Gifted students: from identification to the use of educational technologies

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Abstract
This paper aims to investigate a cognitive profile that is still in the definition phase: giftedness. It was interesting to decline the profile with respect to learning environments and new teaching technologies. We started from the definition of giftedness, highlighting the presence of abilities and potentialities higher than average. Subsequently, several studies were reviewed that identified some cognitive, behavioral and emotional characteristics of gifted students. The difficulty of diagnosing the profile of giftedness was highlighted, referring to some examples of national and international guidelines. A focus was placed on the school integration of gifted students: highlighting the cognitive aspects in teaching practice and the social aspects with the peer group. Finally, it was interesting to analyze the process of gamification in relation to gifted individuals: highlighting the potential of this methodology for particularly gifted students.

Keywords 1
Giftedness, learning environment, gamification, learning technologies.

1. Introduction

The concept of wellness has different meanings, in particular the term appears in the definition of health of the WHO (World Health Organization). The WHO identifies the idea of health as "a state of complete physical, mental and social well-being and not simply the absence of disease" [1]. The interpretation of this definition is constantly evolving and, for there to be a state of complete well-being, it is necessary first to recognize individual differences and be ready to accept them. From this point of view, it is interesting to investigate a cognitive profile that is still being defined: the cognitive profile of giftedness. This cognitive profile represents, in fact, a challenge both for its identification and for its subsequent support and enhancement.

The term "giftedness" defines people who, compared to their peers, possess above-average abilities and potential. Currently, there is no single definition and different countries are developing different guidelines: some are intended for clinicians, others for learning professionals.

In the context of learning, gifted students move quickly and more easily from concrete to abstract ideas [2] and therefore require special learning strategies.

Teachers, in each classroom setting, must prepare an appropriate curriculum to meet the individual needs of each student [3].

In this regard, new technologies can help create flexible learning environments within which to provide students with individualized instruction [4]. Today's students are digital natives and expect technology to be everywhere in their daily lives. Furthermore, technology tools can act, more, on gifted students because they possess features to: provide access to any topic of interest to students; ensure fluency in mastering the tool itself; give quick feedback; and provide access to web 3.0 capabilities [5]. In this regard, advanced software can enable gifted students to use countless types of information and

manipulate it to learn for their own purposes. In fact, gifted learners seek complex ideas and, in addition, want to express those ideas in unique and elaborate ways.

2. The identification of gifted students

It is complicated to refer to a univocal definition for the term " giftedness". One of the most widely accepted definitions defines gifted individuals as individuals who, relative to peers, exhibit or possess the potential to exhibit amazing abilities at a given time and in areas of significance in the relevant culture [6] [7]. Thus, gifted students possess cognitive abilities that make them more similar, in terms of performance, to older individuals. This characteristic is most evident in the developmental years; during the early phases of learning, in fact, a gifted individual's abilities are faster and more advanced than those of the peer group.

In addition to being difficult to define, the term "giftedness" can also refer to countless cognitive profiles. There is, in fact, often confusion in the use of the term. There are several terms in the scientific landscape that encompass cognitive characteristics above the population average.

The Italian Association for the Development of Talent and PlusDotation [8] (AISTAP), in 2015, presented the following classification to identify particularly competent students:

- Gifted: students subjected to expert cognitive assessment, representing 5% of the school population;
- Gifted students: students who exhibit talent in an artistic, musical, kinaesthetic/body language, leadership, emotional intelligence area;
- Plus gifted: students who can excel by achieving significantly higher, than age peers, these students represent 2% of the population;
- Above-average proficient students: students who can perform, academically, above peers and above what is expected in relation to age; these students represent approximately 20% of the student population.

Another interesting definition focuses attention on the instructional-educational aspect. In fact, Stephens [9] states that gifted individuals possess exceptional abilities (academic, intellectual, creative, leadership) and require differentiated educational programs.

Despite countless attempts to uniquely define the "gifted" cognitive profile, it emerges how this is very complicated. Indeed, [10] define gifted individuals as a misunderstood population.

The literature is attempting to develop criteria and characteristics that can identify and describe the gifted profile. First, it is emphasized that giftedness is not a disorder to be diagnosed and that there are currently no universally agreed upon criteria to identify it [11]. The psychometric perspective is the most prevalent perspective in the recognition of giftedness. According to this view, IQ represents a predominant criterion: a finding of a score of at least 120 is the criterion used by most psychologists and schools internationally [12] [13].

It should be emphasized that IQ is not giftedness itself; IQ is only an indicator of whether giftedness can exist. Beyond the IQ component, several characteristics common to gifted individuals have been identified. Studies have highlighted elements such as: highly developed language, large vocabulary, advanced reasoning processes, excellent memory, strong curiosity, strong empathy, excellent visual processing skills, leadership tendencies, strong commitment to challenging situations, high energy levels, and a high sense of justice [14] [15]. In addition, Zanetti [16] identified: problem solving skills, high intrinsic motivation to learn, intense emotional reactions to pain, frustration, and noise, high sensitivity, perfectionism, and difficulty regulating one's emotions. Developmentally, precocity emerges in the areas of language, motor, and learning. In fact, Zanetti [16] highlights that gifted children walk very early, have good oral language before the age of two, and 24% of them learn to read on their own (including 77% before the age of 5).

In defining the key aspects of gifted children, the concept of developmental asynchrony is highlighted, underlining a precociousness in the cognitive sphere and a normotypical development, in terms of trajectories, in the emotional sphere [17]. This implies, precisely, an asynchrony: gifted individuals are strongly ahead in cognitive terms, showing: speed of learning; multiple interests;

excessive curiosity; order and structure; critical thinking; high concentration; persistence. From an emotional point of view, however, their development is aligned to their chronological age. This can lead to difficulties in integration because, by peers, they may be considered strange and eccentric, given their advanced cognitive development. Emotionally, manifestations such as: impatience; frustration; difficulty with peers; preference for adults; feelings of boredom; intolerance for what is known; tendency to ignore others; stubbornness; arrogance; strong introspection; empathy; experience of very intense emotions; continuous search for very intense emotions are found [18].

Although the characteristics listed above are identified, developing a diagnosis involves several difficulties.

Giftedness is not defined by an international diagnostic manual, there are only several guidelines that characterize the diagnostic and support process. In Italy, the National Council of the Order of Psychologists (CNOP) has developed guidelines (2018) [19] to identify giftedness in the developmental age. In particular, the phases highlighted classify:

- Cognitive profile assessment;
- Observation;
- Child/youth interview;
- Parental interview;
- Intellectual testing;
- Additional in-depth testing.

These references represent best practices for professionals in the field. The guidelines are a good starting point to move towards a desirable sharing of clinical practice.

The risk is, in fact, that the child is misdiagnosed and, therefore, does not have the correct support needed. The Department of Education in Colorato has developed the Gifted Identification Guidebook [20], in the 2020, that provides for the identification of a gifted individual through the following areas:

- Referrals: multiple sources, multiple types, multiple times;
- Body of Evidence: quantitative and qualitative data; additional supporting information;
- Review Team: Team of educators; 1 member trained in gifted education.

These components can lead to three different outcomes: talent pool determination, no gifted determination, gifted determination; these appear to be the main areas of investigation.

Another example of guidelines is offered by National Association for Gifted Children (2019) [21]. NAGC has developed standards for pre-k-grade 12. The document reveals the need for educators to understand the developmental and learning differences of gifted students. Understanding is the starting point for designing curricula, programs and assessment methods that are appropriate for gifted students. Educators need to understand not only the cognitive development of students, but also their psychological, social and emotional needs to ensure inclusion and learning.

3. Gifted children in the learning environment

It has been highlighted that there are no universal criteria for being able to identify a gifted child. The literature is full of different criteria and guidelines to be used. This is present in order to be able to identify the diagnostic cognitive profile and to be prepared in learning contexts; however, official transversal criteria have not yet been reached.

In Italy, as previously highlighted, there are guidelines for psychologists; guidelines for teachers and learning experts are still being drafted. With Departmental Decree No. 1603 of November 15, 2018, the Ministry of Education, University and Research [22] established a technical table on giftedness, aimed at defining: national guidelines for the care of pupils and students with high intellectual potential; initiatives to encourage the dissemination and transposition of the guidelines; functional initiatives to protect the right to study, health and well-being within the school structure of pupils and students with high intellectual potential.

The literature shows that teacher training on giftedness, at an international level, is a highly neglected area. In fact, it has been found that such trainings do not occur because teachers and school leaders believe that giftedness does not correspond to a special education need [23]. Berman et al. [24] further

pointed out that this belief is present early in the training of aspiring teachers. The latter, in fact, express more interest in adapted teaching aimed at students with disorders and deficits rather than at gifted students. It is evident how this has serious consequences on the school adaptation of the child and on his or her learning.

Currently, in Italy, students with high cognitive potential are included among the BES (Special Educational Needs) and follow the relevant reference legislation (Miur Directive of 27/12/2012 in the field of BES) [25].

In the absence of precise criteria, in addition to the clinical and cognitive characteristics already identified, it is possible to highlight some behavioral characteristics typical of gifted students at school level.

A study by Miedijensky [26] highlights some characteristics of gifted students that emerged from a survey of teachers' perceptions. The characteristics are categorized into four dimensions: personality characteristics; high-cognitive skills; exceptional abilities; and various area of interests and knowledge. The personality area describes students with high commitment, preference to work alone, extreme sensitivity, maturity, strong goal orientation, perseverance despite difficulties, tendency to nonconformity. The dimension of cognitive abilities underlines, in gifted children, a winning combination of intelligence and creativity. As far as exceptional abilities are concerned, an extraordinary imagination, memory and a wide vocabulary emerge. Moreover, in the analysis of the area of interests and knowledge, it emerged that gifted children possess many interests and strong curiosity; this last characteristic could represent a protective and supporting factor for the intrinsic motivation of pupils.

Despite their above-average cognitive abilities, gifted children can encounter difficulties in adapting. They may experience educational and social difficulties in the school context. In fact, it has been shown that gifted students may experience learning and emotional challenges in the school environment. Often, gifted children rely on their extreme capacity for immediate comprehension and do not apply themselves in consolidating methods and strategies, sometimes developing difficulties in selfregulation. Such conditions can result in feelings of anger and frustration, going to interfere with development [27].

One of the issues gifted students easily run into is boredom. Because of their rapid learning ability, these students learn very easily and find the school curriculum boring [28]. This can lead to symptoms of hyperactivity that children exhibit especially in the school setting, which is why parents may not easily pick up on these aspects [29]. Therefore, there needs to be effective communication between teachers and parents for the creation of an educational alliance and the planning of a shared educational strategy [30] [31].

Fostering potential requires that students experience an appropriate learning environment [32] The National Association for Gifted Children (NAGC) highlighted that the learning environment for gifted, to foster achievement, should promote: personal and social responsibility, multicultural competence, interpersonal communication skills, and technique for leadership. Additionally, [33], in defining the learning environment for the gifted, highlights the following suggestions: encourage independence; be flexible and open to new ideas; accept different perspectives; let students choose who they work with and how; provide physical freedom of movement in the classroom setting; and use a student-centered perspective. Tomlinson [34] states that gifted individuals grow, the most, when challenged; therefore, a good individualized curriculum should include appropriateness of pace, degree of challenge, and pursuit of passion.

4. Gamification to create effective learning environments

To promote effective learning, it is necessary to focus on the individuality of each student. It has been highlighted that gifted individuals need flexible and open learning environments, these students need to: be motivated, challenge themselves, an individualized curriculum, be motivated, and experience new challenges.

Technology can provide opportunities for differentiated and individualized learning [35]. Teachers recognize that new digital technologies motivate students to produce high quality work at the same time, students recognize that they are motivated toward greater subject areas when using technology [36].

Individualized curricula implemented through technology allow teachers to plan learning in ways that promote greater motivation [37]. Special attention to developing and sustaining motivation should be given to gifted students. Teachers should create a learning environment that encourages students to reach their potential. In this view, two key factors turn out to be motivation and a sense of challenge in the learning environment [38].

Gamification is an innovative response to educational practice. It is defined as "the use of gamebased mechanics, aesthetics, and game thinking to engage people, motivate action, promote learning, and solve problems" [39]. The main components of gamification are characterized by: badges, points, levels, avatars, leaderboards, quests, and rewards [39].

When students experience gamification processes, they immerse themselves in virtual challenges for the purpose of achieving goals; in this case, pleasure in performing the task emerges and motivation may be reinforced [40]. Several studies highlight the positive effects of gamification in terms of student motivation, performance, and engagement; at the collective level, instant feedback and collaboration play a key role [41] [42]. Additionally, Attali and Arieli [43] identified higher likeability ratings when gamified environments are introduced.

Through this methodology, game dynamics are triggered that take on a key role in the social interaction between players and, therefore, between students. Another component highlighted is critical thinking, developed and enhanced using gaming in teaching [39].

The use of gamification, in learning contexts, represents a useful tool for students who are alienated by traditional teaching methods. It is, therefore, particularly interesting for gifted students; the latter can take advantage of an innovative type of solution that motivates and supports them in maintaining active attention in learning processes. It should be emphasized, however, that when designing a gamified course, it is necessary to prepare levels of difficulty appropriate to the students [44]. In fact, the risk is to create difficulties so high that they cause anxiety, frustration, and lack of interest. When using a gamification process, in the classroom context, it is necessary to consider the different individualities: therefore, it is necessary that the starting levels are appropriate to the typical skills and performance of each student. Therefore, we will start from a higher level for the most gifted students, to maintain a high sense of challenge and competition; at the same time, it will be necessary to keep homogeneous any levels related to social skills. Gifted students, in fact, follow normal developmental trajectories as far as social development is concerned; the cognitive development of gifted students, however, is more advanced and faster. This makes it necessary to implement mechanisms of social inclusion, within the classroom context, that consider these peculiarities. It is also highlighted that when there is discussion among peers or with teachers, a process of co-construction of knowledge is activated, leading to continuous improvement in learning [45].

It has been highlighted that it is complicated in the school environment to combine demands regarding cognitive development and social-emotional needs for children with multiple disabilities. Eysink [46] highlighted, in one study, the construction of a gamified environment supported by the method of differentiation. In this project, gifted children investigated some learning issues together with their gifted peers and, thus, had the opportunity to discuss ideas at a high cognitive level [46]. At the same time, other tasks were performed with their non-gifted peers. This allowed for the social integration of all students and, at the same time, stimulating the gifted students. It is emphasized that technologies, due to their interdependent relationship with social needs, provide answers to contemporary needs and facilitate cultural processes [47]. In fact, this method, applied to the gamified digital learning environment, supported cooperation among children with different levels of ability.

5. Conclusions

It has emerged how universally accepted criteria for identifying a gifted individual have not yet been defined in the literature. The characteristics highlighted assume considerable importance in learning environments in terms of: need for challenge and motivation, comparison and cooperation with peers [32]. While gifted children exhibit above average cognitive characteristics in certain areas, they also possess emotional and social development equivalent to that of their peers [46]. It has been highlighted

how technology can direct and organize student learning [48]. Technology can be used to differentiate instruction when students, rather than teachers, are the ones using it [49].

In line with the findings, ongoing training for teachers on issues of giftedness would appear to be a critical tool. The scientific literature is constantly being updated and the training tool would be useful to disseminate the latest methodologies suggested. It emerges, therefore, the need to rethink theories and practices, updating on a subject that is still very far from the practical experience of teachers. The success of the teaching/learning process occurs through overcoming the gap between theory and practice, aiming at solving real problems through creative solutions [50]. This possibility is provided by the latest teaching methodologies.

Currently, teachers are interested and receptive to evidence-based methodologies and new technologies. The pandemic has, in fact, allowed to break the barrier of skepticism and break down, therefore, the resistance in teachers still anchored to a pure traditional teaching. However, it is certainly necessary to promote adequate training for teachers to develop functional coping styles to deal with technological changes in work contexts [51].

In particular, the use of digital tools is useful in supporting gifted children. Both digital literacy and gifted education, in fact, promote collaboration, critical thinking, problem solving, creativity, innovation, and decision making. This allows teachers to support and stimulate both gifted and ablebodied students [52].

These strategies, applied to the entire classroom group, would then allow for the stimulation of not only the gifted individuals, but the empowerment of all students. At the moment when the teacher adopts personalized gamified environments, the teacher himself has the possibility to choose the starting level of each individual student and thus guarantee a continuous improvement characterized by performance and feedback in line with the possibilities of the student himself. The cooperation that arises, moreover, in a group perspective thanks to gamification platforms allows a linear and inclusive integration. It is hoped, therefore, that the international scientific and governmental panorama will be increasingly attentive and sensitive to the issue: promoting not only studies on the subject, but putting in place real policies that, through teacher training, aim at a broader knowledge on the subject and attention, more and more, to the cognitive, emotional and social needs of students.

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