HANNA –

A GAMIFIED DIGITAL SUPPLEMENTARY COURSE MATERIAL DEVELOPED TO HELP

SOCIALLY DISADVANTAGED PUPILS LEARN ENGLISH

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Abstract

When it comes to language learning and teaching, one of the major issues that needs to be tackled is the large differences between students in terms of school performance, especially socially disadvantaged children who tend to lag behind their peers. Research on language teaching tends to focus on the average learner, thus leaving little room for students living and learning in low socio-economic regions (low SES). Central Europe, and particularly Hungary, displays one of the most considerate gaps in education, where disadvantaged regions and schools often underperform on the national curriculum tests. Innovation, alternative pedagogical methodologies and different mindset in teaching can bring about enhanced motivation, especially by employing digital devices and the elements of gamification.

The purpose of our study is to introduce a new, tablet-based digital language course programme (HANNA), developed specifically for socially disadvantaged pupils in grades 5-7, which draws upon the teacher's role as a facilitator. The paper explains and describes the factors that contributed to designing the structure of HANNA, along with the organisation of the programme and the gamified elements that are meant to motivate students, thus providing an insight into material development specifically for disadvantaged pupils.

Keywords: gamification; motivation in language learning; self-regulated learning; digital course programme

1. Introduction

National curriculum requires that pupils in Hungary learn a foreign language from 4th grade, attending a minimum of two classes per week, while in grades 5-8 they have three classes per week. Unfortunately, research has failed to demonstrate that language learning in school could be fun, not to mention the large differences across primary schools in terms of children (Nikolov 2011). Language proficiency tests show that schools in bigger towns have usually better results, which is a peculiar side-effect of Hungarian public education (in the following

order: capital, county capital, town, and village). Nikolov (2009) claims that in terms of foreign language teaching Hungary lags behind other European countries, which can be explained by the quality of language learning, rather than by quantitative factors, like the number of classes per week. Foreign language lessons in Hungary are dominated by a frontal, grammar-translation- and drill-based methodology style, and typically apply less favoured and less motivating practices, including activities that prove to be less supportive of cooperation, autonomy and target-language communication, like reading texts out loud, translation and grammar practice. As a result, it becomes difficult to motivate students and keep them motivated, which can easily make classes less engaging. The development of learner's autonomy is often neglected, even though current research puts the emphasis on promoting it (Little 2007). Furthermore, the role of collaborative student work is downplayed despite studies proving its significance in tackling social differences, segregation and academic gaps (Foster & Skehan 1999).

The fact that classwork fails to motivate children may have the dire consequences for socially disadvantaged students, as they are the least likely to receive positive feedback or any motivation relating to language learning at home, e.g. reward for good marks, access to interesting contents in the target language, a supporting and motivating environment, or travelling (Iwaniec 2020). But what is actually meant by socially disadvantaged pupils, low socio-economic statues (low SES), neglected children or children at risk? These terms all refer to children living in a household under the average national income (Staff 2012). Research usually differentiates 5 aspects of low socio-economic status, where all of them interact:
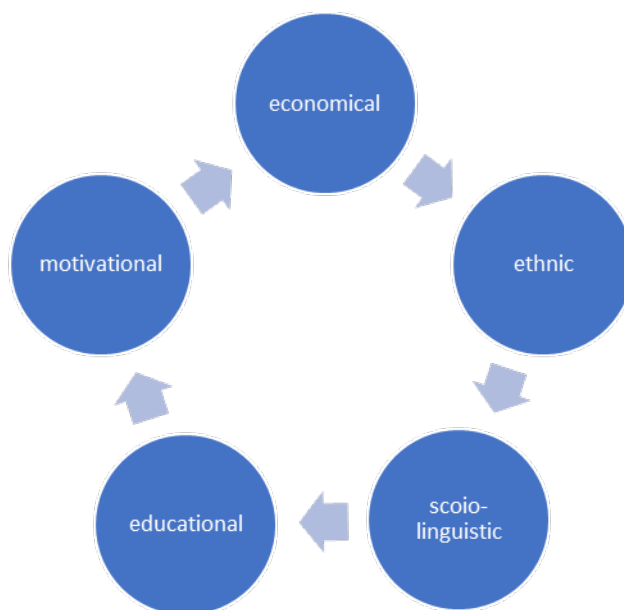

Figure 1. Aspects of socioeconomic status (Furcsa, 2012)

Teaching pupils in low SES backgrounds requires significantly innovative and creative methodologies to engage them in their own learning processes, while establishing a perspective for the pupils to comprehend the importance of their own schooling and to accept responsibility for it (Szabó, 2021). How can this highly complex pedagogical task be achieved? Over the past decade the concept of gamification has received increased attention and interest in academia and practice as it demonstrates potential to promote motivation and learner engagement. The central idea is to take the 'building blocks' of games, and to implement these in real-world situations, often with the goal of motivating specific behaviours within the gamified situation. Based on previous research (among others, Sailer & Homner, 2020) we believe that gamification can be an innovative and promising tool to help socially disadvantaged students overcome the their motivational difficulties.

This paper introduces a gamified supplementary programme for English language learners optimized for tablets and for the classroom environment, which may contribute to the academic improvement of socially disadvantaged students. First, we will describe the aspects and theories considered when designing the programme. Then motivation to learn languages as well as the theory of gamification will be discussed in detail.

2. Literature review

2.1. Motivation and socio-economic status

It is widely believed that the reason behind socially disadvantaged children's low performance and negative attitude towards school is the lack of motivation and often biased motivation stemming from their home environment (Polonyi *et al*., 2021; Lacour & Tissington, 2011; Peter & Mullis, 1997). However, studies do not unequivocally support this assumption (Howse *et al*., 2003; Stipek-Ryan, 1997). In the case of Hungarian students, too, there is only a weak correlation between the educational level of parents and the motivation of children, although the academic motivation of socially disadvantaged students is somewhat less developed compared to their peers (Kovács, 2019; Józsa, 2000; Józsa & Fejes, 2010).

During the developmental phase of our programme we conducted a study to explore the disadvantaged students' motivation and attitude to learning (Polonyi *et al*., 2021). Irrespective of social background, intrinsic motivation generally plays a key role, and group learning has also proved to be important. This means that a higher level of student engagement and stronger learning motivation can be achieved by using methodology that draws on students' attention, personal development and group learning. Social background hardly affects the motivational

profile. The research of Polonyi *et al*. suggests that socially disadvantaged students do not have a specific motivational profile, meaning that being 'disadvantaged' alone does not determine their attitude to learning. Apparently, the same motivational tools should be used in teaching socially disadvantaged students as with other children. The motivational profiles of different student groups are dominated by intrinsic motivation and group aspects, which means that it is crucial to support involvement and cooperation, as well as to eliminate alienation and the resulting boredom.

2.2 Language learning motivation

The motivational factors behind a child's desire and willingness to learn languages may entirely determine learning success and indicate problems and difficulties that may arise later. Thanks to its crucial role in second language learning, much research has been conducted to better understand motivation over past decades (Dörnyei, 2014; Dörnyei *et al*., 2015; Gardner, 1985; Noels *et al*., 2019). Within the historical evolution of language learning motivation, a number of theories and perspectives (for reviews, see Dörnyei *et al*., 2015) have been applied by studies.

Second-generation motivation researchers place more emphasis on cohesion in student groups and classes (Dörnyei & Murphey, 2003). In these studies, they started to focus on the personality, autonomy and learning style of students, and on their position within their learning groups. The other clear trend is that much of this research has emphasized the importance of the self and identity in language learning motivation.

Self-determination theory (SDT; Deci & Ryan, 1985, 2018; for an extended description of SDT in the language learning context, see Noels et al., 2019) is a theoretical framework which outlines the role of the self in motivational processes. SDT originates from humanistic psychology and emphasizes a first-person perspective on motivation and personality. It postulates that the person, supported by the social environment, naturally moves toward growth through the satisfaction of basic psychological needs for *autonomy* (the desire to feel volitional rather than controlled and to establish inner coherence), *competence* (the need to engage optimal challenges and feel effective), and *relatedness* (the need to feel valued and connected with others), which are innate and universal. When these needs are satisfied by the individual's social milieu, the individual becomes more motivated to act and shows greater positive outcomes in the education setting (Deci & Ryan, 1985; 2000; 2017).

Language learning motivation has been further explored along the lines of social background, and current research has revealed that parental education plays a pivotal role in children's academic performance and the level of motivation to learn (Szabó *et al*., 2021).

2.3. Gamification

The origin of the concept of gamification, as well as its most accepted definition, can be dated back to 2011: "Gamification is the application of game-design elements and game principles in non-game contexts" (Deterding *et al*., 2011, p. 10). Out of the numerous other definitions, Kapp's version (2012) is worth mentioning here, as it specifically refers to education: "Gamification is the careful and considered integration of game characteristics, aesthetics and mechanics into a non-game context to promote change in behaviour. It is most often used to motivate and engage people" (p. 15). Applying gamification in the field of education has four important benefits for the teaching/learning process (Boller & Kapp, 2017; Cruaud, 2018). First and foremost, it enhances the motivation and engagement of students, as gamification makes the fulfilment and evaluation of tasks more enjoyable, which in turn results in better performance. Gamified systems are often designed so that they allow repeated access to contents. Repetition supports learning – the more frequently students encounter some content, the more rapidly their knowledge and skills will develop. With a view to enhancing control of the learning situation, students can take different learning paths in gamified systems. The learning environment is generally tailored to the individual's needs, allowing students to walk their unique paths, while being motivated to explore the system itself. Gamification inspires students to reflect: they receive instant feedback, and if they have given a wrong answer, next time they will spend more time figuring out the right one (they want to win), thus learning takes place. To sum up, in an efficient gamified learning environment the combination of engagement, repetition, bespoke solutions and reflection facilitates learning.

A common issue among most studies that have applied gamification in educational context is that they lack any theoretical foundation (Seaborn & Fels, 2015), although some researchers tried to explain the relationship between gamification and learning outcomes. One of the most promising one is Landers' (2014) theory of gamified learning, which defines four components: instructional content, behaviours/attitudes, game characteristics, and learning outcomes. The theory states that the instructional content has a direct influence on the learning outcomes, while gamification has a positive, indirect effect on learning outcomes. Since most of the time gamification is not aimed to replace instruction, in order to be successful gamification requires effective instructional content. The goal of gamification is to influence

behaviours and attitudes associated with learning. In turn, these behaviours and attitudes are hypothesized to influence the relationship between the instructional content and learning outcomes via either moderation or mediation, depending on the nature of the behaviours and attitudes targeted by gamification (Landers, 2014; Sailer & Homner, 2020; Pham *et al.*, 2021).

On the other hand, it is important to note that Landers' theory does not try to provide information about how game elements trigger effective learning mechanism (Sailer & Homner, 2020). In order to understand such a mechanism, we need to turn to other well-established psychological theories such as self-determination theory (Ryan & Deci, 2000). The satisfaction of the needs for competence, autonomy, and social relatedness is central for intrinsic motivation and for high-quality learning. That is why SDT emphasizes the importance of the environment in fostering motivation (Ryan & Deci, 2018). Enriching the environment with game design elements, as gamification does by definition, directly modifies that environment, thereby potentially affecting the learners motivational and psychological experiences (Sailer *et al.*, 2017).

Gamification can be implemented using one of the two approaches: *structural gamification* and *content gamification* (Kapp 2012). The former refers to the gamification of the structure of the programme without modifying the content, in order to motivate children to learn the content. Content modification covers the gamification of content, and the application of game elements and a game-design approach (e.g. story, challenges, mysterious elements and characters, interactivity, feedback, room for mistakes). In gamified systems students are supposed to achieve 'flow state' and absorption, just like when playing with computer games. We can arouse the interest of children and maintain their level of motivation only if we are able to bring about these outcomes in a learning environment as well. Naturally, the primary aim of gamification is not to entertain students (and teachers) in this setting, either, instead it is an approach that aims to increase the efficiency of teaching and learning.

The key benefit of the application of gamification in language learning is that it allows differentiation: students can progress at their own pace, their performance is assessed based on their individual characteristics, their motivation is strongly affected by their opportunity and willingness to catch up and cooperate with their peers, and the requirements regarding when they are supposed to complete a level are also tailored to their abilities. As Prievara (2015) highlights, the testing of students' level of knowledge may be adapted to their abilities.

To sum up, in the framework of gamified education students can achieve their learning goals through a process that is enjoyable and entertaining both for them and their teachers. This is the reason why we decided to employ gamification in our programme. The supplementary

digital and playful programme for teaching English called HANNA (Fehér *et al*., 2018) was designed considering the above aspects.

3. HANNA – A Gamified Course Programme

HANNA, the digital course programme described in this section was developed with the support of the Hungarian Academy of Sciences and the University of Debrecen. The objective of the research group was to create a supplementary English language course programme for 5th, 6th and 7th graders, which is suitable for classroom use on tablets, and can contribute to reducing the gap for under-performing socially disadvantaged students.

3.1 The concept of HANNA

The idea was to develop 20-25-minute long lessons, which are long enough to engage students in meaningful work, while short enough to be added to the standard class programme. Our basic concepts were as follows:

1. General language pedagogy methods will be used in creating the programme.
2. We will compensate for the effects of a non-motivating home environment with motivation in the classroom and with enjoyable, gamified education.
3. The programme will be developed for tablets to allow students to move around in the classroom when fulfilling tasks and to help underachievement to catch up.
4. The programme will be broken down into micro contents, which enables students to have an instant sense of achievement and makes it more likely that the tasks will be completed in time.
5. Students will be allowed to choose from 3 exercises to ensure that all of them find a task that arouses their attention and motivates them.
6. We will provide teachers with everything they need (Teachers' Manual, teachers' interface, and further training) to ensure that they can implement the programme with ease.

3.2. Implementing gamification in HANNA

From the very beginning, we intended to design the programme in a gamified environment, using the elements of both structural and content gamification. Serious gaming elements were integrated in the course programme (Boller & Kapp, 2017). The programme encompasses 11 topics with 2-3 modules in each topic. Each module comprises 3 lessons which are more or less connected in terms of content, vocabulary and grammar. The 3 lessons within a given module

should be delivered in 3 consecutive classes. However, the modules are independent of one another and can be completed in any order. In this regard, no one can fall behind, as students who missed a module due to absence or for other reasons can start the next module like any other students.

All modules have the same structure (Table 1). *Introduction of wordcards 1* contains the basic vocabulary of the given topic, typically involving 9-14 words and expressions (written form, audio and images). *Playing with wordcards 1* helps students to familiarise themselves with the vocabulary, and tests their knowledge using simple exercises (e.g. multiple-choice questions, assembling words, assembling sentences). *Practice games* are proprietary mini-games for practicing the vocabulary, sentence forms and grammatical structures indicated on the word card in an enjoyable and playful manner. Besides language skills, they involve other skills and elements like rapid decision making, luck and humour. The 2nd lesson includes a cooperative skills exercise, which mainly introduces the creative exercise of the 3rd lesson. *Preparatory skills exercises* are completed by students in groups (or pairs). Students watch videos and fulfil comprehension tasks. These tasks and the contents covered are complex, bespoke and varied, and are displayed through a series of instructions and related contents. Sections in *Introduction of wordcards 2* and *Playing with wordcards 2* in Lesson 2 teach students the words of the skills exercise. Lesson 3 comprises a single section, *Creative exercises*, which focuses on oracy and activities. Here students complete the creative exercise introduced in Lesson 2, working typically in groups or pairs. They communicate with each other in the target language, and in addition to language skills they also rely on other skills and fields of interest like singing, dance, arts and crafts, drawing, subject matter knowledge and drama.

Table 1. General structure of modules in HANNA. The 3 lessons should be delivered in 3 consecutive classes. For each lesson we indicated the number of exercises that students can choose from (V-*), the maximum points for each exercise (P-*), and whether the given part includes content gamification or a serious game.

Lesson 1	Lesson 2	Lesson 3
Introduction of wordcards 1	*Introduction of wordcards 2*	
V-2; P-19; P-38	V-2; P-19; P-38	*Creative exercises*
Serious game - teaching	Serious game – teaching	V-3; P-600; P-600; P-600
Playing with wordcards 1	*Playing with wordcards 2*	
V-4; P-15; P-30; P-45; P-60	V-4; P-15; P-30; P-45; P-60	Content gamification
Serious game – testing	Serious game – testing	

Practice games	*Preparatory skills exercises*
V-3; P-130; P-150; P-170	V-3; P-450; P-450; P-450
Serious game - testing	Content gamification

Table 1 shows the number of exercises students can choose from in the individual sections of a given lesson (V-*). The maximum points for each exercise are also indicated (P-*). Exercises include either serious games for teaching or testing purposes, or content gamification.

In our gamified course programme, exercises will be completed in a playful way and can be repeated multiple times, either in the framework of classroom activities or at home. Naturally only *Introduction of wordcards, Playing with wordcards* and *Practice games* can be considered for home practice, because they require independent work. In the case of *Preparatory skills exercises* and *Creative exercises,* which require group or pair work, there is no need for learning at home as these sections are usually dealt with only once in a session.

The course programme offers the opportunity to choose from options at several points. However, the use of different learning paths in the system is restricted. Basically, teachers decide which modules of which topic are discussed in the classroom, and they also select the sections within modules to deal with. However, when it comes to individual sections, choices are available for students (Table 1, V-*). In the case of *Preparatory skills exercises, Creative exercises* and *Practice games,* students can choose from 3 exercises, while they can follow their individual paths in the games played with wordcards, which means that they can complete the exercises in the order of their choice, and they can repeat or skip exercises.

All exercises with one correct solution are evaluated instantly: students receive immediate feedback on whether they have given a right or a wrong answer. Questions with wrong answers will appear again.

In Werbach's system *Dynamics* (restrictions, emotions, narrative, progress and relation) are the highest-level conceptual elements, which make the game experience coherent (Werbach & Hunter, 2012). *Restrictions* define what students can and cannot do. The course programme offers more freedom: all modules of the lessons are directly available, but in a classroom environment the order of exercises is basically defined by the teacher. Another restriction is that in wordcard exercises students have three attempts to find the right answer, while in preparatory and creative exercises pages are only accessible in a fixed order. The aim of the course programme is to generate as many positive *feelings* as possible, since happiness, a sense of achievement and positive feedback all encourage students to continue playing and, consequently, learning. *Narrative* is a structure that makes pieces of the game a coherent whole.

We discarded the idea of using an explicit story line in a classroom environment, but the regular appearance of certain graphic and other elements (like Hanna, the baby elephant) connects the pieces and results in a coherent whole in the players' head. The element of *Relations* appears in the framework of group and pair work, through the preparatory and creative exercises.

The second level in Werbach's system is *Mechanics*, which allows progress in the course programme. Here the most important elements are *Feedback,* which accounts for efficient progress, and *Turns*, which refer to the exercises following each other in a given lesson. A further important element is *Reward*, which is the primary guarantee for positive experience, as it provides immediate feedback.

The third level includes *Game components,* which are elements that appear on the surface and are responsible for providing higher-level dynamics and mechanics. Considering that we are working with a classroom environment and socially disadvantaged children, we left out several components including *Avatar,* which might disturb classroom work, and *Rank list*, which may demotivate students or even trigger a feeling of shame. However, *Points* and *Badges,* which are associated with feedback, progress and reward, are included in the programme. Our evaluation system was designed to strengthen intrinsic motivation, and we also put great emphasis on the development of the social competencies, social skills, co-operation and communication skills of students.

Students are aware of the maximum number of points available in the individual exercises of the modules. While working on the exercises, they continuously receive feedback (on whether or not their answers were correct). They are given maximum points only if they have provided a correct answer to each exercise at the first attempt, therefore the number of points collected truly reflects their performance. The number of points achieved is displayed when the exercise is completed, along with the student's performance (in percentages). Students can review their previous results as well, which enables them to monitor their progress. This means that they receive continuous feedback on their strengths and the areas to improve. As a result, they know exactly how they are doing. Stored scores are also available to the teacher, allowing them to keep track of students' progress and development.

4. Methodology

4.1. The aim of the study

The aim of our study was to examine the long-term effects of HANNA on English language academic achievement in primary school. We expected that the introduction of the tablet-based,

gamified course material would increase pupils' English academic performance. During the design process of HANNA the main motivation was to create an application that focuses on the needs of disadvantaged students. Thus we also aimed to examine how the socioeconomic status (SES) of students effects their langue learning during the intervention period.

4.2. Participants and the context

HANNA was introduced in primary schools as a pilot program in Hajdú-Bihar County, which is located in the Eastern part of Hungary between 2018 and 2021. The region is characterized by profound poverty and the unemployment rate is significantly higher than the national average. Three of the micro regions of the county are considered extremely disadvantaged.

Three teachers involved in the intervention attended a 30-hour-workshop on how to use HANNA. They were financially compensated for their efforts. Consent to participate was granted by teachers, who were in charge of distributing and collecting parental permission forms. All parents completed a written consent form allowing their children to participate in the research. During the intervention period, the classes in the experimental group used HANNA on average for two out of their four English lessons per week. The classes in the control group followed only the state-defined curriculum.

The data collection took place at the schools, in person, between September 2018 and March 2020. The study used a pre/post-test design, the first assessment was carried out at the beginning of the school year before the introduction of HANNA, while the second measurement took place six months later. A total of 112 students from four schools participated in the intervention group and the control group consisted of 119 students from five different schools. The SES was measured by identifying the mother's school qualification. The ratio of low-SES students in the classes participating in the study varied between 52 and 68 %. Most of the students were from Roma ethnicity.

Unfortunately, our research was interrupted by the national lockdown and the closure of schools due to COVID-19. Because of that we were not able to gather post-intervention data from five schools and they were eventually excluded from our sample. The final sample consisted of 101 students, 60 of whom were in the HANNA group (age: M=11.4 years, SD=0.66, 28 girls) and 41 in the control group (M=11.7 years, SD=0.56, 23 girls). Details of the sample are given in Table 2.

Table 2. Number of students, their age, sex, maternal education

	N	Age (means)	Sex		Maternal education			
			Boy	Girl	Primary	Vocation.	GCSE	Higher
HANNA group Intervention	**60**	**11.4**	**32 (53.3%)**	**28 (46.7%)**	**20 (33.3%)**	**16 (26.7%)**	**16 (26.7%)**	**8 (13.3%)**
Esztár (village 1)	45	11.4	26 (57.8%)	19 (42.2%)	20 (44.4%)	10 (22.2%)	11 (24.4%)	4 (8.9%)
Hosszúpályi (village 2)	15	11.3	6 (40.0%)	9 (60.0%)	0 (0.0%)	6 (40.0%)	5 (33.3%)	4 (26.7%)
Control group	**41**	**11.7**	**18 (43.9%)**	**23 (56.1%)**	**3 (7.3%)**	**18 (43.9%)**	**16 (39.0%)**	**4 (9.8%)**
Nagyhegyes (village 3)	19	11.7	9 (40.9%)	13 (59.1%)	3 (15.8%)	7 (36.8%)	8 (42.1%)	1 (5.3%)
Kaba (village 4)	22	11.7	9 (47.4%)	10 (52.6%)	0 (0.0%)	11 (50.0%)	8 (36.4%)	3 (13.6%)

4.2. Data collection instruments

4.2.1. Demographic questionnaire

In addition to the personal data of the students (gender, age, academic results), the questionnaire we created also included items relating to the educational qualifications of the parents, as well as the composition and the economic background of the family.

4.2.2. Language skills assessment test

To assess language skills, one member of the research team (teacher trainer and foreign language educator) created a test consisting of 10 items, which covers the most important skill areas, with the exception of listening. The test consisted of tasks in the following areas, (a) Understanding texts (reading comprehension); (b) Recognition of lexical units (vocabulary); (c) Grammar tasks (grammar). The test was based on Project Fourth Edition Teacher's Site (https://elt.oup.com/teachers/project) as well as on the National Curriculum. The test was two versions, one for assessing language skills at the beginning and one at the end of the measurement period. The tasks were by and large the same, only their order was changed. This was due to the fact that intensive development cannot be expected in the groups of our study after 6 months.

4.3. Statistical analysis

To analyse our data we used the statistical software called R (R Core Team, 2020). We performed 2×2×4 mixed model analyses of variance (ANOVA) where the dependent variable was the result of the language skill assessment test and the independent variables are *TIME* (with "pre-test" and "post-test" values) as a within-subject factor, *CONDITION* ("HANNA" and "control") and mother's educational attainment *MEA* ("primary ed.", "vocational ed.", "GCSE" and "higher ed.") as between-subject factors.

4.4. Results

The descriptive statistics of the language skill assessment test in relation to each target group by maternal status are shown in Table 3.

Table 3. Descriptive statistics of the language skill assessment test in relation to each target group by maternal status

Scale	Time	Condition	Mean (SD)			
			Mother's educational attainment			
			Pri.	Voc.	GCSE	Higher
Language skill [0,100]%	**Pre-test**	HANNA	74.39 (11.51)	66.87 (20.10)	71.70 (16.39)	72.41 (8.08)
		Control	82.25 (12.27)	80.30 (15.99)	67.78 (18.92)	82.47 (12.48)
	Post-test	HANNA	61.25 (22.47)	76.93 (11.68)	79.14 (18.46)	83.46 (4.89)
		Control	64.71 (25.09)	71.32 (20.06)	81.62 (20.67)	92.28 (4.55)

The significant interaction of MEA×TIME ($F_{(3, 93)} = 5.74$, $p = .001$, $\eta_p^2 = .16$) indicated that pre-tests and post-tests were affected differently by mother's educational attainment. Running a new model (2×2 mixed ANOVA: TIME, CONDITION) on each level of maternal education (Figure 2), students in the most disadvantaged group (primary ed.) achieved a lower result in both HANNA and control condition (significant main effect of TIME: $F_{(1, 21)} = 5.34$, $p = .031$, $\eta_p^2 = .20$), while students where the maternal education was the highest (GCSE and higher education) improved their language skills between pre-test and post-test (significant main effect of TIME, GCSE: $F_{(1, 30)} = 6.54$, $p = .016$, $\eta_p^2 = .18$; higher education: $F_{(1, 10)} = 20.46$, $p = .001$, $\eta_p^2 = .67$). In vocational education group, the gamified HANNA course material improved students' language skills, while the results in the control group proved to be lower (significant interaction of CONDITION×TIME,: $F_{(1, 32)} = 5.31$, $p = .028$, $\eta_p^2 = .14$).
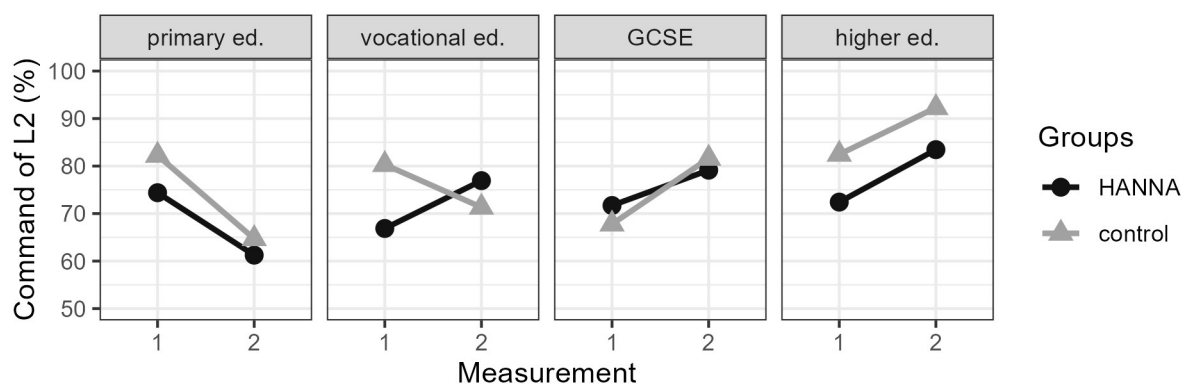
Figure 2. The results of the English progress test in our two groups (intervention – HANNA and the control group)

5. Discussion

Following the implementation of the course material into the school curriculum, both the academic performance and motivation of the pupils in low SES witnessed a significant shift in improvement. To assess development in language skills, we created a test consisting of 10 items covering the most important skill areas, with the exception of listening. The test was applied at the beginning as well as at the end of the measurement period. It was clearly visible that improvement was noticeable, however, due to the fact that intensive development cannot be expected in the groups of our study after 6 months, we assumed that the increase in language skills and motivation would be slower yet noticeable. The application of the digital course material clearly and successfully brought about positive changes in the pupils' motivation, which was also a set aim at the beginning of the project. It must be highlighted that when it comes to teaching pupils in low socio-economic regions, one of the key issues is to increase engagement and motivation in their learning processes. Our gamified digital course material has accomplished this goal, however, expecting a fast academic development seemed to be rather unrealistic. The impact of maternal education is also significant. As expected, children of mothers with a college/university degree performed best in all tasks, which confirmed our hypothesis. At the same time, surprisingly, children of mothers with a secondary vocational qualification performed better in more tasks than children of mothers with a high school certificate (A-level exam). We assume that this may be due to a specific socio-cultural difference, as parents with a secondary vocational certificate are often blue-collar workers, so learning and work are much more present in their lives. Based on this, the results of the language aptitude test show a tendency that maternal education has a strong impact on the academic achievement of the pupils. The results of the children of mothers who have a high

school certificate and those with a secondary vocational qualification were very similar, which can also be explained by the fact that the school-leaving examination has no value in the country areas, especially in the disadvantaged regions. Based on the language learned, it can be said that, in general, the difference between English and German learners is small regarding language aptitude. However, English learners performed better in all dimensions. We assume that the language choice is realised as a result of a subjective selection by the teachers based on the achievement of the pupils. In addition, there is a fundamental tendency to place children studying in disadvantaged regions, especially those with learning difficulties, in German-learning groups when choosing a foreign language.

The teachers involved in the study reported that the pupils using HANNA became very focused, deeply involved in the application and more co-operative. This result can clearly be put down to the effects of gamification. The research also revealed how the principles of gamification can be realised and implemented in developing material for disadvantaged pupils. The various types of tasks and the elements of the program all followed Werbach's system of gamification, which underline the fact that it does increase participants' motivation and engagement not only in games, but in strictly limited educational setting as well. The findings may pave the way for future studies and research shedding the light on the interrelationship between gamification, learning and low socio-economic backgrounds. HANNA embraces all these aspects, and as a pioneer in the regional context with its specification with socio-economic involvement can benefit governmental decision-makers and actors of education.

However, it needs to be emphasized that achieving academic development is seemingly a slower process than in higher socio-economic backgrounds. Its reasons are complex and several influencing factors were uncovered in our research: maternal education, facilities at the home of the pupil, family background, language choice at school etc. HANNA enables teachers to follow the improvement of the pupils regularly, but most importantly, the entry to increased language knowledge and skills is through enhancing motivation by gamification. It is inevitable that pupils in low SES background need course materials that revert their attention and engagement into learning, that raise their own interest into school subjects and that implicitly push them towards embracing their own learning. HANNA has proven to achieve this, even with existing limitations in the programme and in the circumstances.

6. Conclusion

When it comes to language learning and teaching, one of the major issues that needs to be tackled is the large differences between students in terms of school performance, especially

socially disadvantaged children. Research on language teaching tends to focus on the average learner, thus leaving little room for students living and learning in low socio-economic regions (low SES). Our study tackles this particular social segment in education. PISA results reveal that Hungary displays one of the most considerate gaps in education, where disadvantaged regions and schools often underperform on the national curriculum tests. Innovation, alternative pedagogical methodologies and different mindset in teaching can bring about enhanced motivation, especially by employing digital devices and the elements of gamification. The aim of our study was to introduce a new, tablet-based digital language course programme (HANNA), developed specifically for socially disadvantaged pupils in grades 5-7, which promotes improvement in motivation and engagement.

In our next step, we would like to extend the research to conduct the survey in a representative sample. Also, we believe that the teachers and directors of schools can provide a more in-depth picture of language teaching, thus we would like to conduct semi-structured interviews with teachers teaching in schools in disadvantaged regions and their headmasters, considering the following factors: the decreasing number of children in disadvantaged schools, the low turnover of teachers, the division of classes according to the language learned, the choice of foreign language, the use of ICT in teaching, teaching methods, and evaluation in these classes.

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