where am I going next? (Feed-forward) (Frey, Fisher, 2011).

When all three components of a formative assessment system are present, there is a give-and-take between teachers and students that facilitates learning. The absence of any one component places learning at risk. For example, when students do not understand the purpose of

a lesson (feed-up), they are unlikely to demonstrate their best effort. If students do not have a clear purpose, they are not motivated and do not see the relevance of the content they are expected to master. When students are not assessed or do not receive assessment results (feedback), they are unsure about their performance and assume that they are doing just fine. They are unlikely to make mid-course corrections in their learning processes and understanding. When teachers fail to plan instruction based on student performance (feed-forward), misconceptions are reinforced, errors go unaddressed, and gaps in knowledge persist. Teachers march through their pacing guides and continue to “teach” while students passively observe. Unfortunately, when this is the case, teachers remain oblivious to the lack of real learning their students are doing (Frey, Fisher, 2011).

### **2.2.1. Feed-up**

Feed-up lies at the heart of teaching since it makes the student a partner in the business of learning and creating. It also addresses some of the individual variables that make each learner unique, especially when it comes to motivation. The feed-up process addresses the “Where am I going?” question that students and teachers ask. The answer to the “Where am I going?” question should be jointly shared by the teacher and the student. In a traditional classroom, the teacher assumes the responsibility for identifying what will be learned and when thereby leaving students to play a passive role in their learning (Frey, Fisher, 2011).

Jay McTighe and Ken O’Connor (2005) describe three elements that shape learners’ perceptions of their ability to learn:

1. Task clarity (students clearly understand the learning goal and know how teachers will evaluate their learning).
2. Relevance (students think the learning goals and assessments are meaningful and worth learning).
3. Potential for success (students believe that they can successfully learn and meet the evaluative expectations) (McTighe, O’Conor, 2005).

That is why attention to each of these factors – establishing purpose, increasing motivation, and setting goals – is critical to the process of learning. When each factor is attended to, students take a more active role in learning.

Motivating students to become actively involved in their learning begins with **establishing a purpose**. In too many schools, the only apparent purpose is compliance. Students learn something because the teacher said so. Although obedience may hook some students (at least for a while), it is likely to miss many others. Those neglected students are often the high-profile ones who exhibit social and behavioural problems and regularly get themselves into trouble. A lesson's purpose lays out the content of what will be learned, the learner's role in what will be accomplished, and the expectations for the interactions. They are called the content purpose, language purpose, and social purpose (Fisher, Frey, & Rothenberg, 2008). Taken together, these elements explain what will be learned today, what the students will do with the content, and how they will work with others to accomplish these tasks.

Establishing purpose is one element in a feed-up system that views the learner as an active partner. Another element is **motivation**, both internal and external. Motivation is linked with purpose as students decide if they are interested in the purpose that has been established. That is not to say that students only study things that are interesting to them individually. They also have to learn specific things in specific grades. There are standards for different grade levels and content disciplines. It is up to the teacher to ensure that the purpose for achieving those standards is relevant and that students are invited into the content.

As it has been noted, students deserve to know the purpose of each lesson and why that information is important and relevant. **Goal-setting** is another area that is important in the feed-up process. There are different types of goals, but orienting students toward their goals helps them achieve more. When the purpose is aligned with goals, and students are motivated, the formative assessment system is in motion (Frey, Fisher, 2011).

With these conditions present, the student performance data will represent students' best efforts and guide the instruction. Once goals are agreed upon and instruction begins, the teacher must check for understanding to determine if students are making progress toward their goals.

### **2.2.2. Feedback**

In a formative assessment system, students receive feedback about their work and performance and learn about their level of achievement or attainment. However, that feedback alone is not enough to ensure understanding. Some students are immune to feedback; others become defensive. Ultimately, because feedback shifts the responsibility back to the learner, it must be

useful to the learner. Inadequate feedback or feedback that is not followed by further instruction (when needed) will discourage rather than encourage learners.

The act of providing feedback needs to be approached as purposefully as other aspects of instruction. It is important that feedback is not just evaluative, but is tailored to the needs of the learner. Feedback can include encouragement as well as correction, and feedback on social and behavioural elements can be as important as academic feedback.

There are four levels of feedback, and these levels influence the feedback's effectiveness. Though each type of feedback is valuable, in specific contexts, the level of feedback must be consistent with the goals that were established as part of the feed-up process (Frey, Fisher, 2011).

**1. Feedback about the task.** At this level, the learner receives feedback about how well he or she is performing. When providing feedback about the task, teachers often identify correct and incorrect responses, request additional or different information, and suggest attention to specific knowledge. This level of feedback is often called **corrective feedback** since it is designed to address, or correct, misunderstandings. Rod Ellis (2009) identifies several types of corrective feedback, including **direct corrective feedback** wherein the teacher provides the student with the correct information, **indirect corrective feedback** wherein the teacher identifies an error but does not provide the correction (and may or may not indicate the location of the error), and **metalinguistic corrective feedback** wherein the teacher provides a clue about the types of errors for the student to correct. Corrective feedback is the most common type of feedback that teachers provide (Airasian, 1997) and is most useful when used to address mistakes. It is much less helpful when students lack information. When students lack information, feedback will not supply that information; they need additional instruction.

**2. Feedback about the processing of the task.** This level of feedback focuses on the processes a student use to complete a task or assignment. When teachers understand the processes, students need to use, they can provide feedback and scaffold students' use of those processes. As students become increasingly proficient with learning processes, they are likely to transfer that learning to new tasks.

**3. Feedback about self-regulation.** The third level of feedback relates to students' self-appraisal and self-management (Paris, Winograd, 1990). Students must learn to assess their ability, knowledge, cognitive strategies, and achievement. In doing so, they must regulate their behaviour and actions, working toward the goal that has been established.

**4. Feedback about the self as a person.** The final level of feedback focuses on the student himself or herself. Although this type of feedback may not be effective by itself, it can be effective when it causes a change in students' effort, interest, engagement, or efficacy. Simply saying "well done" or "nice try" is not likely to result in substantive changes, even though many students appreciate this type of feedback (Burnett, 2002). In part, this is because generalized feedback does not provide task-specific information. In addition, students use different lenses to evaluate the feedback they receive about themselves. Students who want to be seen as good students receive this type of feedback differently from students who do not want to be seen as successful in school. Unfortunately, feedback about the self as a person is often combined with other types of feedback, despite the evidence that it can harm learning (Frey, Fisher, 2011).

There are specific **criteria** to consider when providing students with all types of feedback. Grant Wiggins (1998) defines that feedback must be timely, specific, understandable, and actionable – to be especially informative on the subject.

**1. Timely.** The sooner feedback is given, the better. Feedback is more powerful when it is linked as closely as possible in time with student performance. It is about motivation and relevance. If students are still focused on the purpose or learning goal, they are likely to incorporate the feedback they receive in their future attempts to meet that purpose.

**2. Specific.** When students understand what they have done well and what they need to focus on next, they are more likely to make adjustments and improve their performance. When feedback is generic, superficial, or cursory, students are often unable to decide what to do with it and may not even see the relationship between the effort and the outcome. When feedback is specific, students understand what they did well and where they still need to focus. Grades and points are not feedback.

**3. Understandable.** Feedback does not do much good if students cannot understand it. Rubrics are a good way to ensure that feedback is understandable, assuming that students have developed the rubric with the teacher or that the teacher has focused on quality indicators from the rubric. In advance of the student's initial work on the task.

**4. Actionable.** Feedback must provide learners with the opportunity to act on the information provided. Students should be able to self-adjust – review, revise, practise, improve, and retry – based on the feedback they get. Feedback can occur in different **ways**:

- teachers can provide oral feedback

- teachers can provide written feedback
- students can provide feedback to one another, provided they have been taught to do so.

**1. Oral feedback.** Feedback comes, first and foremost, through spoken channels. It should be well-timed and actionable. Beyond that, the setting, structure, and tone of oral feedback should result in positive outcomes for the learner so he or she leaves the interaction with a plan for appropriate next steps.

**2. Written feedback.** Oral feedback offers an immediacy that written feedback cannot. It also offers the chance to accompany feedback with nonverbal behaviours that can strengthen communication. The tone and the structure of written feedback should be respectful and actionable. The content of the feedback should reflect one's beliefs about teaching and learning.

**3. Peer feedback.** Students who have recently worked or are currently working on similar concepts can provide insightful support for their fellow learners. These peer-mediated learning experiences foster mutual problem-solving and experimentation as students try out potential solutions. Peer feedback commonly takes two forms: peer tutoring and peer response (Frey, Fisher, 2011).

Feedback is an important component of effective learning. It improves learners' confidence, motivation to learn, and a learner's attainment. It comes in different levels, has different criteria, and in different ways.

### **2.2.3. Feed-forward**

An analysis of misconceptions and errors is essential in a feed-forward system since it allows the teacher to make purposeful decisions about which students need further instruction and in what areas. In addition, error analysis provides the teacher with the basis for precise teaching and reteaching of concepts that students do not yet fully understand.

**Analysing the errors** that students make is very informative for teachers who want to implement a formative assessment system. Errors are interesting because they represent the current understanding of the student. Errors can be used to plan instruction, especially instruction that is tailored to current student needs (Kramarski, Zoldan, 2008). It is important to remember that the errors students make are perfectly logical to them; they do not know that they are making errors. When this is the case, simply pointing out the error may not be effective in changing

student achievements. In contrast to simple error identification, error analysis allows teachers to devote half their grading time to feed-forward and half to feedback (Fisher, Frey, 2011).

- **Miscues.** One of the most common error analysis systems involves analysing the errors that readers make while reading. The general idea of a miscue analysis is to note the types of errors a reader makes while reading.

- **Error coding.** As teachers evaluate student work, they identify the errors that students make and catalogue them. Error analysis is useful for identifying who needs reteaching so the teacher can make decisions about grouping.

- **Guided instruction.** The term “guided instruction” has existed for decades and describes the shift from direct explanation and modelling to a state where learners assume some of the cognitive responsibility under the tutelage of a teacher.

There are several purposes for using guided instruction:

- to check for understanding and to determine what students have learned and where they continue to struggle.

- to reveal partial understanding and other misconceptions that might lie just below the surface.

- to use scaffolds in the form of prompts and cues as needed to strengthen a learner’s knowledge.

- to provide direct instruction and modelling when the learner is not successful despite scaffolding.

- to foster productive success in which students see themselves as capable and their efforts rewarded (Fisher, Frey, 2011).

These are the scaffolds that are most evident in guided instruction:

- asking robust questions to check for understanding.

- providing cognitive and metacognitive prompts to activate background, procedural, reflective, and heuristic knowledge.

- providing cues to shift the learner’s attention to a source.

- providing direct explanation and modelling to reteach when the learner is not able to complete the task (Fisher, Frey, 2010).

Taken together, these elements of scaffolding make guided instruction a necessary component for formative assessment because it bridges what is known with what will be learned. The active participation of learners is viewed as a necessary step in meeting instructional goals.

### **2.3. Formative assessment strategies**

Formative assessment should not just be about how the teacher discovers what the learners know; the daily application of formative assessment techniques should also foster each student's capacity to assess himself or herself. In the same way that students need to be kept at the centre of the processes to establish purpose, build motivation, and set goals, so should they be at the core of what occurs during formative assessments.

In the absence of effective techniques for monitoring student understanding throughout a lesson, learning suffers. To be sure, students who are struggling academically are much less likely to ask a question than those students who are doing well (Nelson-Le Gall, 1985). This reluctance to ask questions may be due to social reasons – particularly an unwillingness to expose a lack of understanding to classmates and teachers. Yet it may also occur because students simply do not know enough about a topic to ask a relevant question. The teacher's role in daily formative assessments should be active, and it should overlap with many other markers of active teacher involvement, including sensitivity to student needs, emotional and instructional support, and high-quality feedback given to struggling students (Pianta, LaParo, & Hamre, 2008). Together, these behaviours suggest that the teacher views learning as interactive and that monitoring student understanding is essential to teaching and formative assessment must be embedded in the student-centred instructional process. Most teachers learn early in their careers that daily lesson plans can capture only the most obvious details of a learning event. No amount of planning could allow for what happens when student understanding either bogs down or suddenly advance. Good planning requires incorporating a variety of ways to check for understanding – and then implementing these checks as instruction is being given. Without this focus, the benefit of the instruction is diminished.

Several formative assessment strategies can be used effectively to check for understanding in the classroom.

**1. Using oral language to check for understanding.** One of the most common ways that teachers can check for understanding is through oral language. When students talk and teachers

listen, they can get a sense of what students understand and what they still need to learn. Carl Bereiter and Siegfried Engelmann (2006) identified 10 language functions that still serve as a useful organizational system to get an insight into learners' understanding:

- a) **To instruct:** To provide specific sequential directions.
- b) **To inquire:** To seek understanding through asking questions.
- c) **To test:** To investigate the logic of a statement.
- d) **To describe:** To talk about giving necessary information to identify.
- e) **To compare and contrast:** To show how things are similar and different.
- f) **To explain:** To define terms by providing specific examples.
- g) **To analyse:** To break down a statement into its parts, tell what each means, and show how they are related.
- h) **To hypothesize:** To test a statement's logical or empirical consequences.
- i) **To deduce:** To conclude by reasoning; to infer.
- j) **To evaluate:** To weigh and judge the relative importance of an idea.

**2. Think-Pair-Share.** Think-Pair-Share is a cooperative discussion strategy that allows students to discuss their responses with a peer before sharing their ideas with the whole class. Developed by Frank Lyman (1981) and his colleagues, the strategy has three stages of student action:

- a) **Think.** The teacher engages students' thinking with a question, prompt, reading, visual, or observation. The students take a few moments (not minutes) just to THINK about the question.
- b) **Pair.** Using designated partners, students PAIR up to discuss their respective responses. They compare their thoughts and identify the responses they think are the best, most intriguing, most convincing, or most creative.
- c) **Share.** After students talk in pairs for a few moments, the teacher asks pairs to SHARE their thinking with the rest of the class. This activity offers great opportunities to check for understanding. The teacher can listen as pairs of students discuss their responses and note how responses are being shared (Frey, Fisher, 2011).

**3. Using writing to check for understanding.** Writing is a complex cognitive process that involves thinking. It is hard to do anything but think while you write. As such, writing provides an interesting glimpse into how students think. Nevertheless, writing is more than

thinking. It is not as simple as saying that you write what you think. Instead, you think as you write. You clarify your understanding as you write. You learn as you write. That is part of the power of using writing to check for understanding: teachers get to see how students think, and students get to clarify their understanding (Frey, Fisher, 2011).

It is helpful to distinguish between two very different goals for writing. The normal and conventional goal is writing to demonstrate learning: for this goal, the writing should be good. It is high-stakes writing. But there is another important kind of writing that is less commonly used and valued: writing for learning. This is low-stakes writing. The goal is not so much good writing as coming to learn, understand, remember and figure out what you do not yet know. Even though low-stakes writing-to-learn is not always good writing, it is particularly effective at promoting learning and involvement in the course material, and it is much easier on teachers - especially those who are not writing teachers (Elbow, 1994).

- **Summary writing.** Summary writing is a valuable tool for checking for understanding because it provides the teacher with insight into how students condense information. It is similar to retelling in that it serves as a way for students to demonstrate their ability to synthesize what they have read, viewed, or done. The most common form of summary writing is the précis, a short piece that contains the major ideas or concepts of a topic. The emphasis is on an economy of words and an accurate rendering of the read or observed phenomena.

- **Writing prompts.** Many writing prompts can be useful in checking for understanding.

a) **Exit slips** are used for “closure” activities. Students write on a topic or question that the teacher supplies and they hand the paper to their teacher on their way out of class. The teacher then reviews the exit slips for content information, making decisions about what students understand and what they still need to be taught.

b) **Admit Slips:** Upon entering the classroom, students write on an assigned topic.

c) **Crystal Ball:** Students describe what they think the class will be about, what might happen next in the novel they are reading, or the next step in a science lab.

d) **Found Poems:** Students reread a piece of text, either something they have written or something published and find key phrases. They arrange these into a poem without adding any new words.

e) **Awards:** Students recommend someone or something for an award that the teacher has created, such as “Most Interesting Character” or “Most Dangerous Chemical.”

f) **Yesterday's News:** Students summarize the information presented the day before, from either a film, lecture, discussion, or reading.

g) **Take a Stand:** Students discuss their opinions about a controversial topic.

h) **Letters:** Students write letters to others, including elected officials, family members, friends, or people who have made a difference (Frey, Fisher, 2011).

**4. Checklists During Projects.** Most projects take a relatively long time to complete (often several class periods) and can quickly go astray if there is no method for checking progress. It can also be difficult for the teacher to manage so many projects in various states of preparation and completion. Deceptively simple, checklists are a great tool for keeping students on track and for checking their growing understanding of skills and concepts. In a complex environment, experts are up against two main difficulties. The first is the fallibility of human memory and attention, especially when it comes to mundane, routine matters that are easily overlooked under the strain of more pressing events. A further difficulty, just as insidious, is that people can lull themselves into skipping steps even when they remember them. Checklists seem to protect against such failures. They remind us of the minimum necessary steps and make them explicit (Gawande, 2009, p. 36).

There are many ways to incorporate formative assessment into everyday classroom routine and suitable formative assessment strategies can help.

#### **2.4. Technology-enhanced formative assessment**

Formative assessment can be enhanced by the effective use of technology to support a successful pedagogy. Students' interactions with online learning tasks through digital tools can be captured, stored, and analysed for learning behavioural patterns and needs. Also, the real-time nature of data capture and reporting with digital tools offer teachers timely updates. Digital tools can save teachers time since they do not have to grade assignments or quizzes manually. Learning goals and content can be customised to each child, and digital tools can make real-time adjustments in students' learning paths by analysing student activity and responding to it with more or less challenging tasks, depending on where the students are (Elmahdi, Al-Hattami, & Fawzi, H. (2018).

## 2.5. Offline and technology-enhanced formative assessment tools

Formative assessment is an essential part of the learning process and student success, and many offline and digital tools can support this process. These tools have a wide variety of features and options to help the teacher solidify formative assessment strategies. The range of offline and technology-enhanced formative assessment tools is given in Table 1.

**Table 1. Offline and technology-enhanced formative assessment tools**

Offline formative assessment tools	Technology-enhanced formative assessment tools
<p><b>1. Entrance/Exit slips as the tools of the formative assessment strategy of checking students existing knowledge before beginning a learning process.</b></p>	
<p>Entrance/Exit slips are a simple student diagnostic tool that can provide educators with a metric on student comprehension of a given concept. This method allows students to start working as soon as they enter the classroom, which increases time for instruction, or the teacher can check the comprehension of the students at the end of the lesson to decide what actions to take next time.</p> <p>Entrance/Exit slips can be used in a couple of ways:</p> <ul style="list-style-type: none"> <li>- to see if there are any students with major misconceptions.</li> <li>- to see if the entire class is missing understanding and if the teacher needs to reteach.</li> <li>- to sort students into groups for instructions.</li> </ul>	
Offline entrance/Exit slips	Online entrance/Exit slips
<p>The teacher distributes an index card with a prompt or discussion question on it for students to answer or reflect upon within a given time frame.</p>	<p>Online dynamic tools, such as Mentimeter, can be used instead of paper entrance/exit slips. It saves teacher's time and resources. It provides different types of questions and interactions. The teacher and the students get immediate feedback at the beginning of the lesson/at the end of the lesson, and the outcomes of it can influence teachers' and students' next steps.</p>
<p><b>2. 3-2-1 Exit tickets</b></p>	
<p>The 3-2-1 exit ticket strategy encourages students to reflect on and summarise their learning while identifying areas that require more attention. Students are asked to answer three questions:</p> <ul style="list-style-type: none"> <li>- 3 things students learned in the lesson.</li> <li>- 2 things they liked about the lesson or 2 interesting facts they learned.</li> </ul>	

<p>- 1 question they still have about the lesson. The prompts can be changed depending on the learning goals, lesson outcomes or student needs. Benefits of the tool:</p> <ul style="list-style-type: none"> <li>- It gives the students the chance for self-modification before the summative assessment.</li> <li>- The teacher can embed reflective learning practices.</li> <li>- The teacher can use the responses to guide lesson planning, understand what concepts may need further review, and learn what students enjoy.</li> </ul>	
<b>Offline 3-2-1 Exit tickets</b>	<b>Online 3-2-1 exit slips</b>
<p>The teacher distributes cards for students to answer within a given time frame at the end of the lesson.</p>	<p>To make the formative assessment process faster, the teacher can use Online Forms or PowerPoint/Slides to get instant feedback. The use of online tools enables the teacher immediately assess students' understanding of a concept and observe the outcomes.</p>
<b>3. Traffic light</b>	
<p>The Traffic Light system is an excellent tool to help students take responsibility for their learning and help to identify their next step. It enables the teacher to intervene and give the students confidence or support where needed, to identify their strengths and areas for improvement and therefore positively impact the student's ability to learn. Green would indicate the students feel they coped well with the task and have a good understanding. Yellow would indicate they feel they coped okay but may have got some answers wrong and a red dot would indicate that the student struggled with the task and will need some extra support to feel comfortable.</p>	
<b>Offline traffic light</b>	<b>Online traffic light</b>
<p>Students are provided with red, yellow, and green cards. The teacher defines when to ask the students to give feedback and they use these cards to indicate their comprehension of the material or how they think they coped with the task.</p>	<p>The teacher can use Plickers to get instant feedback. The use of online tools enables the teacher to immediately assess students' understanding of a concept and monitor the outcomes. It is a good tool for shy students who do not want their classmates to see if they encounter any problems during the lesson.</p>
<b>4. TAG feedback</b>	
<p>TAG Feedback is a great tool to provide opportunities where students can be actively engaged. This approach encourages more students' participation. It helps deliver effective feedback and generate a worthwhile learning experience for students. "T" stands for "Tell me something you like". This is usually the easiest part of the feedback</p>	

<p>cycle.          “A” stands for “Ask a question”, and this takes a bit of modelling to ensure that students ask relevant questions.          “G” stands for “Give me some positive suggestions to improve my work”.          Often during feedback, students write that there is nothing that needs to be changed or improved; that is why the T-A-G sentence starters can guide students in providing constructive suggestions.</p>	
<p><b>Offline TAG feedback</b></p>	<p><b>Online TAG feedback</b></p>
<p>The teacher distributes cards for students to answer within a given time frame at the end of the lesson.</p>	<p>The teacher can use Online Forms or PowerPoint/Slides to get instant feedback. The use of online tools enables the teacher to immediately assess students’ understanding of a concept and monitor the outcomes. Students can also provide feedback at home.</p>
<p><b>5. Vocabulary practice tools</b></p>	
<p><b>Offline tools</b></p>	<p><b>Quizlet</b></p>
<p>There are different ways to learn and practice vocabulary in the lesson. The variety of offline strategies, tools and approaches depends on the mastery and experience of the teacher, for example, word games, activities, etc.</p>	<p>This online tool can be used to enhance the target vocabulary study in the lesson, as well as at home. Though this tool was originally conceived to help with memorisation, the application can be used as part of the teacher’s toolkit for formative assessment. It provides several study modes (Flash Cards, Gravity, Learn, Spell, Match) and it gives students feedback on their progress. It can be used to recap key terms or to check and consolidate students’ understanding. The teacher also has the opportunity to create classes and monitor the progress of the students.</p>
<p><b>6. Quizzes</b></p>	
<p><b>Offline quizzes</b></p>	<p><b>Kahoot</b></p>
<p>A test of knowledge can be conducted in the classroom by asking questions in written form or orally.</p>	<p>Kahoot is a quiz-based tool. Teachers can also create surveys and polls through this platform. Students answer in real-time and the teacher gets instant feedback and the outcomes. The teacher can also download reports in a spreadsheet and see the progress level of the class.</p>

Technology is considered to be a great support in teaching and learning by improving the use of formative assessment tools to enhance students' skills and knowledge during the teaching and instructional process. Providing immediate feedback during learning, with the objective of improving students' outcomes, is very crucial in learning and teaching, and online formative assessment tools can effectively enhance this process.

The goal of the research is to measure the efficiency of embedded technology-enhanced formative assessment in the learning process of secondary school learners' ESL academic outcomes in grammar. Accordingly, the present thesis addresses the following **research questions:**

**RQ1.** To what extent can the integration of technology-enhanced formative assessment influence secondary school learners' ESL academic outcomes in grammar?

**RQ2.** Do the effects of the technology-enhanced formative assessment differ across gender?

**Hypothesis 1** of the thesis is that there will be a slight improvement in secondary school learners' ESL academic outcomes in grammar after the integration of technology-enhanced formative assessment because of the short period of intervention. This hypothesis is grounded in the theories of formative assessment, which suggest that providing timely and specific feedback to students can help them monitor their progress, identify their areas of weakness, and ultimately improve their performance.

**Hypothesis 2** of the thesis is that there will be no significant difference in the effects of technology-enhanced formative assessment on secondary school learners' ESL academic outcomes in grammar among boys and girls. This hypothesis is based on the social cognitive theory which suggests that gender is not a significant factor in the process of learning.

The thesis contributes to the area of the formative assessment study by investigating how embedding technology-enhanced formative assessment in the ESL learning process of secondary school learners (aged 10-11) influences their academic outcomes in grammar.

### 3. Method

#### 3.1. Study design

The research was designed in a state school in Estonia to investigate secondary school learners' ESL academic outcomes in grammar while embedding technology-enhanced formative assessment in the learning process.

The time frame of the research was 6 weeks (13.03.23-21.04.23). This period was chosen because it was the beginning of the new term and the research period finished before the school holidays. Students had 3 English lessons a week, and every week 2 lessons were devoted to the research and research materials were used.

The study was based on a quasi-experimental design where the objective was to examine how variables interact with each other. The groups involved in the studies consisted of 2 classes with intervention (2 treatment groups) and 1 group without any treatment (1 control group). The format of the design was chosen because it allowed the drawing of causal relationships between variables, and it was suitable for testing a cause-and-effect relationship (the effect of an independent variable on a dependent variable).

The **stages of the research** were the following:

**1) Pre-assessment grammar test.** The first stage of the research involved conducting a pre-assessment grammar test. This test was administered to all students of 3 groups to measure their knowledge of grammar in ESL. The test was designed to include various grammatical concepts, such as Present Simple (do/does/do not like/does not like/am/is/are), special questions (When?, What?, Who?, How?, Why?, Where?), comparatives, connectives, which are important for ESL learners to master. The purpose of this stage was to establish a baseline of grammatical competence, which could be used to compare the students' progress at the end of the study.

**2) Learning process with/without implementing technology-enhanced formative assessment tools.** The second stage of the research involved using various digital formative-assessment tools to enhance the learning process and improve the students' academic achievement in ESL grammar. These tools were used only in two classes (2 treatment groups). In one class (1 control group), the teacher did not use any digital formative assessment tools. The purpose of this stage was to implement digital formative assessment tools in practice.

**3) Post-assessment grammar test.** In the final stage of the research, a post-assessment grammar test was administered to all students from 3 groups. The test was designed to be similar to the pre-assessment test, with the same grammatical concepts tested. The purpose of this stage was to compare the students' performance in the pre-assessment test with their performance in the post-assessment test and determine whether the use of digital formative assessment tools had a significant impact on their learning outcomes.

### 3.2. Sample

The participants of this study were fourth-grade students of a state school in Estonia. They belong to three different fourth classes (4A, 4B, 4C), and the author of this thesis teaches them English as a second language regularly.

Non-probabilistic sample method was used to select participants for this research as the study aims to analyse a specific group of students. The population of the study was chosen by convenience sampling. The total number of participants amounted to 42, 16 girls and 26 boys. The age range is 10-11 years. Table 2 presents the students' demographics in the research.

**Table 2. Students' demographics**

<b>Study groups</b>	<b>Number of female students who participated in all the activities</b>	<b>Number of male students who participated in all the activities</b>	<b>Totals</b>
<b>4A (Control group)</b>	6	9	<b>15</b>
<b>4B (Treatment group)</b>	7	7	<b>14</b>
<b>4C (Treatment group)</b>	3	10	<b>13</b>
<b>Totals</b>	<b>16</b>	<b>26</b>	<b>42</b>

The participants were assigned to three groups: 2 treatment groups (4B, 4C) and one control group (4A). Treatment groups were separated because they were different classes. In the control group, technology-enhanced formative assessment tools were not used during the period of the research. In the two treatment groups, technology-enhanced formative assessment tools

were used during the period of the research. The reason for such a division was that the students were already accessible for the study since the researcher was also the teacher of the participants. The number of students can be explained by feasibility reasons as the author of the study doesn't teach in other classes of the same group age.

### 3.3. Materials used

Different materials were used in the research to provide practice and reinforce the process of learning. These materials include a student's book and a workbook, pre- and post-assessment tests, online activities and interactive games which provided the students with a dynamic and engaging learning experience that helped them to achieve learning goals.

The range of materials used in this research in every group is presented in Table 3. The samples of the materials are presented in the Appendices.

**Table 3. Research materials**

<b>Material</b>	<b>Description</b>	<b>4A (Control group)</b>	<b>4B (Treatment group)</b>	<b>4C (Treatment group)</b>
<b>Students' book "I Love English 2"</b>	This is a textbook used by students to learn English. It contains various chapters, each covering a different topic related to English grammar, vocabulary, and conversation skills. The book is designed to be interactive and engaging for young learners, with colourful illustrations, exercises, and activities to practise the language.	+	+	+
<b>Workbook "I Love English 2"</b>	This workbook is supplementary material to the students' book, containing additional exercises and activities to reinforce the lessons in the textbook. It is designed to be completed by	+	+	+

	students independently or with the help of a teacher and provides extra practice with tasks such as writing, reading comprehension, and grammar exercises.			
<b>Pre-assessment grammar test</b>	This is a diagnostic test administered at the start of the research to evaluate the students' knowledge and skill level in English grammar. This test helps the teacher-researcher understand the areas where students need more support and plan lessons and the intervention accordingly.	+	+	+
<b>Post-assessment grammar test</b>	This is an evaluation tool used at the end of the research to measure the students' progress in English grammar. It helps the teacher-researcher determine if students have achieved the learning objectives and if any additional support is required.	+	+	+
<b>Online entrance slips</b>	These online activities were administered to students before they started a new lesson or topic. These tasks are designed to assess the students' prior knowledge of the topic and activate their learning before the class begins.	-	+	+
<b>Online 3-2-1 exit slips</b>	These online tasks were administered to students at the end of the lesson or topic they just completed. These tasks require students to reflect on	-	+	+

	what they have learned and consolidate their knowledge.			
<b>Plickers for traffic light</b>	Plickers is a classroom response system that allowed the teacher-researcher to gather real-time data on students' understanding of a lesson or topic. The Traffic Light feature allowed the teacher to quickly gauge understanding by students' answers to questions posed in the form of a red, yellow, or green paper card.	-	+	+
<b>Kahoot</b>	This is an interactive game played by students to consolidate and reinforce learning. It involves answering multiple-choice quizzes on a digital platform using a mobile device or computer. Kahoot provided immediate feedback on student performance and helped the teacher-researcher identify areas of weakness in the learning process.	-	+	+

### 3.4. Data collection tools

To investigate the effectiveness of digital formative assessment tools on students' academic achievement various data collection tools were used. They included formative assessment trackers for the teacher and assessment records for every student. The data collection tools for this research are presented in Table 4.

**Table 4. Data collection tools**

	<b>Data collection tool</b>	<b>Description of the tool</b>
<b>1.</b>	<b>Formative assessment tracker for the teacher</b>	This tracker was used to mark the use of digital formative assessment tools during the intervention.

2.	<b>Assessment records</b>	The assessment records of each student were used to track their progress throughout the intervention period.
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### 3.5. Data collection procedure

The intervention began on the 13th of March and lasted 6 weeks (13.03.23-21.04.23). Students had 3 ESL lessons a week and every week 2 lessons were devoted to the research. In general, the researcher had 12 lessons for this intervention.

**Stage 1:** The first lesson of the intervention included the pre-assessment grammar test (Appendix 1) which was administered to all participants before the intervention to measure their ESL grammar knowledge and skills in these topics: Present Simple (do/does/do not like/does not like/am/is/are), special questions (When?, What?, Who?, How?, Why?, Where?), comparatives, connectives. The preparation for the pre-assessment test did not include the use of any digital formative assessment tools.

**Stage 2:** Then started the main phase of the intervention, where the control group of students was taught without any digital formative assessment tools, and two treatment groups were taught with digital formative assessment tools. The research materials which were used during this stage were the student's book and the workbook. In addition, digital online tools were implemented during this period, such as online entrance slips (2 times) (Appendix 2), online 3-2-1 exit slips (3 times) (Appendix 3), online traffic light tool (2 times) (Appendix 4), Kahoot (3 times) (Appendix 5). During this stage, the researcher used a formative assessment tracker to mark the use of digital formative assessment tools during the intervention (Appendix 6), and assessment records.

**Stage 3:** The last stage of the intervention was to write the post-assessment test (Appendix 7) and compare the outcomes of both tests.

Overall, the data collection procedure involved administering pre- and post-assessment tests and implementing digital formative assessment tools in the learning process.

### 3.6. Data analysis

Quantitative data were collected through pre- and post-assessment tasks aimed at measuring students' academic outcomes in ESL grammar before and after the integration of

technology-enhanced formative assessment into the learning process. The data collected were analysed using statistical software to determine if there were significant differences in the academic performances of the students from the treatment groups and the control group. The analysis involved comparing the mean scores of the students and conducting inferential statistical tests such as an ANOVA test to establish if there were any significant differences among the groups. T-test was used to test if gender had a differentiating effect on study results.

Overall, the quantitative method provided a comprehensive understanding of how digital formative assessment technologies influenced learning and teaching grammar in the ESL classroom.

### **3.7. Ethical issues**

The research took place in a school setting. There were several ethical issues considered before implementing the study.

One ethical issue of this research is a potentially disadvantageous condition that the control group might find itself in because it was not taught with the use of the technology-enhanced formative assessment tools, and it may have put the students at a disadvantage in terms of their ESL academic outcomes in grammar.

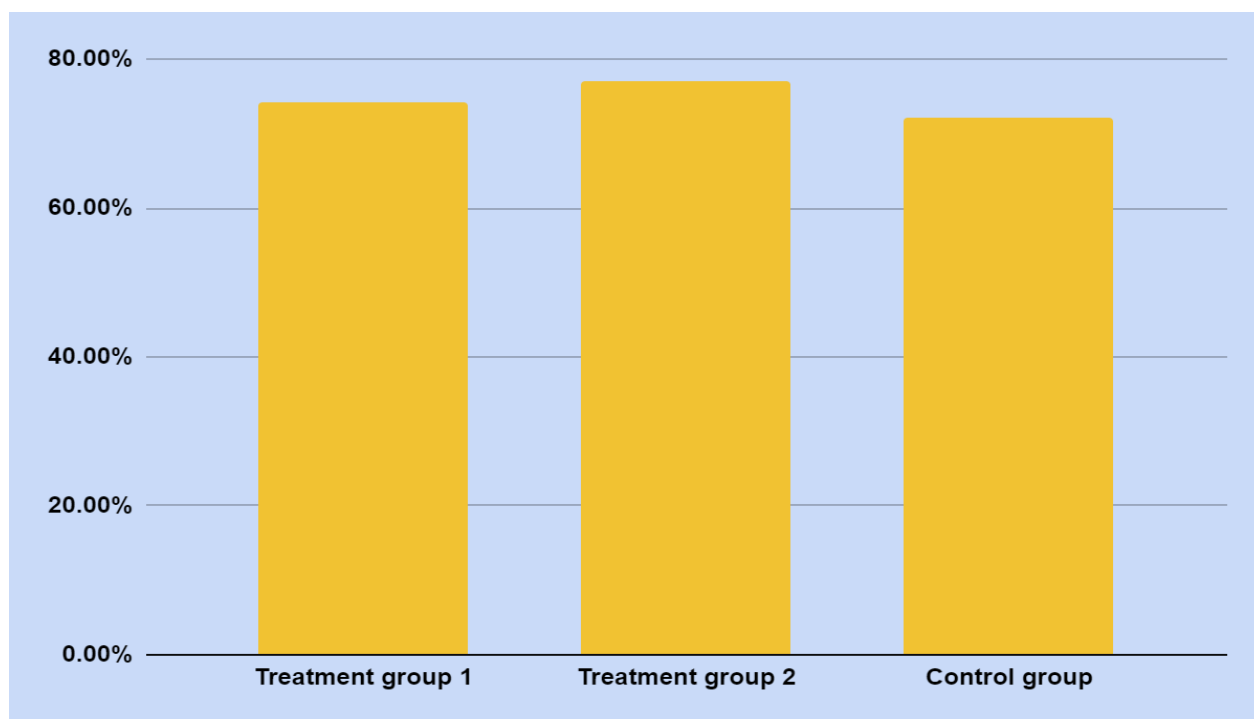
Another ethical issue is the use of student data for research purposes. The research may have involved collecting and analysing sensitive information about the students, such as their test scores and participation in the study. This raises questions about the privacy of the students and informed consent for their participation in the study. For this reason, the consent forms were distributed to and completed by the parents of the study participants.

#### 4. Results

Two research questions study aimed to answer with the corresponding results are presented below.

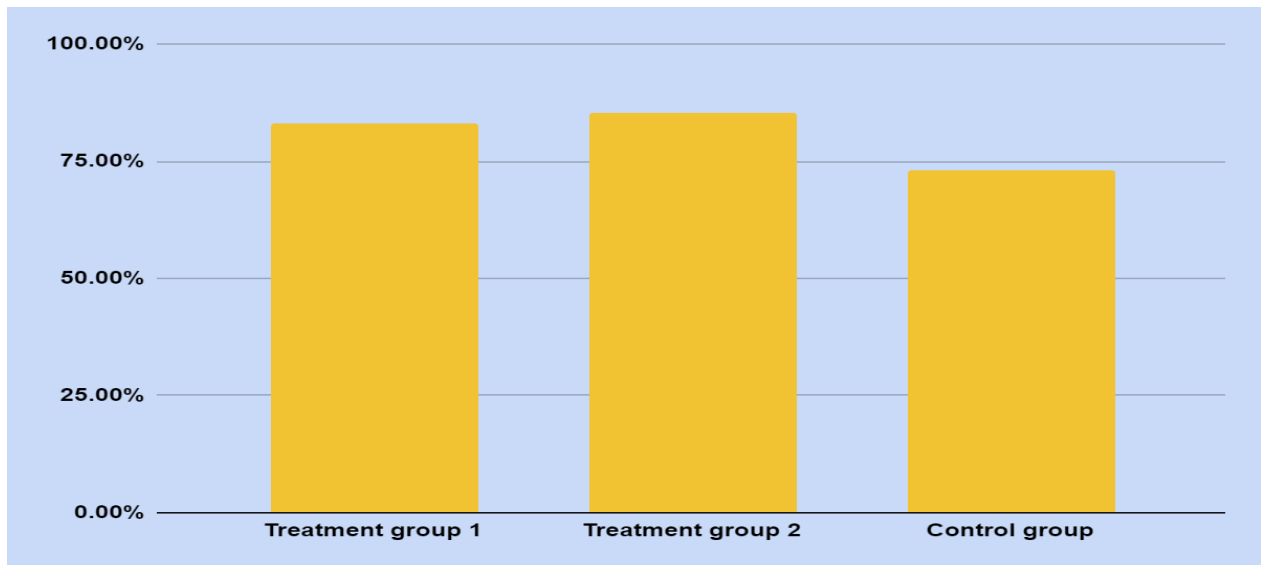
**RQ1.** To what extent can the integration of technology-enhanced formative assessment influence secondary school learners' ESL academic outcomes in grammar?

The study aimed at confirming whether the integration of technology-enhanced formative assessment influence secondary school students' ESL academic outcomes in grammar. To answer this question, we analysed and compared the outcomes of pre- and post-assessment grammar tests in all 3 groups using the ANOVA test. The results of the pre-assessment test are presented in Figure 1.



**Figure 1. The results of the pre-assessment test**

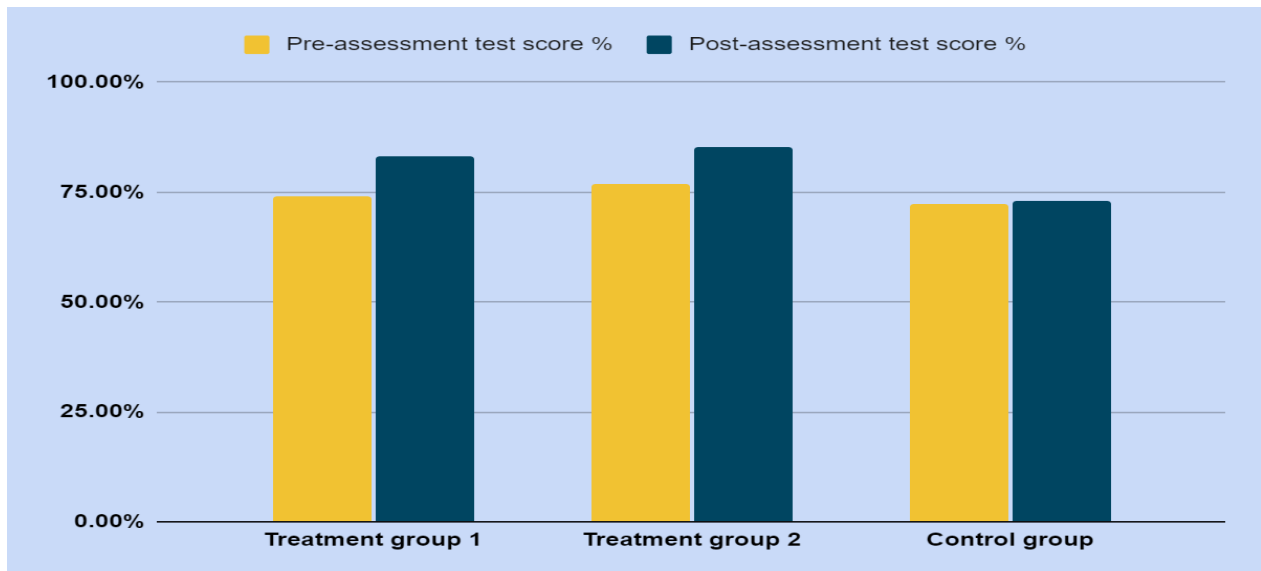
The results of the pre-assessment test indicate that both treatment groups performed better on average compared to the control group. The first treatment group had an average score of 74.14%, the second treatment group had an average score of 77%, and the control group had an average score of 72.2%. According to ANOVA statistics, the  $f$ -ratio value is 0.21432. The  $p$ -value is .808039. The result is *not* significant at  $p < .05$ . The results of the post-assessment test are presented in Figure 2.



**Figure 2. The results of the post-assessment test**

Based on the results of the post-assessment test, the first treatment group had an average score of 83.2%, the second treatment group had an average score of 85%, while the control group had an average score of 73.06%. To determine whether the observed differences are significant or not, an ANOVA test was conducted. According to ANOVA statistics, the  $f$ -ratio value is 1.69952. The  $p$ -value is .196027. The result is *not* significant at  $p < .05$ .

The comparative results of both tests in 2 treatment groups and one control group are presented in Figure 3.

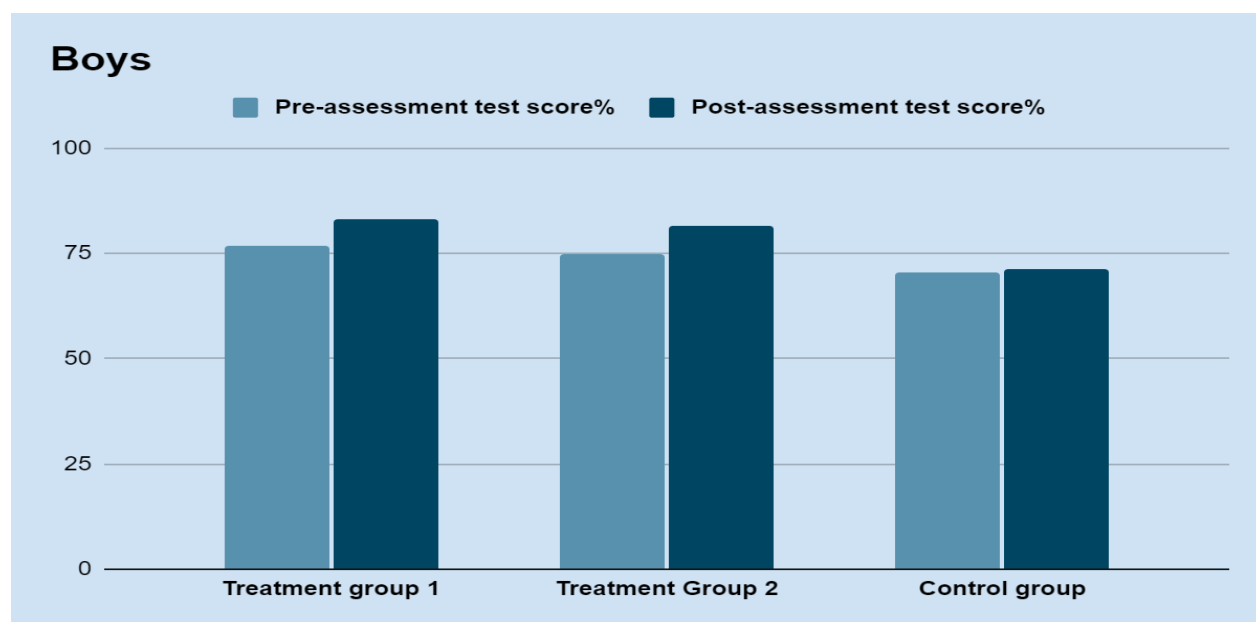


**Figure 3. Comparative results of the pre-and post-assessment tests**

According to the comparative results of pre-and post-assessment test scores, the difference between both treatment and control groups is considered to be not significant.

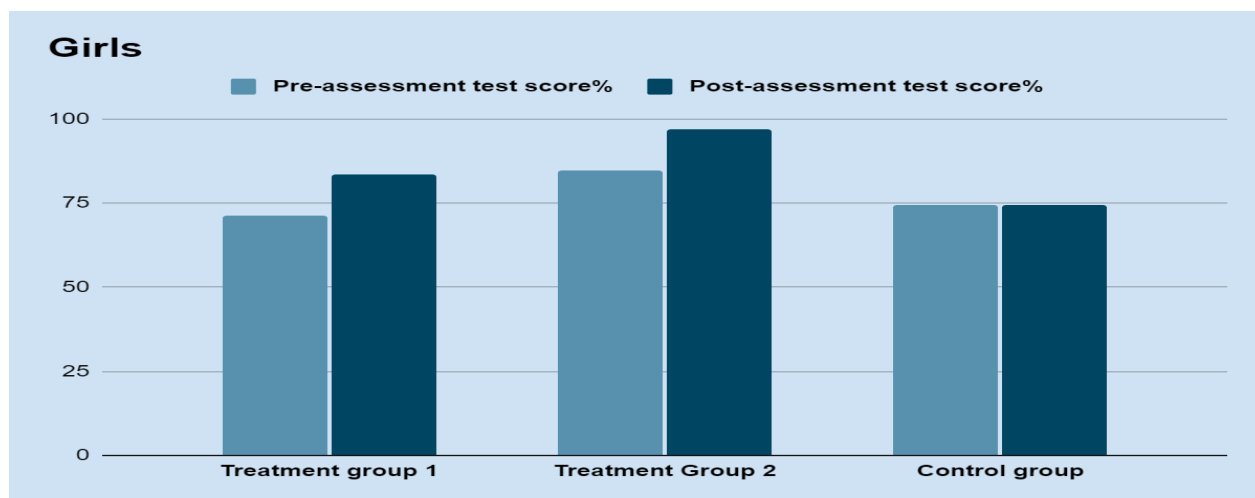
**RQ2.** Do the effects of the technology-enhanced formative assessment differ across gender?

To answer the second research question, a comparative analysis of the data collected across gender was conducted to evaluate whether gender plays a role in the effectiveness of the technology-enhanced formative assessment. The boys' results are presented in Figure 4.



**Figure 4. Pre-and post-assessment test results among boys**

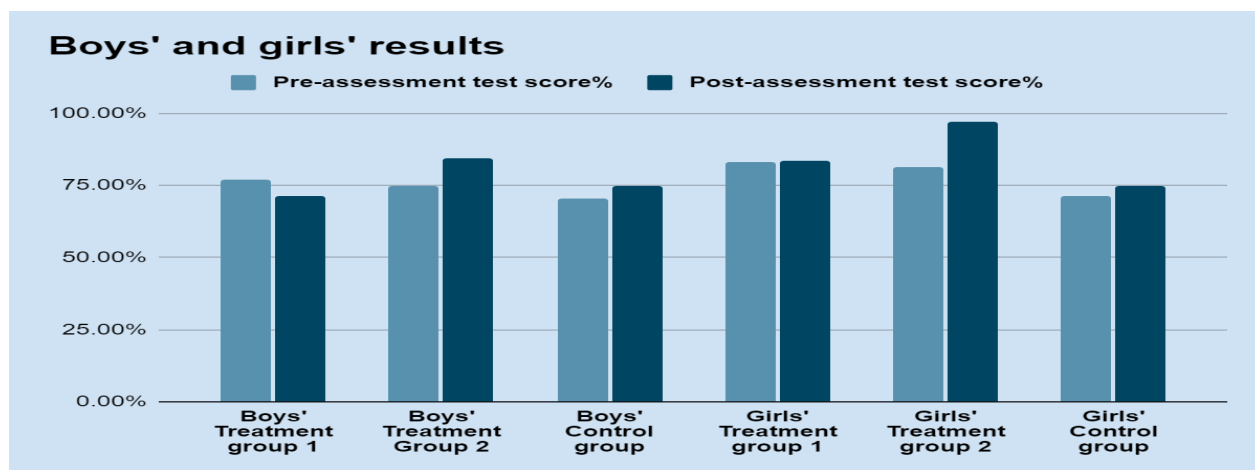
Based on the results of the pre-and post-assessment tests among boys, the first treatment group had an average pre-assessment test score of 76.8% and an average post-assessment test score of 83%. The second treatment group had an average pre-assessment test score of 74.7% and an average post-assessment test score of 81.5%. The control group had an average pre-assessment test score of 70.6% and an average post-assessment test score of 71.3%. According to ANOVA statistics, the  $f$ -ratio value is 0.15549. The  $p$ -value is .856887. The result of the pre-assessment test results is *not* significant at  $p < .05$ . The result of the post-assessment test shows that the  $f$ -ratio value is 0.15549. The  $p$ -value is .856887. The result is also *not* significant at  $p < .05$ . The girls' results are presented in Figure 5.



**Figure 5. Pre-and post-assessment test results among girls**

Based on the results of the pre-and post-assessment tests among girls, the first treatment group had an average pre-assessment test score of 71.4% and an average post-assessment test score of 83.5%. The second treatment group had an average pre-assessment test score of 84.6% and an average post-assessment test score of 97%. The control group had an average pre-assessment test score of 74.6% and an average post-assessment test score of 74.6%.

According to ANOVA statistics, The  $f$ -ratio value is 1.74495. The  $p$ -value is .208293. The result of the pre-assessment test is *not* significant at  $p < .05$ . The  $f$ -ratio value is 1.85361. The  $p$ -value is .190816. The result of the post-assessment test is also *not* significant at  $p < .05$ . The boys' and girls' results in comparison are presented in Figure 6 and the difference is considered to be not significant.



**Figure 6. Pre-and post-assessment test results among boys and girls**

## 5. Discussion and conclusions

**Hypothesis 1** of the thesis is that there will be a slight improvement in secondary school learners' ESL academic outcomes in grammar after the integration of technology-enhanced formative assessment because of the short period of intervention. This hypothesis was confirmed. According to the results, there was a slight increase in students' average academic outcomes.

**Hypothesis 2** of the thesis is that there will be no significant difference in the effects of technology-enhanced formative assessment on secondary school learners' ESL academic outcomes in grammar among boys and girls. This hypothesis was also confirmed.

This study was intended to answer two questions: 1) To what extent can the integration of technology-enhanced formative assessment influence secondary school learners' ESL academic outcomes in grammar? 2) Do the effects of the technology-enhanced formative assessment differ across gender?

The pre-assessment test average scores showed that both treatment groups outperformed the control group. However, the difference between the groups was not statistically significant. In the post-assessment test, both treatment groups continued to outperform the control group. The post-assessment test showed a larger improvement in the control group's average score.

Overall, while both treatment groups showed improvement in their average scores, the difference between the groups and the control group was not considered to be significant. The outcomes of this research show that the implementation of technology-enhanced formative assessment can have a positive association on secondary school learners' ESL academic outcomes in grammar, though the average scores of the treatment groups did not increase significantly from pre- to post-assessment tests, as well as the control group showed only a slight increase.

The results across gender in terms of the effects of the treatments on the pre-and post-assessment test scores were also not significantly different. In the case of boys, neither of the treatment groups showed a significant improvement in the post-assessment test scores after undergoing the treatments. On the other hand, among girls, the first treatment group showed a bigger improvement in their post-assessment scores, while the second treatment group showed a significant improvement in their pre-and post-assessment test scores.

Overall, it appears that the treatments had a bit more positive effect on the girls' test scores than on the boys' scores. However, it is important to note that the control groups in both cases did not show any significant changes in their scores, suggesting that there may be other factors besides the treatments that could affect the performance of the students in the assessments. There were some variations in the results across individual students. For example, some students in the treatment groups showed a decrease in their grammar scores, while some students in the control group showed an increase. This highlights the importance of individualizing instruction and assessment to meet the needs of each student, and also looking at many background/moderating variables to check their differentiating effect.

The results of this study also suggest that the effects of the technology-enhanced formative assessment differed a bit across gender. This finding is consistent with previous research, which suggests that girls tend to perform better in exams and assessments than boys (Hyde, 2014). However, it is important to note that the sample size in this study was small, and further research is needed to fully understand the gender differences in the effects of formative assessment.

Formative assessment is an effective tool in improving academic outcomes, particularly for secondary school students learning English as a second language. According to Black and Wiliam (1998), formative assessment helps teachers and students assess the current state of learning and identify areas for improvement. As a result, formative assessment fosters continuous improvement and helps students stay on track to meet learning objectives.

In this study, technology-enhanced formative assessment helped to improve the students' ESL academic outcomes in grammar. The use of technology-enhanced formative assessment tools allowed students to identify their strengths and weaknesses in grammar while providing teachers with valuable feedback on students' progress. According to Clarke and Timperley (2010), formative assessment that includes immediate feedback is likely to lead to better outcomes.

Overall, this study provides evidence that technology-enhanced formative assessment can contribute to the improvement of ESL academic outcomes in grammar for secondary school learners of ESL. However, as with any educational intervention, it is essential to consider various factors that could influence students' performance, including learning styles, teacher practices, and socio-cultural factors.

## **6. Limitations and further research**

Some limitations of this research include the small sample size, which limits the generalizability of the findings to other contexts. Additionally, the study only focused on grammar skills and did not assess other aspects of students' language proficiency, such as speaking, listening skills, writing, or reading. Furthermore, the study did not account for the potential impact of other factors, such as teacher training or curriculum design, on students' academic outcomes. Finally, the study did not consider the potential limitations or barriers to implementing technology-enhanced formative assessment in various educational contexts.

Future research can explore the use of other tools, such as gamification or interactive whiteboards to examine the impact of various technology-enhanced formative assessment tools on learners' achievement in ESL grammar.

Peer reviews can also be added to investigate their effectiveness in the learning process while using technology-enhanced formative assessment tools, and their impact on learners' engagement, motivation and academic outcomes.

Future research can also explore the long-term effects of technology-enhanced formative assessment tools on learners' academic outcomes in ESL grammar. The study can examine the impact of using these tools over a more extended period on learners' overall academic outcomes and language proficiency.

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## **Author's declaration**

I hereby declare that I have written this thesis independently and that all contributions of other authors and supporters have been referenced. The thesis has been written in accordance with the requirements for graduation theses of the Institute of Education of the University of Tartu and is in compliance with good academic practices.

Signature: Iryna Inozemtseva

Date: 30/05/2023

## References

- Airasian, P. W. (1997). *Classroom assessment* (3rd ed.). New York: McGraw-Hill.
- Bereiter, D., & Engelmann, S. (1966). *Teaching disadvantaged children in the preschool*. Boston: Allyn & Bacon.
- Bereiter, C., & Scardamalia, M. (2014). Knowledge building and knowledge creation: One concept, two hills to climb. *Knowledge creation in education*, 35-52.
- Black, P., & Wiliam, D. (1998). Assessment and Classroom Learning. *Assessment in Education*. Vol. 5, No. 1.  
<https://www.semanticscholar.org/paper/Assessment-in-Education%3A-Principles%2C-Policy-%26-Wiliam/b02de73dabd2cf4a24b1139df196c2e40c06879b?p2df>
- Bloom, M. (1969). The selection of knowledge from the behavioural sciences and its integration into social work curricula. *Journal of Education for Social Work*, 5(1), 15-27.
- Burnett, P. C. (2002). Teacher praise and feedback and students' perceptions of the classroom environment. *Educational psychology*, 22(1), 5-16.
- Council of Europe (CEFR) (2001). *Common European Framework of Reference for Languages: Learning, Teaching, Assessment*. New York: Cambridge University Press.
- Dweck, C. S. (2007). *Is math a gift? Beliefs that put females at risk*. American Psychological Association.
- Elbow, P. (1994). *Writing for learning—not just for demonstrating learning*. University of Massachusetts, Amherst. Available: <http://www.ntlf.com/html/lib/bib/writing.htm>
- Ellis, R. (2009). Task-based language teaching: Sorting out the misunderstandings. *International journal of applied linguistics*, 19(3), 221-246.
- Elmahdi, I., Al-Hattami, A., & Fawzi, H. (2018). Using Technology for Formative Assessment to Improve Students' Learning. *Turkish Online Journal of Educational Technology-TOJET*, 17(2), 182-188.
- Fisher, D., Frey, N., & Rothenberg, C. (2008). *Content area conversations: How to plan discussion-based lessons for diverse language learners*. Alexandria, VA: ASCD.
- Frey, N., & Fisher, D. (2011). *The formative assessment action plan: Practical steps to more successful teaching and learning*. ASCD.
- Gawande, A. (2009). *The checklist manifesto: How to get things right*. New York: Metropolitan.

- Hamre, B. K., Pianta, R. C., Burchinal, M., Field, S., LoCasale-Crouch, J., Downer, J. T., ... & Scott-Little, C. (2012). A course on effective teacher-child interactions: Effects on teacher beliefs, knowledge, and observed practice. *American Educational Research Journal*, 49(1), 88-123.
- Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77, 81–112.
- Kramarski, B., Zoldan, S. (2008). Using errors as springboards for enhancing mathematical reasoning with three metacognitive approaches. *The Journal of Educational Research*, 102 (2), 137-151.
- Lyman, F. T. (1981). The responsive classroom discussion: The inclusion of all students. In A. Anderson (Ed.), *Mainstreaming digest* (pp. 109–113). College Park: University of Maryland Press.
- McTighe, J., O'Connor, K. (2005). Seven practices for effective learning. *Educational Leadership*, 63(3), 10–17.
- Montalvo-Balbed, M. (2012). English Language Learners and the Common Core. Module 4. *Reading: Using Formative Assessment to Help English Language Learners*.
- National Education Association. (2003). *Balanced assessment: The key to accountability and improved student learning*. Washington, DC: Author.
- Nelson-le Gall, S. A. (1985). Motive–outcome matching and outcome foreseeability: Effects on attribution of intentionality and moral judgments. *Developmental Psychology*, 21(2), 332.
- Scriven, M. (1967). The methodology of evaluation. In *Perspectives of curriculum evaluation*, ed. R.W. Tyler, R.M. Gagne, and M. Scriven, 39–83. Chicago, IL: Rand McNally.
- Weeden, P., Broadfoot, P., Winter, J. (2002). *Assessment: What's in it for school?* Taylor & Francis.
- Wiggins, G. (1998). *Educative assessment: Designing assessments to inform and improve student performance*. San Francisco: Jossey-Bass.
- William, D. (2006). *Formative Assessment: Getting the Focus Right*. *Educational Assessment*. [https://www.researchgate.net/publication/248940867\\_Formative\\_Assessment\\_Getting\\_the\\_Focus\\_Right](https://www.researchgate.net/publication/248940867_Formative_Assessment_Getting_the_Focus_Right)
- Winograd, P., Paris, S., & Bridge, C. (1991). Improving the assessment of literacy. *The Reading Teacher*, 45(2), 108-116.

## 7. Appendices

### Appendix 1. Pre-assessment grammar test

#### 1. Kirjuta lünka DO/DOES. Vasta küsimustele.

Fill in the blanks with DO/DOES. Answer the questions.

1. \_\_\_\_\_ all your mates play dodgeball? \_\_\_\_\_
2. \_\_\_\_\_ you usually drop sweet wrappers? \_\_\_\_\_
3. \_\_\_\_\_ your dad play basketball? \_\_\_\_\_
4. \_\_\_\_\_ your friend look forward to PE lessons? \_\_\_\_\_
5. \_\_\_\_\_ your grandad play games with you? \_\_\_\_\_
6. \_\_\_\_\_ all your friends go to the same school? \_\_\_\_\_

#### 2. Kirjuta lünka AND, BUT, BECAUSE.

Fill in the blanks with AND, BUT, BECAUSE.

1. I can throw a ball \_\_\_\_\_. I'm not a good catcher.
2. She's good at dodgeball \_\_\_\_\_ basketball.
3. He can't join the game \_\_\_\_\_ his knee hurts.
4. Peter knows the score \_\_\_\_\_ we don't.
5. He's looking forward to the match \_\_\_\_\_ he wants to win.
6. We can't go out \_\_\_\_\_ it's too late.

#### 3. Kirjuta lünka sobiv sõna.

Fill in the blanks with an appropriate word.

**FEEL FEELS GO GOES ENJOY ENJOYS MAKE MAKES**

1. My mummy \_\_\_\_\_ cooking.
2. My daddy's car \_\_\_\_\_ really fast.
3. The lights and warmth \_\_\_\_\_ plants grow.
4. Fay \_\_\_\_\_ like a star in her new green dress.
5. I \_\_\_\_\_ dancing in my red shoes.
6. My best friend \_\_\_\_\_ me happy.

#### 4. Moodusta omadussõnade keskvõrded ja kirjuta need sobivasse tulpa.

**Form the comparatives of the adjectives and write them in the appropriate column.**

BORING FRIENDLY SERIOUS CLEAN LOVELY INTERESTING WINDY FAST  
TALL TIDY HARD

short-shorter

lucky-luckier

beautiful-more beautiful

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**5. Alusta küsimus sobiva sõnaga.**

**Start the question with an appropriate word.**

**DO DOES IS ARE**

1. \_\_\_\_\_ Dave go to football practice?
2. \_\_\_\_\_ your granny live in the country?
3. \_\_\_\_\_ you eat healthy food?
4. \_\_\_\_\_ you sometimes play hide-and-seeK?
5. \_\_\_\_\_ there any computers in the classroom?
6. \_\_\_\_\_ there a TV in your room?

**6. Alusta küsimus sobiva sõnaga.**

**Start the question with an appropriate word.**

**WHEN WHAT WHO**

1. \_\_\_\_\_ can join the game?
2. \_\_\_\_\_ are you fond of?
3. \_\_\_\_\_ do you ask for help?
4. \_\_\_\_\_ do you do in the evening?

**HOW WHY WHERE**

5. \_\_\_\_\_ are you here?
6. \_\_\_\_\_ many pockets have you got?
7. \_\_\_\_\_ old is your English teacher?
8. \_\_\_\_\_ can you keep your money?

**7. Kirjuta küsimused.**

**Write the questions.**

1. where    hopscotch    do you play

---

2. are you    what    allergic to

---

3. the street    do you cross    where

---

4. what    for breakfast    do you have

---

5. fairy tales    how many    do you know

---

## Appendix 2. Samples of online entrance slips

1. Fill in the blank with the correct present simple form: My sister (like) \_\_\_\_\_ playing basketball.
2. Rewrite the following sentence in a negative form: John is happy.
3. Write a special question for the following sentence using the word “Where”: Mary is going to the park.
4. Fill in the blank with the correct comparative form: The elephant is (big) \_\_\_\_\_ than the dog.
5. Connect the following sentences using “and”: Peter likes to play soccer. Mary likes to play tennis.
6. Rewrite the following sentence in a question form using “what”: Tom is reading a book.
7. Fill in the blank with the correct present simple form: We (have) \_\_\_\_\_ a dog, his name is Rex.
8. Fill in the blank with the correct comparative form: The apple is (small) \_\_\_\_\_ than the orange.
9. Connect the following sentences using “but”: She loves ice cream. She doesn't like chocolate.
10. Rewrite the following sentence in plural form: The baby is crying.

### **Appendix 3. Samples of online 3-2-1 exit slips**

#### **1. Online 3-2-1 exit slip for Present Simple:**

List 3 things you like to do at the weekends.

Name 2 things you don't like to do in class.

Write 1 sentence using "does not" in it.

#### **2. Online 3-2-1 exit slip for Special Questions:**

What is your favorite subject in school and why?

Where do you spend your family vacations?

When is your birthday?

#### **3. Online 3-2-1 exit slip for Comparatives:**

Choose the correct comparative in the sentence: "The elephant is (bigger, biggest) than the dog."

Write a sentence comparing two animals.

List 3 things that are heavier than your backpack.

#### **4. Online 3-2-1 exit slip for Connectives:**

Write a sentence using the word "and" to connect two ideas.

Complete this sentence using "but": "I wanted to go outside, \_\_\_\_\_ it was raining."

Write a sentence using "so" to show cause and effect.

## Appendix 4. Samples of online traffic light tools

### 1. Present Simple:

Choose the correct form of the verb: “Jenny \_\_\_ sports on the weekends.” (does/play/do not play/does not play)

Complete the sentence: “My sister \_\_\_ her homework every day.” (likes/do/does not do/does)

### 2. Special Questions:

Choose the correct question word: “\_\_\_ do you go to school?” (When/What/Who/Where)

Answer the question with a complete sentence: “\_\_\_ are you doing this weekend?” (What/I am going to the beach/I don't know/Why)

### 3. Comparatives:

Choose the correct form of the adjective: “This is \_\_\_ than that.” (more big/bigger/most big/biggier)

Complete the sentence: “My cat is \_\_\_ than my dog.” (fast/faster/most faster/fastest)

### 4. Connectives:

Choose the correct connective: “I like pizza, \_\_\_ I don't like onions.” (and/but/so/or)

Complete the sentence with a suitable connective: “I am hungry, \_\_\_ I will make some pasta.” (so/and/but/or)

## Appendix 5. Sample of kahoot

### 1. Present Simple:

**Choose do or does.**

Do/Does you like to play sports?

Do/Does Sarah watch TV every day?

**Fill in the blank.**

We \_\_\_\_\_ (am/ are/ is) going to the park.

They \_\_\_\_\_ (do not/ does not) eat pizza.

### 2. Special questions:

**Choose the correct special word: what, when, who, how, why.**

\_\_\_\_\_ is your favourite subject in school?

\_\_\_\_\_ do you go to bed?

\_\_\_\_\_ is your best friend?

\_\_\_\_\_ do you get to school?

\_\_\_\_\_ do you like your favourite food?

### 3. Comparatives:

**Use a comparative form.**

Is a dog (fast) \_\_\_\_\_ than a cat?

Which is (tall) \_\_\_\_\_, a tree or a house?

Is pizza (popular) \_\_\_\_\_ than hamburgers?

Who is (old) \_\_\_\_\_, your mom or dad?

### 4. Connectives:

**Use the connective words to join the sentences.**

I like to play basketball, \_\_\_\_\_ I don't like to play soccer. (and/but)

Let's go to the park, \_\_\_\_\_ it's a beautiful day. (so/but)

I want to eat a sandwich, \_\_\_\_\_ I don't have any bread. (but/so)

She is very athletic, \_\_\_\_\_ she doesn't like to run. (but/so)



## Appendix 7. Post-assessment grammar test

### 1. Kirjuta lünka DO/DOES. Vasta küsimustele.

Fill in the blanks with DO/DOES. Answer the questions.

1. \_\_\_\_\_ your best friend like dodgeball? \_\_\_\_\_
2. \_\_\_\_\_ your dad play football? \_\_\_\_\_
3. \_\_\_\_\_ your classmates like cartoons? \_\_\_\_\_
4. \_\_\_\_\_ you look forward to PE lessons? \_\_\_\_\_
5. \_\_\_\_\_ you live near school? \_\_\_\_\_
6. \_\_\_\_\_ you enjoy computer games? \_\_\_\_\_

### 2. Kirjuta lünka AND, BUT, BECAUSE.

Fill in the blanks with AND, BUT, BECAUSE.

1. I can't go for a ride \_\_\_\_\_ my feet hurt.
2. He can join the team \_\_\_\_\_ she can't.
3. He wants to borrow my ball \_\_\_\_\_ go out to play.
4. We can't go on a trip \_\_\_\_\_ it's very expensive.
5. Jim eats healthy food \_\_\_\_\_ Jack doesn't.
6. I need an umbrella \_\_\_\_\_ it's raining.

### 3. Kirjuta lünka sobiv sõna.

Fill in the blanks with an appropriate word.

**TELL TELLS GROW GROWS ENJOY ENJOYS MAKE MAKES**

1. The light and warmth \_\_\_\_\_ plants grow.
2. Elephant babies \_\_\_\_\_ fast.
3. Billy sometimes \_\_\_\_\_ jokes.
4. Jim and Andy \_\_\_\_\_ cooking.
5. My granny and grandad \_\_\_\_\_ me fairy tales.
6. Ailysh \_\_\_\_\_ riding his spaceship.

**4. Moodusta omadussõnade keskvõrded ja kirjuta need sobivasse tulpa.**

**Form the comparatives of the adjectives and write them in the appropriate column.**

**VISIBLE FUNNY WARM HEALTHY BORING EASY LARGE OLD FLUFFY  
EXPENSIVE BIG**

short-shorter

lucky-luckier

beautiful-more beautiful

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**5. Alusta küsimus sobiva sõnaga.**

**Start the question with an appropriate word.**

DO DOES IS ARE

1. \_\_\_\_\_ Dave go to music school?
2. \_\_\_\_\_ your sisters live in London?
3. \_\_\_\_\_ there a computer in your living room?
4. \_\_\_\_\_ there are any plants in your kitchen?
5. \_\_\_\_\_ your best friend enjoy reading?
6. \_\_\_\_\_ you help your mum and dad?

**6. Alusta küsimus sobiva sõnaga.**

**Start the question with an appropriate word.**

**WHEN WHAT WHO**

1. \_\_\_\_\_ can help me?
2. \_\_\_\_\_ are you proud of?
3. \_\_\_\_\_ do you do at the weekends?
4. \_\_\_\_\_ do you do your homework?

**HOW WHY WHERE**

5. \_\_\_\_\_ are you going?
6. \_\_\_\_\_ have you got so many pockets?
7. \_\_\_\_\_ old is your granny?
8. \_\_\_\_\_ do you get up so late?

**7. Kirjuta küsimused.**

**Write the questions.**

1. after school    what    do you do

---

2. can help    who    you

---

3. singing    good at    who is

---

4. do you play    ball games    where

---

5. when    a reflector    do you wear

---

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