

Gamification in the “Applied Phonetics and Phonology” course: do personality traits and learning styles affect gamification satisfaction and effectiveness?

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Abstract

The increased interest received by gamification over the last decade for its hypothesized benefits on motivation and learning leads to question which factors contribute most to its success. Literature reports significant differences in the approach to gamified experience based on individual characteristics. The article arises from the need to analyze the factors influencing the success of a rapidly growing teaching method in order to achieve its effective use. The purpose of our study is to investigate the presence of any correlations between effectiveness and satisfaction of a gamification experience with the learning strategies and / or students' personality traits, in the “Applied Phonetics and Phonology” course in Speech and Language Therapy (SLT) Bachelor Degree at the University of Padova.

To achieve the proposed goal, three questionnaires were administered to the 25 students of the second year of the Degree Course in SLT in order to value the gamified activity and to study satisfaction and effectiveness related to students' learning strategies and their personality traits. The data collected showed a statistically significant positive correlation between performance and student satisfaction with gamified activity. Another significant positive correlation was also highlighted between student satisfaction and the personality trait of emotional stability. The analysis of the relationships between learning strategies and satisfaction and between learning strategies and performance led to a negative correlation between satisfaction and the verbal visual channel, a negative correlation between satisfaction and the kinesthetic channel and a positive correlation between satisfaction and the auditory channel. As found in the literature, the present study also shows significant differences in the approach to gamified experience based on individual student features, which underscores the importance of understanding how these affect the effectiveness of gamification to achieve its effective use. In view of the findings, gamification must be therefore studied and implemented, while also taking into account individual learning styles and personal traits.

Keywords: *gamification; education; personality traits; learning strategies; satisfaction; effectiveness*

Introduction

Gamification, as an educational strategy, is becoming increasingly popular in health care education. This novel and innovative active learning method uses game design elements such as the concept of a player or players, rules, conflicts, and predetermined goals in an artificial setting. Gamified implementation

is beneficial for academic performance at the university stage (Ferriz-Valero et al., 2020) in which students are more aware of the importance of education they have chosen. Gamification is considered to be a next-generation approach to enhance learning outcomes in education (Ohn et al., 2019) in view of the fact

that students sometimes prefer it over traditional educational curricula and gamification experts have documented that its use in education may positively impact the engagement and perceived satisfaction of users (Pettit et al., 2015). Findings from research carried out to data on the effectiveness of gamification in educational contexts can be summarized as cautiously optimistic. However, researchers warn that further and more nuanced research is needed. It is generally accepted that matching an individual's learning style with the appropriate form of an instructional intervention significantly impacts upon the performance of the students and their achievement of learning outcomes. It is also widely acknowledged that personality traits have a significant impact on academic achievement. Knowing how individual characteristics will impact on the experience of gamification will inform the effective design of gamified learning interventions and enable its effective integration into the learning environment (Buckley & Doyle, 2017). Starting from the existing gamification activity in the "Applied Phonetics and Phonology" course in Speech and Language Therapy (SLT) at University of Padova, we have improved and proposed it, as a tool for influencing individuals and mediating learning behaviors, investigating and deploying it with due regard paid to issues such as individual learning styles and personality traits.

The article is a preliminary study to detect possible correlations between satisfaction and effectiveness of the gamified activity related to students' learning styles and their personality traits.

Factors affecting gamification

Gamification is a relatively new trend, used as an innovative pedagogical approach that focuses on applying game mechanics to non-game contexts in order to engage audiences and to inject a little fun into mundane activities besides generating motivational and cognitive benefits (Sardi et al., 2017). Gamification can help students to engage in a particular activity, think critically about both their plan and outcome, and then apply important insights gained from their analyses to improve and learn (Dichev & Dicheva, 2017).

Gamification is currently garnering significantly increased attention from both practitioners and academics across a wide range of disciplines. This method has become widespread in academic education, for several reasons: to propose challenges; to involve students; to promote both collaborative and competitive dynamics; to transform participation with inclusive dynamics. In recent years, university teaching methods have evolved and almost all higher education institutions, such as Medical education, use e-learning platforms to deliver courses and learning activities (Khaldi et al., 2023). Gamification strategies are being used by a variety of specialties, from surgery to internal medicine and radiology, with the intent of harnessing its potential to improve adult student engagement and motivation (Rutledge et al., 2018). Additionally, the ongoing pandemic caused by coronavirus disease 2019 (COVID-19) has forced the closure of educational institutions at all levels and forced educators and institutions to adopt teaching strategies in an abrupt manner. In a period disrupted by COVID-19, developing educational tools compatible with social distancing was a key strategy as millions of students found themselves isolated to reduce the spread of the epidemic. Therefore, almost all teaching quickly shifted to distance education in order to provide adequate social distancing. Technology has enabled distance education, as well as giving the student broad access to information and promoting knowledge creation and sharing. However, this situation requires educators to work to find ways to increase student motivation and engagement. Therefore, a great deal of work has also been devoted to developing new teaching strategies that enhance student motivation and engagement and maximize student knowledge acquisition. Among the various strategies, gamification has attracted the interest of educators, who in recent times have been exploring its potential to improve student learning. In particular, its pedagogical applications are the subject of growing interest.

Actually, the aim of gamification is to keep interest and the feeling of being able to achieve educational objectives high. Gamification appears to be at least as effective as controls, and in many studies, more effective

for improving knowledge, skills, and satisfaction. However, the available evidence is mostly of low quality and calls for further rigorous, theory-driven research (Gentry et al., 2019). Researchers who are broadly positive as to the pedagogical benefits of gamification also caution that further and more nuanced research in this area is needed. Some studies have shown that gamified activities don't lead to good results for everyone, so it's important to assess who may benefit the most from gamification. Several activities will appeal to different participants in different ways so further research is therefore needed to understand how the effects of gamification change at the individual level.

It is generally accepted that matching an individual's learning style with the appropriate form of an instructional intervention significantly impacts upon students' performance and their achievement of learning outcomes. "Learning style" is defined as "a person's overall approach to learning, his or her preferred way of perceiving and reacting to learning tasks" (Rossini, 2016), a way that manifests itself fairly consistently, in a variety of contexts, and which then conditions the choice and use of strategies, not being reduced only to a cognitive style, i.e., a preferred way of processing information. There would seem to be at least three factors that condition the application and usefulness of a strategy individual variability: variability in the tasks, variability in the context in which students approach the tasks, and the dynamic that binds students and teachers, learning and teaching. Most people show some preference for a particular style. This does not mean that multiple styles cannot be used as needed. On the contrary, the most efficient way of learning consists precisely in knowing how to use, in addition to one's preferred style, also different ways according to circumstances.

It is also widely acknowledged that personality traits have a significant impact on academic achievement. Personality traits are responsible for interpersonal differences concerning both behavior in a given situation and the perception and execution of challenging tasks, conflicts and opportunities. Specifically, personality traits refer to characteristics that are stable over time, provide reasons for a person's behavior, and are psychologi-

cal in nature. They reflect who we are and, as a whole, determine our affective, behavioral and cognitive styles. The most commonly used model to provide a consistent taxonomy of the personality traits is the Five Factor Model, which organizes the personality traits using five dimensions: extraversion, agreeableness, conscientiousness, neuroticism (emotional stability) and openness to experience (Buckley & Doyle, 2017). Each of these areas may be more or less strong in a given person, and again, a person may have fairly balanced scores or have one area particularly developed at the expense of the others.

Knowing how characteristics of an individual will affect the gamification experience is therefore useful for the effective design of gamified learning interventions and enables its effective integration into the learning (Buckley & Doyle, 2017).

More research is required to investigate the role of the qualities and attributes of users when considering gamified learning interventions and to investigate how the characteristics of users impact on the effectiveness of gamification.

Context

The context in which the gamification project was designed and applied is the course "Applied Phonetics and Phonology", in SLT Bachelor Degree. During the course students deepen their knowledge about articulation skills and phonological competence in children and adults. They learn how to observe speech and spot speech errors, how to transcribe speech using the International Phonetic Alphabet, how to analyze transcribed speech, how to assess intelligibility, and how to choose priorities for rehabilitation.

The gamification activity, created expressly to provide an alternative educational opportunity during the 2020/2021 academic year, in which due to the COVID-19 pandemic, traditional teaching mode and lectures were changed to carry out exclusively remotely (Italia. Presidenza del Consiglio dei Ministri, 2020; Italia. Università degli Studi di Padova, 2020) has been applied in the 2021/2022 academic year, retaining the same features as the previous edition, except for minor changes described below.

Gamification implementation

The gamified activities proposed and called “Fonogame2022” were built taking into account some of the typical elements of gamification. Game Design elements used in the first Fonogame edition were retained in the second edition as well, including: points (to give an instant feedback and stimulate students’ intrinsic motivation); levels (to split up the activity in more sections); progress bar (to make visible the state of activities’ progress); badges (symbolic reward that increase students motivation achieved when a learning goal is reached); ranking (constantly updated on students’ performance); final reward (to motivate to reach a concrete final goal). These elements guarantee a design in line with the sense of gamification. We devised a set of educational activities that are linked to each other, but proposed at different times and such that they are available only after having passed a previous level. Each level takes place in a section of Moodle space, a platform available to the University of Padova, access to which is conditional (on having reached the set time period and having passed the previous level). Within each section, students have carried out activities of a different nature.

There was a welcome section that explains the meaning of all the activities and contains the ranking, which is updated in real time. The first level, called “Logo Starter Pack”, offers three activities related to verbal articulation in normal conditions. This level was not changed from the previous edition. The second level, entitled “Something doesn’t add up” is dedicated to the observation of alterations in verbal articulation. One of the activities of this level from uploads of videos found online was changed to the analysis of short videos with subsequent answers to quizzes. The third one, entitled “/tra.skri.'tsjo.ne fo.'n . ti.ka/”, proposes phonetic transcription activities, not changed from the previous edition. The last one, dedicated to phonological analysis, proposes quizzes as formative evaluation, and, in this edition it was named “Phonological Processes et al.” One of the activities of this level was changed from the first edition of the course: from the analysis of a video resulting in the answering of open-ended questions, it

was changed to multiple-choice questions related to errors made in repetition tests.

At the end three questionnaires were administered: a survey, created to collect data about learning experience, the I-TIPI, Italian – Ten Items Personality Inventory”, to identify students’ personality traits, and a learning styles questionnaire, to identify their learning strategies.

Content and activity planning

The single activities are active learning proposals in which the student is called upon to actively engage in the execution. What transforms these activities into true gamification is the logical structure of the whole proposal: levels to be reached, competitive but also cooperative dynamics, set times, indicators of completion, obtaining badges linked to the levels passed, the ranking *in itinere* and the final one with the explicit display of the winning teams.

“FonoGame2022”, as the previous edition, was developed on a structure consisting of four levels, taking into consideration the objectives and teaching content of the course made explicit in the University Syllabus.

After defining the learning objectives, it was decided to make changes to those activities whose objective was not in line with what was defined in the planning phase. Each level, in the present academic year, was preceded by an in-person theoretical lecture given by the course instructor, aimed at providing the theoretical skills needed to deal with the subsequent activities and to clarify doubts related to the previous activities. The first lecture also included a theoretical explanation of the gamified teaching mode and a demonstration of the structure and operation of the Moodle platform hosting the project. During this lecture, the class was divided into twelve groups, all of which consisted of two students, with the exception of a three-member group, who formed the teams participating in gamification. Four sessions of gamification activities on a weekly basis followed. One month after the conclusion of the gamified activities a final meeting was planned in order to share thoughts about the experience, to complete the questionnaires and to give a prize to the

winning group, a bonus book as a symbolic reward.

Materials and method

The purpose of this project is the implementation and evaluation of gamified activities, proposed in the course of "Applied Phonetics and Phonology", in order to study the relationships between satisfaction and effectiveness of the gamified activity related to students' learning styles and their personality traits.

The design and development of the gamified activity, called FonoGame 2022, began in December 2021 and ended in April 2022 with its application for 25 students. At the end, three questionnaires were proposed and analyzed, one created to investigate students' satisfaction, the I-TIPI, Italian - Ten Items Personality Inventory", aimed to identify personality traits, and a learning styles questionnaire, aimed to identify learning strategies. Ranking at the end of the course was used as a measure of the "Performance" variable.

In order to gain a better understanding of the usefulness, liking and effectiveness of the project, as well as its strengths and areas for improvement, a questionnaire was proposed to all the students involved. The questionnaire was made up of 15 questions: 3 open-ended and 12 closed questions. Some questions concern personal information, such as sex, age (researchers considered 4 age range: 19-24 years, 25-30 years, 31-36 years, >36 years) and educational qualifications already acquired (bachelor's degree, master, doctorate or others).

Others investigate the course organization and student's perception about some elements of the proposed gamified activity, for example the access ease to the contents, clarity of audio/video materials, the comprehensibility of the instructions, the availability of the tutors, the time allowed for the execution of the individual tasks and student's satisfaction (for example graphics and design, the possibility of working in pairs, the weekly subdivision of activities, the use of the Moodle platform, the performance of the project, the attribution of points and badges and the use of a ranking). In question 13 students were asked to rate whether the proposed ac-

tivities were most useful, fun or interesting. In question number 15, used to evaluate the parameter Satisfaction, students were asked to indicate their overall satisfaction with the gamified teaching mode, by assigning a score ranging from 1 (totally negative perception) to 5 (totally positive perception).

The questionnaire, "I-TIPI, Italian - Ten Items Personality Inventory," by Gosling, Rentfrow, and Swann (Gosling et al., 2003), a very rapid personality test, translated and validated in many languages, including Italian, was administered to identify students' personality characteristics (Chiorri et al., 2015). It is based on the Big Five personality model, which is a conception of personality consisting of 5 areas: emotional stability, agreeableness, conscientiousness, openness and extraversion. To make the variables measured by the personality traits questionnaire numerical, each level was assigned a numerical value: 1-Low level, 2-Medium-Low level, 3-Medium level, 4-Medium-High level, and 5-High level.

Students were also administered Mariani's "Learning styles questionnaire," which aims to identify learning style characteristics (Mariani, 2000). Each questionnaire, completed at the end of the gamified activities, yielded scores related to three areas: A Area, related to the sensory channels through which we perceive the external world (visual verbal, visual nonverbal, auditory and kinaesthetic), B Area, related to the ways of processing information (analytical and global), C Area, related to preference toward individual or group work (individual or group). Most people show some preference for a certain style: for example, one person may prefer an auditory, global and group style; another a visual verbal, analytical and individual style; and so on. For each area, the percentages of the related sub-areas are obtained.

Data analysis was carried out by calculating the correlation index R by Spearman ranks, a nonparametric statistical measure of correlation, which measures the degree of relationship between two variables, where the only assumption required is that they are ordinal, and, if possible, continuous. Specifically, the two-tailed test was used, and the resulting correlations are considered significant for a p value <0.01.

Results

All students attending the second year of the Bachelor's Degree in SLT took part in the project and completed all the gamified activities. Twenty students (18 female) fill in the final questionnaire. The most represented age group is the one between 19 and 24 years old. Fifteen participants were at their first experience in a Bachelor Degree.

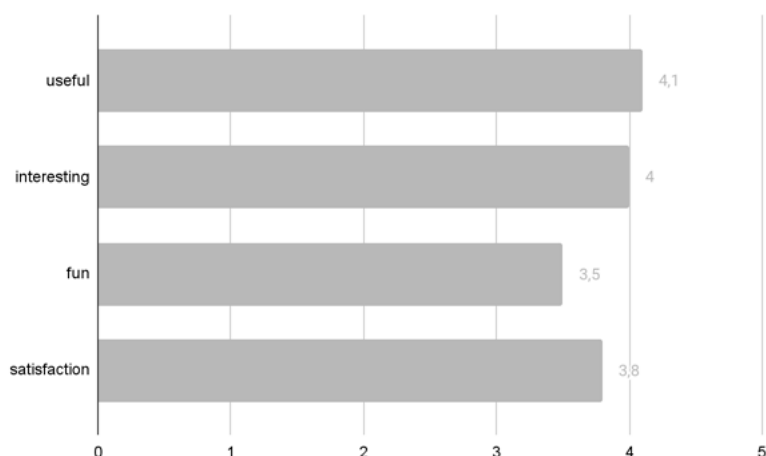
Authors chose to analyze the answers to questions 13 and 15 of the questionnaire because they were questions with closed responses and they were about specific charac-

teristics of gamification (useful, interesting, fun) and students' satisfaction.

In question 13 students were asked to rate three statements on a scale of 1 (totally disagree) to 5 (totally agree); specifically, they were asked whether the gamified activity was found to be useful, interesting, and/or fun. The answers showed that gamification was perceived as a useful (4.1/5) and interesting (4/5), but less fun (3.5/5) activity (Figure 1).

Regarding question number 15, used to assess the Satisfaction parameter, the average score was 3.8/5 (Figure 1).

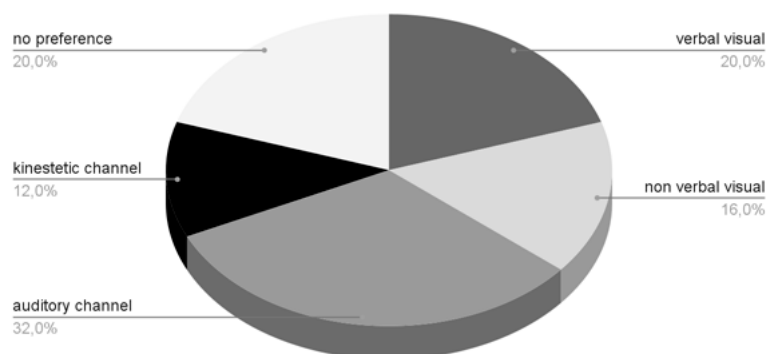
Fig 1. Gamification perception and satisfaction



Regarding learning styles, the analysis of the collected data shows that for A area, related to the sensory channels through which we perceive the external world, 20% of the students (5 students) prefer the verbal visual channel, 16% (4 students) the nonverbal visual channel, 32% (8 students) the auditory channel, and 12% (3 students) the kinesthet-

ic channel. The remaining 20% showed no preference for a single style: 8% of students (2 students) use the auditory and kinesthetic channels more equally, 4% (1 student) the visual verbal and auditory channels, and another 8% (2 students) prefer the visual verbal and kinesthetic channels (Figure 2).

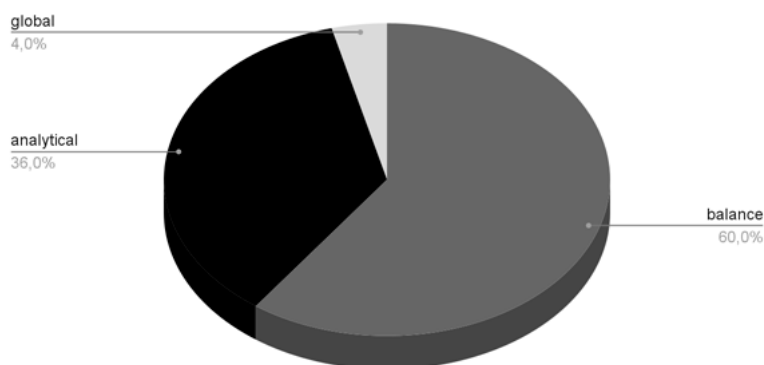
Fig.2 A Area: sensory channels through which we perceive the external world



As for B Area, related to ways of processing information, 60% of students (15 students) process information analytically and comprehensively, 36% (9 students) tend to prefer logical and systematic reasoning, based on facts

and details (analytical), and 4% (1 student) tend to consider situations synthetically, relying on intuition and general aspects of a problem (global), as shown in Figure 3.

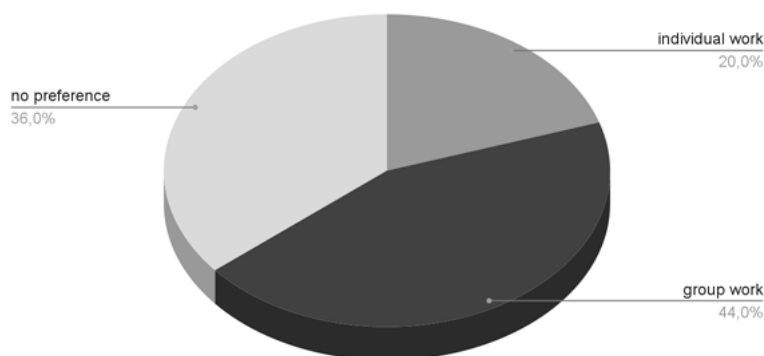
Fig. 3: B Area: way to process information



As for C Area, regarding preference toward individual or group work, 20% of students (5 students) have a clear preference for individual work, while 44% (11 students) have a clear

preference for group work. In contrast, 36% (9 students) do not have a clear preference toward either mode (Figure 4).

Fig.4 C Area: work preference



Then the variables examined, namely *performance* and *satisfaction*, *extraversion*, *agreeableness*, *conscientiousness*, *emotional stability* and *openness* for the personality traits, and *verbal visual*, *non verbal visual*, *auditory*, *kines-
thetic*, *analytical*, *global*, *individual* and *group*

for learning styles were studied through Spearman's rank correlation coefficient. The relationship between *performance*, considered as participants' ranking, and students' *satisfaction*, shown in Table 1, points out a statistically significant positive correlation.

Tab 1: Correlation between performance and satisfaction.

	<i>Satisfaction</i>
<i>Performance</i>	$r_s = 0.56444$, p (2-tailed) = 0.00329*

* Correlation is significant at the 0.01 level (2-tailed)

The results of the analysis of the relationships between personality traits and *satisfaction* and between personality traits and students' *performance* show a statistically sig-

nificant positive correlation between student *satisfaction* and the personality trait of *emotional stability* (Table 2).

Tab 2: Correlation between performance, satisfaction and personality traits.

	<i>Performance</i>	<i>Satisfaction</i>
<i>Extraversion</i>	rs = -0.05702, p (2-tailed) = 0.7866	rs = 0.17311, p (2-tailed) = 0.40795
<i>Agreeableness</i>	rs = -0.06311, p (2-tailed) = 0.76441	rs = 0.37748, p (2-tailed) = 0.06284
<i>Conscientiousness</i>	rs = 0.21444, p (2-tailed) = 0.30333	rs = -0.03259, p (2-tailed) = 0.87709
<i>Emotional stability</i>	rs = 0.38149, p (2-tailed) = 0.05988	rs = 0.62923, p (2-tailed) = 0.00075*
<i>Openness</i>	rs = 0.12565, p (2-tailed) = 0.54951	rs = 0.03627, p (2-tailed) = 0.86335

* Correlation is significant at the 0.01 level (2-tailed).

The analysis of the relationships between learning styles and satisfaction and between learning styles and performance, shown in Table 3, leads to three statistically significant correlations, all concerning *satisfaction* and the learning area related to the sensory channels through which we perceive the external

world. Specifically, there is a negative correlation between *satisfaction* and the *verbal visual* channel, a negative correlation between *satisfaction* and the *kinaesthetic* channel, and a final positive correlation between *satisfaction* and the *auditory* channel.

Tab 3: Correlation between performance, satisfaction and learning strategies.

	<i>Performance</i>	<i>Satisfaction</i>
<i>Verbal visual</i>	rs = -0.30399, p (2-tailed) = 0.13959	rs = -0.48186, p (2-tailed) = 0.01472*
<i>Non verbal visual</i>	rs = 0.2754, p (2-tailed) = 0.18271	rs = 0.2839, p (2-tailed) = 0.16904
<i>Auditory</i>	rs = 0.13599, p (2-tailed) = 0.51687	rs = 0.61614, p (2-tailed) = 0.00104*
<i>Kinesthetic</i>	rs = -0.02451, p (2-tailed) = 0.90742	rs = -0.41231, p (2-tailed) = 0.04055*
<i>Analytical</i>	rs = 0.0085, p (2-tailed) = 0.96784	rs = -0.00302, p (2-tailed) = 0.98858
<i>Global</i>	rs = -0.0085, p (2-tailed) = 0.96784	rs = 0.00302, p (2-tailed) = 0.98858
<i>Individual</i>	rs = -0.08012, p (2-tailed) = 0.70344	rs = -0.39011, p (2-tailed) = 0.05387
<i>Group</i>	rs = 0.08012, p (2-tailed) = 0.70344	rs = 0.39011, p (2-tailed) = 0.05387

* Correlation is significant at the 0.01 level (2-tailed).

Discussion and limitations

The study presents the application of a gamified activity to a cohort of students who attend the second year of the Bachelor Degree in SLT at the University of Padova. Aim of the study is to analyze satisfaction and effectiveness of the gamified experience "FonoGame2022" related to students' learning strategies and their personality traits.

The first consideration concerns the correlation between performance and student's satisfaction with the gamified teaching methods: most satisfied students are those who occupy higher positions in the final ranking, which recap the performances obtained in the various activities included in the course. This result is in line with literature, which shows that students' satisfaction comes from an evaluation of their own school experience: they would consider themselves satisfied when the current performance meets or exceeds their expectations (Ghaban et al., 2019).

Our results lead to a reflection of the potential correlation between effectiveness and satisfaction of gamification and personality traits. Although a previous study (Buckley & Doyle, 2017) showed a statistically significant correlation between satisfaction and extraversion personality trait, this correlation was not found in the present study. Among studies on personality traits, the most studied factor is extraversion: in particular students with a high degree of extraversion and openness like to compete for ranking scores (Trentin, 2008). Extroverted students seem to prefer ranking scores because of their ability to reflect the social landscape constituted by participants in the system. When creating gamified activities, the Game Design elements chosen are those described in literature as the most functional, i.e. point, badges, levels, ranking and score bar progression (Domínguez et al., 2013; Lister, 2015; Gómez-Carrasco et al., 2020). For example, regarding the presence and constant updating of the ranking, Lister says that it can be a positive stimulus; however, for some students it brings motivation, while other participants see it as a very competitive tool for learning (Yin Kei Chong, 2019). Several studies have suggested the use of personalization and rankings for individuals with high extraversion, and some

studies recommend badges, competition, feedback, levels, points and social networks for extroverted people; badges, levels and rewards for people with high neuroticism, and personalization for individuals with high openness (Klock et al., 2020).

Additionally, there are differences in playful perception between introverts and extroverts in literature. Although no significant difference was found in terms of playfulness, the way of achieving it is different. For extroverts, the playfulness due to rankings has a negative effect on the playfulness of the whole system. The opposite is true for introverts. This could be explained by the offline nature of the rankings. Being on top of a leaderboard is fun for both personality types, but because extroverts prefer to brag in real time and in a face-to-face situation, they would perceive the activity as unfun. The liking of badges is significantly different among the groups, with extroverts liking them more than introverts. The relationships between badges and rankings and between badges and rewards are stronger for introverts, consistent with their higher liking of rankings. Rewards are perceived as more enjoyable by extroverts. The liking of these mechanisms seems to be positive and significant for extroverts, neutral for introverts. Points, on the other hand, do not seem to be related to rankings, but seem to be related to progress and play for extroverts (Codish & Ravid, 2014).

Also the correlation between satisfaction and conscientiousness, found by Buckley & Doyle, is not statistically significant in the present investigation. In addition, the correlation between agreeableness and satisfaction with gamification is not statistically significant, unlike that shown by Trentin. A previous study also shows that people with a high degree of conscientiousness and agreeableness would be bored by points and progress bars (Codish & Ravid, 2014). Therefore, in terms of the learning experience, implementing these game elements may not help them focus on the reading material and complete the task. Students characterized by high conscientiousness would, for example, prefer challenges as game elements (Pakinee & Puritat, 2021).

Our results show a statistically significant correlation between emotional stability and satisfaction. This personality trait, however,

has been correlated with student performance by Buckley & Doyle. This correlation was not found in the present study. The conflicting results could be due to the heterogeneity in the characteristics of various gamified experiences; however, there is no doubt that the correlations described should give pause to teachers and staff who plan and implement gamified experiences.

Our study finds a statistically significant correlation between most components of the sensory channels through which we perceive the external world and satisfaction to gamification. Students who prefer the verbal-visual and kinesthetic channels appreciate the experience less, while students who prefer the auditory channel appreciate this educational mode more. These results are certainly consistent with the nature of the activities offered during "FonoGame2022", which are very often based on non verbal-visual/auditory material, such as video analysis, while not many activities are based on written material or promote activation of the kinesthetic channel.

Interestingly, no correlation appears between performance, understood as ranking position, and personality traits and/or learning styles. In fact, the highlighted correlations only concern the satisfaction parameter and the students' personality traits and/or learning styles. It is well known that student satisfaction is an important element in academic success (Ghaban et al., 2019), so analysis of student opinion is necessary for anyone approaching teaching. Analyzing the students' responses to the final evaluation questionnaire, it can be inferred that the level of engagement shown was positive for all activities. Active Learning methodologies increase the student's active participation in their own learning process, encouraging their desire to learn and thus pursuing one of the main goals of the gamification, which is to increase the student's intrinsic motivation (Ohn, 2019; Yin Kei Chong, 2019). Gamification seems to be an interesting strategy for actively engaging students in their learning journey (Toda et al., 2019; Mora et al., 2017). From the responses provided, gamification was perceived as an useful and interesting activity, but less fun: these findings, while positive, leads us to reflect on whether the gamified project achieved

the purpose for which it was designed. In fact, as gamification is not about ludic activities, it is about game elements and mechanics, as well as game design techniques, embedded in non-typically ludic activities, such as the university educational setting, with the goal of engaging and motivating the audience to solve problems, perform certain activities, achieve goals, and acquire specific behaviors (Muangsrinoon & Boonbrahm, 2019; Ferriz-Valero 2020). Therefore, gamifying activities is not synonymous with game-based learning (Dominguez, 2013; Gómez-Carrasco, 2020), which is why, according to the literature, the experience was expected to be useful and interesting, but not very fun.

The narrowness of the sample analyzed prevents the generalizability of the findings and invalidates their statistical power. Furthermore, the data collected fall within a well-defined framework, identified with the Applied Phonetics and Phonology course in SLT, delivered during the second year of the Bachelor's Degree at the University of Padova; therefore, these are observations referring to a short period of time, which actually reduces the accuracy of the results. Gamified activities should be subjected to empirical evaluations covering longer periods in order to better explore the long-term feasibility of integrated game mechanics (Sardi et al., 2017). A further limitation is the specificity of the context in which the gamified activity under consideration is embedded. The conflicting results with those of other studies in the literature could be due to the heterogeneity of the characteristics of the various gamified experiences. Moreover, the lack of a control group does not allow a real comparison to be made between the results obtained by students who took the proposed course in gamified mode and those who took it in the traditional in-person mode. However, there is no doubt that the correlations described should give pause to those involved in designing and implementing gamification experiences.

Conclusion and future work

Although gamification is now popular, the effectiveness of the various elements of which it is composed has not been sufficiently tested. Recent research, however, suggests

that the effects of the various elements that make up gamification are mixed (Hanus & Fox, 2015) and the question of which factors contribute most to its success remains partly unresolved, at least as regards cognitive learning outcomes (Majuri et al., 2018). Furthermore, of the limited sample of empirical studies conducted on gamification, many suffer from methodological problems such as lack of comparison groups, short treatments, and lack of validated measures (Hamari et al., 2014). Severely limited research in higher education that formally states and tests how gamification affects students' skills, academic achievement and satisfaction in an enriched active learning setup (Murillo-Zamorano et al., 2021). Gamified e-learning cannot indiscriminately improve the knowledge performance of every personality type indiscriminately (Pakinee & Puritat, 2021). In fact, gamification is known to affect learners with different personalities differently; some get significant benefits from some forms of gamification, while other personalities do not benefit at all (Ghaban et al., 2019). The fact that each student approaches the task in a personal way that is different from others and tends to prefer certain learning strategies consistently and stably over time is indeed of considerable importance in the educational context, as it may or may not foster the student's learning ability and help to understand how certain difficulties depend on the fact that one's own style does not fit well with the task. Indeed it has been shown that performance tends to be better if the task is congruent with the preferred style, thus supporting the influence of cognitive styles on academic performance (Yousaf et al., 2021). Furthermore, it is known that student engagement can be increased by providing content that is easily understood and congruent with their cognitive learning style (Yousaf et al., 2021). In the present study, significant differences in the approach to the gamified experience were revealed based on individual student characteristics. Therefore in order to significantly increase students' motivation, it is necessary to design content tailored to the learning goal and learning style. This could also significantly increase factors such as performance and engagement in e-learning courses (Yousaf et al., 2021). The positive level of engage-

ment shown in the gamified activity examined leads one to consider gamification as a successful teaching methodology. Analyzing participants' opinion is a necessary step for anyone approaching teaching, considering that student satisfaction is an important element for academic success (Ghaban et al., 2019) and, since it was perceived as a useful and interesting activity, but less fun, it is certainly in line with the concept of gamification itself. As reported in the literature, it is also necessary to calibrate the elements of Game Design and adapt them when creating courses and content. Those used within Fonogame2022 are those described in the literature as the most functional, but, as suggested by the most recent studies, it is necessary to choose the various elements taking into consideration the personality traits of the participants, since what may be perceived as fun, for example, by an extrovert, is not also fun for an introvert (Codish & Ravid, 2014). Thus, as a tool for influencing individuals and mediating learning behaviors, gamification must be designed and implemented with individual learning styles and personality traits, in mind to achieve its most effective use possible.

It might be useful in the future to conduct research that diversifies the data in terms of level of education or type of education, considering that depending on the level and type of education a different approach to study is implemented (Zepke & Leach, 2010), and thus, for example, a learning style that correlates positively with students' satisfaction in high school might correlate negatively in the university context, where a different type of approach to studying is required. Moreover, much of the literature tends to treat gamification as something unitary, in a counterproductive way. Instead, it is functional to analyze it as part of a set of tools that can be used to mediate behavior. Recent studies examine the elements of gamification individually and how they can help influence individuals' behavior (Aldemir et al., 2018). Even more recent are articles looking at the relationships between game elements and personality traits (Pakinee, 2021; Tondello, 2017), which show how users can be more or less receptive to different game elements, depending on their personality or gamer profile (Hallifax et al., 2019). Finally, with regard

to future lines of research, more detailed research investigating how particular elements influence behavior, particularly in relation to personality traits, according to the Big Five model, would be enlightening. This would allow for a more nuanced and effective design of gamified learning interventions (Majuri et al., 2018), leading to the creation of innovative and individualized teaching methods. In the present study, learning styles and personality traits were investigated to a limited extent. The most studied user characteristics are generally player types, gender and personality traits (Klock et al., 2020). However, it stands to reason that other variables, such as age and education, for example, can also have significant effects on gamified activities. Analysis of these aspects is likely to provide a better contextual understanding of gamification, allowing for its more subtle and beneficial design, when seeking to mediate and promote positive behaviors in both pedagogical and other contexts. Future research should also be oriented towards exploring theories that could explain the positive or negative effects of gamified interventions with well-defined control groups in a long-term way. Like this, it will be possible to build on theories to gain a practical and comprehensive understanding of how to select the appropriate game elements for the right educational context and the right type of student, considering individual characteristics (Sailer & Hommer, 2020). One of the most recently worked on

approaches is the personalization of gamified educational systems, expecting to provide systems with the gamification design composed according to the users' characteristics. However, this approach still presents contradictory results, calling attention to the need for new studies that can bring more concrete results on the effectiveness of personalized gamification in educational systems (Oliveira et al., 2022).

Educational innovations should have a solid foundation in research data. In the case of gamification as an educational strategy, future research must therefore address different aspects, such as game mechanics and elements, in relation to an underlying theoretical framework (Nieto-Escamez et al., 2021).

The results of this application seems to support the validity of the project and the teaching method which students approach with significant differences according to individual characteristics. Taking it into account means a more in-depth research that helps design gamified activities adapting game elements to students' personality traits. Future perspectives will include a different analyze of other variables, which can have significant effects on gamified activities, providing a better contextual understanding of gamification, in order to allow for a more specific and beneficial design, when looking for to mediate and promote positive behaviors both in pedagogical contexts and in other contexts.

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