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# PRAGMATICS COMMUNICATION DEFICIENCIES AND THE ROLE OF GAMIFICATION

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**Abstract**

The proper use of language for communication in any context is defined as Pragmatics. Pragmatics includes the linguistic adjustments made (what is said, how it is said, body language, appropriateness) in order to accomplish the communication goal. Children and adults may be referred for rehabilitation when pragmatic communication deficits have an impact on social functioning, employment, and family/marital relationships (Turkstra et al., 2016). The aim of this study is to examine gamification as an alternative to supplement clinical assessment procedures of an individual's communication deficiencies with a focus on pragmatics perception, which led to the creation of a mobile gamified procedure designed to collect data on pragmatics perception. The gamified procedure was created in Kahoot! and was played by a sample of two hundred and fifty-six (256) university students with non-acquired communicative deficits studying health related courses in Greece. Data on points scored, response accuracy and duration of time spent on of each language feature was recorded. A detailed description on students' pragmatics abilities and motivation was reported. The results of the study described normative data concerning points scored, response time and accuracy of language features. Statistically significant differences were found between genders in terms of response accuracy and time for some language features. The gamified e-assessment has the clear potential to contribute innovatively to the clinical assessment procedures of pragmatic communicative deficits including the needs of individuals with developmental disorders, psychiatric disorders, acquired brain injury, neurodegenerative disorders in a motivating way along with current technological advances of face to face and/or telepractice services.

*Keywords:* Gamification; pragmatics; clinical assessment; communicative deficits; normative data; telepractice

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## 1. Introduction

Communication refers to the process of sending and receiving messages through a common system of symbols, signs, or behavior with verbal or nonverbal means (Merriam-Webster, 2017; Nordquist, 2017). Language in oral communication involves information processing in terms of production and perception processes, phonetics and phonology, syntax, semantics and pragmatics (Owens, 2014). Pragmatic communication refers to the ability to use language (verbally and nonverbally) in context, beyond understanding and expressing basic word meanings (semantics) in the correct grammatical forms (syntax) (Turkstra et al., 2016). Owens (2014) identifies pragmatics aspects in a conversational context, consisting of intentions or communication goals as well as linguistic adjustments for the listener. Each speaker may accomplish these goals depending on preceding linguistic information and each other's point of reference (Owens, 2014).

Adults are expected to possess pragmatics skills in order to express their thoughts, ideas and feelings in a competent and flexible way across all linguistic contexts. That is, they need to be able to display mastery of language use (comprehension, production, and interpretation) adapting to different settings (Arcara & Bambini, 2016), in the same way, children use language, verbally and nonverbally, to get the message across.

Pragmatics skills connect language and context, while social cognition[1] combines social interaction and social cue interpretation (Carotenuto et al., 2017). Pragmatics communicative skills in children involve (i) using language for different purposes (to make requests or demands), (ii) adjusting to the needs and the age of the listener, and (iii) adapting to interaction according to the communication setting, such as storytelling and taking turns in conversation (Longobardi, Lonigro, Laghi, & O'Neill, 2017).

Adults start developing pragmatic skills from childhood. According to Airenti (2017), children start to develop pragmatic skills in the preverbal stage with dyadic interactions that will become the basis of turn-taking, the most fundamental rule of conversation. More precisely, as cognitive level correlates positively with age, social rules in verbal conversation change from primary verbal skills (requests, replies, refusals) to more complex speech forms (promises, threats, apologies). Later, during maturity, rules governing metaphor, irony and politeness are acquired. These pragmatic phenomena can be explained by the theories of mind[2]

1 "… Social cognition is an umbrella term that refers to the cognitive processes involved in social interaction …" (Turkstra, et al., 2016)
2 Theory Of Mind refers to the "… ability to understand that others have thoughts, that these thoughts differ from one's own, and that thoughts determine behavior …" (Turkstra, et al., 2016)

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and social knowledge. Mastery of pragmatics is an ongoing process, mostly developing during school years through linguistic and cognitive procedures.

The lack of pragmatics competence is known as pragmatics communication deficit and has been documented in many populations: in developmental disorders (autism spectrum disorder, attention deficit hyperactivity disorder), in neurodevelopmental psychiatric disorders (schizophrenia, phychosis) (Turkstra, et al., 2016), in acquired brain injury and neurodegenerative diseases (Carotenuto et al., 2017). The range of what is considered successful adult pragmatics competence varies widely, although there is evidence in the literature stating symptoms in individuals with schizophrenia as poor speech, i.e. laconic talking, with a less connected and more linear structure (Mota et al., 2012). Evaluation of functional communication and pragmatics abilities in adults is carried out with standardized tests (Arcara & Bambini, 2016; Turkstra et al., 2016) including pragmatic communication items, such as Communication Activities of Daily Living-Second Edition (CADL-2), LaTrobe Communication Questionnaire (LCQ), the Behavior Rating Inventory of Executive Function, Awareness Questionnaire, the Brock Adaptive Functioning Questionnaire and the Assessment of Pragmatic Abilities and Cognitive Substrates (APACS).

APACS is a paper-based tool that evaluates pragmatic abilities in clinical populations with acquired communicative deficits, ranging from schizophrenia to neurodegenerative diseases. APACS focuses on two main domains, namely discourse and non-literal language, combining traditional tasks with refined linguistic materials, in a unified framework inspired by language pragmatics. The test includes six tasks (Interview, Description, Narratives, Figurative Language 1, Humor, Figurative Language 2) and three composite scores (Pragmatic Productions, Pragmatic Comprehension, APACS Total) (Arcara & Bambini, 2016).

The effective use of technology offers to health care receipients approaches in diagnostic and therapeutic health and well-being issues (Aschebrook-Kilfoy et al., 2018; Johnson, et al., 2016). A range of software applications has been developed to contribute to clinical practice; enhancing monitoring and intervention, i.e. in depression, psychosis, post-traumatic stress disorder, autism spectrum disorder, attention deficit hyperactivity disorder, aphasia, dementia, alcohol use disorder and other pathologies (Kraemer & Freedman, 2014; Haas et al., 2015; Lau, Smit, Fleming, & Riper, 2017; Berrouiguet et al., 2018). Mobile devices such as tablets, smartphones, smart watches with touch screens, speech technology and other sensors, offer anywhere-anytime access to meet pathological populations' needs (Berrouiguet et al., 2018). They run applications, which are flexible, fast and easy to use, individually or in groups, regardless of age.

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New technologies offer an alternative path for effective speech-language diagnostic and intervention procedures (Drigas & Petrova, 2014; Toki, Pange, & Mikropoulos, 2012). For instance, there are applications that aim to support individuals with articulation disorders (e.g. Pocket SLP, Oral Motor app), expressive language disabilities (e.g. Watch Me Learn app, Story Kit app, Question Builder app) as well as receptive language disabilities (e.g. Farm Sounds, Zoo Sounds), developmental disorders (e.g. Emotions, Going Places, Everyday) and acquired disorders (e.g. computerized treatments in aphasia). Technology is increasingly being used in boosting speech and communication skills ranging from childhood to adulthood (Lau et al., 2017). Research literature also appears on speech and language assessment procedures using technology (Protopapas & Skaloumbakas, 2007; Toki, Pange, & Mikropoulos, 2012; Toki, Zakopoulou, & Pange, 2014; Wieckowski & White, 2017).

Up-to-date software applications in various forms are used for evaluation of language abilities under educational and clinical purposes (Zakopoulou, et al., 2017). These may include the use of avatars (Nasiri, Shirmohammadi, & Rashed, 2017), virtual reality (Gamito, et al., 2017), artificial intelligence (Sharma & Carter, 2017), speech technology (Strik, Palumbo, Wet, & Cucchiarini, 2015), e-questionnaires (Aslam, Sidorov, Bogomazov, Berezyuk, & Brown, 2017), games (Lekka, Toki, Tsolakidis, & Pange, 2017) and others.

Digital games are widely used for evaluation of educational and health processes (Alahäivälä & Oinas-Kukkonen, 2016; Fleming, et al., 2017; Lekka, Tsironi, & Pange, 2015) offering new motivation and engagement opportunities. Although a broad adaption has been reported in the literature, the cost of well-designed games production and the need to create committed spaces and times for gameplay remain high (Johnson, et al., 2016). Gamification, which refers to "… the use of game design elements in non-game contexts…" (Deterding, Dixon, Khaled, & Nacke, 2011) can serve as a model to overcome these restraints (Johnson, et al., 2016). It embeds game-like features that may include narratives, avatars, a desire for competition incorporating 'gaming elements' (such as badges, leaderboards, antagonisms, rewards) so as to engage and motivate people in otherwise mundane/repetitive tasks (Lumsden, Edwards, Lawrence, Coyle, & Munafò, 2016; Fleming, et al., 2017; Feng, Ye, Yu, Yang, & Cui, 2018). Other types of gamified situations include digital storytelling (Meimaris, 2017), which reveals potential elements in evaluation like child sexual abuse by monitoring children's digital stories (Pharshy, 2016).

A free online software called Kahoot! can be used to create gamified situations for the aforementioned purposes. It is an online learning tool (https://kahoot.it/), also available as an app (https://kahoot.com/mobile-app/) for creating, playing and sharing fun learning games and challenges anytime on a smartphone or other devices. It can be used to create a gamified

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environment to evaluate various aspects (Lester, 2015). Available online, it is easily accessible allowing everyone to build quizzes, create flashcards, embed videos, images and diagrams, review and share games. Kahoot! can be played standalone using the app or in a group setting. In a group setting, players answer on their own digital devices, while games are displayed on a shared screen (Johns, 2015). This gaming environment may include points scored as well as a competitive nature of playing against others and can be played worldwide from any location (Smith & Mader, 2015; Wang & Lieberoth, 2016). It provides direct feedback on self and group achievement, by reporting on individual's mobile device (whether the question was correctly answered) and then ranking the participant leaderboard based on points scored (for response time and answer). Kahoot! is often used for educational purposes (Kocadere & Çağlar, 2015; Cahyani, 2016; Pange, 2016; Fotaris, Mastoras, Leinfellner, & Rosunally, 2016; Guaqueta & Castro-Garces, 2018), but there are no references of its use for language assessment in clinical settings.

## 2. Purpose of the Study

The aim of this study is to demonstrate the impact of an electronic assessment of pragmatics deficits in verbal communication in Greek. A gamified procedure, specifically created for this study, was applied for data collection in order to evaluate the perception of language pragmatics in a group of university students without communicative deficits.

## 3. Materials and Methods

For the purpose of the study, a self-selected sample of 256 (male:51; female:205) Greek university students with non-communicative deficits participated in the study. The sample consisted of 230 majors in Speech & Language Therapy from the Technological Educational Institute of Epirus and 26 majors at the School of Medicine from the University of Ioannina in Greece. The sample was selected regardless of students' socioeconomic status. All students were Greek language native speakers.

A gamified e-assessment called "Pragmatics" was created using the software Kahoot! based on APACS criteria (Arcara & Bambini, 2016) and examination aspects of pragmatics in Greek (Terzi, Marinis, Francis, & Kotsopoulou, 2012; Haas et al., 2015; Kulakova & Nieuwland, 2016).

This game comprised 25 multiple-choice questions assessing language pragmatics perception based on the following language features: a) every-day life situations, b) story comprehension on real news, c) figurative language (idioms, metaphors and proverbs), d)

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sense of humor, e) emotions perception, f) counterfactual comprehension, and g) language aspects (pronouns, and pragmatic connectors).

The group of 256 students was split into subgroups of 40 students, to facilitate participation within lab hours. They played the gamified application for the duration of an hour in a 2-week schedule. The sample participated either online or in the Computer Laboratory in the Technological Educational Institute of Epirus. The game was applied on mobile devices in areas with fast Internet connection. Firstly, instructions on the use of the game were given to all participants one hour before the game, after which they could play the game using their mobiles devices.

Variables measured scores, number of correct responses and time responses for the entire game and for each language feature on pragmatics according to gender.

Data from all participants was gathered by Kahoot! in Excel files and analyzed accordingly using SPSS (v.21). The Mann-Whitney non-parametric test was used for the comparison of continuous variables between the gender subgroups. Statistical significance was set at $p<0.01$. Spearman rank-order correlations.

## 4. Results

The sample mean age was 21±2.25 and ranged from 18 to 30 years old.

The overall gamified procedure is reported (Table 1) presenting by gender the mean and range of the Total Score points, the Response Time (seconds), the Number of Correct Answers and the Number of Incorrect Answers. Mean total score points for males was 27105.20 ± 3393.270, for females was 27650.00 ± 3176.224 and for both genders, it was 27541.46±3221.173. Mean response time for males was 148.74±60.735 sec, for females was 136.44±77.999 sec and for both genders was 138.89±74.931 sec. Mean Number of Correct Answers for males was 22.14±1.497, for females was 22.52±1.356 and for both genders was 22.45±1.391 out of the 25 questions of the gamified procedure.

**Table 1.** Variables of the overall gamified procedure by gender

| Score points | Male (N=51) | Female (N=205) | Total (N=256) |
|---|---|---|---|
| Total Score points | 27105.20±3393.270 | 27650.00±3176.224 | 27541.46±3221.173 |
| Response Time (sec) | 148.74±60.735 | 136.44±77.999 | 138.89±74.931 |
| Number of Correct Answers | 22.14±1.497 | 22.52±1.356 | 22.45±1.391 |
| Number of Incorrect Answers | 2.63±1.326 | 2.34±1.287 | 2.40±1.298 |

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Kahoot! awarded points on each language feature according to gender, as detailed in Table 2. Response times for each language feature by gender are detailed in Table 3.

**Table 2.** Points scored on each language feature according to gender

| Score points | Male (N=51) | Female (N=205) | Total (N=256) |
|---|---|---|---|
| Everyday Life | 849.373±194.608 | 761.660±170.483 | 779.134±178.633 |
| Story Comprehension | 614.588±330.845 | 612.688±338.665 | 613.066±336.479 |
| Figurative Lang-Idioms | 1182.971±167.474 | 1176.849±201.427 | 1178.068±194.843 |
| Figurative Lang-Metaphors | 1267.569±243.878 | 1254.334±256.800 | 1256.971±253.864 |
| Figurative Lang-Proverbs | 1102.902±447.268 | 1283.829±342.177 | 1247.785±371.666 |
| Sense Of Humour | 1043.755±447.536 | 1117.349±429.517 | 1102.688±433.275 |
| Emotions' Perception | 1283.072±236.717 | 1323.270±217.591 | 1315.262±221.637 |
| Counterfactual Comprehension | 1093.209±400.512 | 1145.467±355.327 | 1135.056±364.550 |
| Understanding Pronouns | 1156.000±345.117 | 1160.537±364.167 | 1159.647±359.850 |
| Pragmatic Connector | 1320.310±187.213 | 1309.229±217.007 | 1311.402±211.193 |

**Table 3.** Response time (sec) on each language feature according to gender

| Response time (sec) | Male (N=51) | Female (N=205) | Total (N=256) |
|---|---|---|---|
| Everyday Life | 7,495±3,966 | 7,581±5,088 | 7,564±4,878 |
| Story Comprehension | 18,015±7,049 | 18,200±7,874 | 18,163±7,704 |
| Figurative Lang-Idioms | 3,614±3,177 | 2,714±2,801 | 2,893±2,896 |
| Figurative Lang-Metaphors | 3,700±3,079 | 3,417±3,965 | 3,473±3,801 |
| Figurative Lang-Proverbs | 4,583±3,422 | 4,690±4,476 | 4,669±4,281 |
| Sense Of Humour | 5,491±3,692 | 5,193±4,646 | 5,252±4,467 |
| Expressing Feelings | 2,998±1,840 | 2,071±1,795 | 2,256±1,838 |
| Counterfactual Comprehension | 6,890±5,848 | 5,674±4,692 | 5,916±4,955 |
| Understanding Pronouns | 4,047±2,796 | 3,282±3,528 | 3,434±3,403 |
| Pragmatic Connector | 3,474±3,087 | 2,394±2,422 | 2,599±2,590 |

In order to test the correlations of points scored on each Language Feature, a series of Spearman rank-order correlations were conducted and some strong correlations were indicated. According to Spearman Rho, statistically significant differences were recorded for (i) Idioms when correlated to Story Comprehension on Real News rs=.71, p=.000 and Metaphors rs=.75, p=.000, (ii) Emotion Perception with Sense of Humour rs=.85, p= .000 and (iii) Pronouns with Pragmatic Connectors rs=.89, p=.000. When a series of Spearman rank-

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order correlations were conducted in the male sample and female sample separately, similar results were recorded, with the addition of statistically significant differences among males in Idioms and Proverbs (rs=.65, p=.000).

Nonparametric correlation assessment on response time and gender is also presented. The comparison of medians between male and female students for response time on language feature items showed statistically significant differences for (i) Idioms (U=3930.00, p=.006), (ii) Metaphors (U= 4092.50, p=.016), (iii) Emotion Perception (U= 3589.50, p=.001), (iv) Understanding Pronouns (U= 3998.00, p=.009), and (v) Pragmatic Connectors (U= 3820.50, p=.016).

Moreover, a series of Spearman rank-order correlations found strong relationships among the response time on Language Features in both genders. Table 4 reports on statistically significant correlations coefficient for males' response time on the various Language Features.

**Table 4.** Correlations in response time among Language Features for males

| LANGUAGE FEATURES | Sense of Humour $r_s$ (p) | Emotion Perception $r_s$ (p) | Counterfactual Comprehension $r_s$ (p) | Language Aspects-Pronouns $r_s$ (p) | Language Aspects-Pragmatic Connectors $r_s$ (p) |
|---|---|---|---|---|---|
| Figurative Features-Idioms | $r_s$ =.62 (p=.000) | $r_s$ =.71 (p=.000) | | $r_s$ =.66 (p=.000) | $r_s$ =.70 (p=.000) |
| Figurative Features-Proverbs | $r_s$=.72 (p=.000) | $r_s$ =.64 (p=.000) | $r_s$ =.64 (p=.000) | $r_s$ =.69 (p=.000) | |
| Sense of Humour | | $r_s$ =.65 (p=.000) | $r_s$ =.60 (p=.000) | $r_s$ =.75 (p=.000) | $r_s$ =.68 (p=.000) |
| Emotion Perception | | | $r_s$ =.64 (p=.000) | $r_s$ =.84 (p=.000) | $r_s$ =.83 (p=.000) |
| Counterfactual Comprehension | | | | $r_s$ =.74 (p=.000) | $r_s$ =.62 (p=.000) |
| Language Aspects-Pronouns | | | | | $r_s$ =.78 (p=.000) |

Correlation is significant at the .01 level (2-tailed)

Table 5 reports on statistically significant correlations coefficient for females' response time on the various Language Features.

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**Table 5.** Correlations in response time among Language Features for females

| LANGUAGE FEATURES | Figurative Features-Idioms $r_s$ (p) | Figurative Features-Metaphors $r_s$ (p) | Figurative Features-Proverbs $r_s$ (p) | Sense of Humour $r_s$ (p) | Emotion Perception $r_s$ (p) | Counterfactual Comprehension $r_s$ (p)) | Language Aspects-Pronouns $r_s$ (p) | Language Aspects-Pragmatic Connectors $r_s$ (p) |
|---|---|---|---|---|---|---|---|---|
| Story Comprehension on Real News | $r_s$ =.60 (p=.000) | | $r_s$ =.60 (p=.000) | $r_s$ =.60 (p=.000) | $r_s$ =.66 (p=.000) | | $r_s$ =.69 (p=.000) | $r_s$ =.66 (p=.000) |
| Figurative Features-Idioms | | $r_s$ =.65 (p=.000) | | $r_s$ =.66 (p=.000) | $r_s$ =.74 (p=.000) | $r_s$ =.60 (p=.000) | $r_s$ =.67 (p=.000) | $r_s$ =.75 (p=.000) |
| Figurative Features-Metaphors | | | | | $r_s$ =.66 (p=.000) | | | |
| Figurative Features-Proverbs | | | | $r_s$ =.66 (p=.000) | $r_s$ =.67 (p=.000) | | $r_s$ =.66 (p=.000) | $r_s$ =.70 (p=.000) |
| Sense of Humour | | | | | $r_s$ =.69 (p=.000) | $r_s$ =.63 (p=.000) | $r_s$ =.66 (p=.000) | $r_s$ =.75 (p=.000) |
| Emotion Perception | | | | | | $r_s$ =.62 (p=.000) | $r_s$ =.78 (p=.000) | $r_s$ =.81 (p=.000) |
| Counterfactual Comprehension | | | | | | | $r_s$ =.64 (p=.000) | $r_s$ =.69 (p=.000) |
| Language Aspects-Pronouns | | | | | | | | $r_s$ =.82 (p=.000) |

Correlation is significant at the .01 level (2-tailed)

It is worth mentioning the sample's feedback highlighted that they enjoyed playing the "Pragmatics" game because of the gamified online nature of the tool. The majority of the sample (93.75%) found this e-assessment tool a fun way of learning and spending time. Almost all (97.66%) were motivated and engaged until the end of the gaming procedure and (90.63%) reported that they would like to use it in the clinical setting.

## 5. Discussion and Conclusions

A gamified e-assessment has been explored, revealing abilities in perception of pragmatic communication skills. According to the findings of this study, pragmatic abilities were identified for young adult students in higher education by the number of correct answers, the score and the response time to pragmatics features (every-day life situations, story comprehension on real news, figurative language, sense of humour, emotion perception, counterfactual comprehension, pronouns and pragmatic connectors). Students majoring in health professions used the gamified procedure demonstrating the potential of e-assessment technology use to collect data to supplement clinical decision-making. It provided normative

data as aforementioned and functioned as an electronic response system embedding elements of gaming, such as competition and score points.

Some positive elements of this research include the high sample response to the game and the positive students' attitude, motivation and engagement while collecting the data for assessing pragmatics perception abilities. Hence, the use of gamification approaches offers the potential to include it (i) in the curriculum of Speech & Language Therapy or other health profession majors, to facilitate online clinical face to face and telepractice approaches and (ii) in clinical practice to collect data to supplement clinical decision making. Additionally, functioning as an electronic response system that exports immediate automated results along with score points on pragmatics perception, it can stimulate in-depth future research on gamified electronic assessment and screening procedures. The success of this game can also promote the role of mobile and handheld devices (tablets, smartphones) for assessment and rehabilitation in health and welfare.

Despite the homogeneity of the sample in terms of age and educational level, statistically significant differences were recorded between males and females, where females reported higher total points and response accuracy than males. This may be explained by differences in brain organization. The analysis for males present more accuracy in everyday life situations, whereas females present more accuracy in proverbs and emotion perception. This is contrary to other research, where gender was not found to be a significant predictor (Arcara & Bambini, 2016).

Strong correlations were indicated in responses between some language features:- (i) Idioms with Story Comprehension on Real News and Metaphors, (ii) Emotions Perception with Sense of Humour, and (iii) Pronouns with Pragmatic Connectors. Among males, Idioms were also correlated with Proverbs. These results are consistent with Figurative Language tasks and Humor clustering separately, possibly in relation to different cognitive substrates (Arcara & Bambini, 2016).

Overall, females responded faster than males indicating statistically significant differences for idioms, metaphors, emotion perception, understanding pronouns and pragmatic connectors.

It has to be noted that response time in Story Comprehension on Real News presented the highest value as the subjects needed to watch videos in order to provide an answer.

Furthermore, the study findings reported that a student's response time in one language category is correlated with response times of other language categories. Such strong correlations were indicated (Table 4 and Table 5) for males and females. The results of this study are in line with current research (Kulakova & Nieuwland, 2016) reporting that

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individuals who are better at understanding the communicative intentions of other people are more likely to reduce knowledge-based expectations in counterfactuals.

The results of the study pointed towards the positive use of gamification to supplement clinical procedures on an individual's pragmatic perception abilities. Clinicians (i.e. speech pathologists, psychiatrists, psychologists, developmental paediatricians) may be able to employ such strategies for diagnostic and intervention procedures. Their clinical decision-making can be enhanced using gamified assessment in mobile devices as:-

(i) it promotes tracking an individual's symptoms before or during the clinical section

(ii) it allows for real time collection of data on self-reporting and/or monitoring,

(iii) it provides immediate results while allowing patients to engage in fun and motivating procedures

(iv) it enables remote collaboration between clinician-patient which, together with the application of gamification, can be embedded in telediagnostic approaches.

Thus, this model can be adopted in telepractice service according to recent technological advances in the literature aiming to contribute to the efficiency of service, access to the diagnostic clinical time and potentially decrease the cost of clinical services (Grogan-Johnson, Meehan, McCormick, & Miller, 2015; Lowman & Kleinert, 2017).

A limitation of this study was the use of the gamified procedure on pragmatics perception in individuals with non-acquired communicative deficits, which may not have given the study the desired results, as the aim of the study was to assess the potential of a gamified procedure for pragmatics perception in individuals with communicative deficits. However, despite this limitation, this study has clearly shown that the gamified procedure for pragmatics perception has great potential as an assessment instrument in this area. The next step of research can include a population with acquired communicative deficits to verify the use of the gamified procedure. Further research may be conducted in different normative populations regardless of major or even educational level, different age groups and in various pathological populations. It may also explore the use of other gamified response systems and smartphone applications in face to face and telepractice clinical service.

## 6. Implications

The current research has opened up a relatively new path; a gamified collection of data for assessment in health and wellbeing, specifically, in communicative competence. The success of the gamified procedure with this sample strongly suggests that the tool can enhance

the learning experiences of students majoring in health professions and can, more importantly, offer a valuable innovative potential to supplement clinical decision-making by motivating the patient to get involved in the healing process through a playful setting. Furthermore, gamification can be used to report real time on individual abilities in pragmatic communication perception skills and may be further employed as an electronic response system. Given the benefits of the gamified electronic assessment and screening procedures, face to face and telepractice services for both patient and clinicians can be advanced to the mutual benefit of both clinician and patient.

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