Università Ca'Foscari Venezia

MASTER'S DEGREE PROGRAMME

IN LANGUAGE SCIENCES

FINAL THESIS

INCLUSIVE INSTRUCTIONAL DESIGN IN PRIMARY SCHOOLS: THE UNIVERSAL DESIGN FOR LEARNING

Supervisors

Prof.ssa Monica Banzato

Prof.ssa Francesca Coin

Co-supervisor

Professore Graziano Serragiotto

Graduand

Vanessa Barazza

Matriculation number 859820

Academic Year

2022/2023

TABLE OF CONTENTS

LIST OF FIGURES

ABSTRACT

In the last decade, particular attention has been given to producing inclusive environments for Special needs students, but nowadays, it is gradually spreading the concept that an inclusive environment is an environment that considers each student's unity and potential. “The Universal Design for Learning approach is an educational framework that supports teachers to apply inclusive teaching and learning strategies in the classroom to involve students with and without disabilities” (National Centre on Universal Design for Learning, 2014 cited in Scott, 2018). It is based on neuroscientific theories that each student learns, intakes information and expresses their knowledge differently. However, despite being thought-provoking, previous research studies highlighted that its implementation is still challenging due to several constraints.

Considering the international overview and the research carried out in the Italian context, my research study aimed to investigate the knowledge and the potential implementation of the approach among teachers of two primary schools in the province of Treviso.

Results are quite in line with previous research studies. It has been evidenced that teachers have mostly theoretical knowledge, and one-third of the participants did not know the approach. Furthermore, the percentage of teachers who have actually applied it in classrooms is extremely low, only 16%.

INTRODUCTION

The research subject of this dissertation is the Universal Design for Learning as an approach that promotes inclusiveness.

My interest in this research topic has developed from direct experience in teaching both as an English teacher and a Special education teacher in two primary schools in the Province of Treviso. I came across this approach during a specialisation course for special education teachers that was carried out among different school comprehensives, and I realised that even senior teachers were not accustomed to this approach.

Universal design for learning is an approach that arises from Universal design, which is aimed at planning products and environments to prevent barriers before they manifest and to plan products and environments that can be accessible to all students, avoiding further adaptations. Equally, two researchers, Ann Mayer and David Rose, started to introduce, through the Centre for Applied Specialized Technologies, technologies that could help students with special needs so that they could customise their learning experience. Successively, however, there has been a change of course, and by 1990, the focus was not more on the disabilities of individuals but on school disabilities. It has been provided with the example of a "curb cut" that is not just suitable for students with disabilities but is beneficial for all students. The principle of Universal design started to be considered not only at a design level and physical environments but also how they can be applied to "Educational environments". In fact, "The Universal Design movement changed how architects think about designing buildings. Similarly, UDL calls for a shift in how educators think about designing learning environments". (Hall et al., 2014)

Universal design for the learning approach starts from the assumption that each student is special and has its own unique potential, and it bases its theories on Gardner's theory on multiple intelligences and on neuroscientist researchers that each person has their own cognitive style and learning style. So, the basic principle of the UDL is to build a flexible curriculum that offers from the beginning multiple options of representation, expressions and ways to sustain engagement. Likewise, Universal design aims to build environments to prevent barriers before they manifest. Similarly, The Universal Design for Learning aims at supporting each individual potential by offering multiple options from the beginning so as to avoid creating special curriculum paths.

Given this theoretical framework, by attending this course, I had the general impression that many teachers were quite unfamiliar with the approach and that the idea of inclusivity was mainly linked to a traditional vision of students with disabilities and SEN students. So, I decided to investigate teachers' knowledge of this approach and its potential implementation in the classrooms of two schools of the comprehensive.

The aim of my research is to carry out quantitative research to deepen teachers' knowledge of the approach and investigate whether teachers have implemented the approach and if there is a potential for implementation.

Previous research has been conducted on the topic. Specifically, Ghedin E., Silvia M, (2017), Mavrovic-Glaser, Katherine D. (2017) and Turki A. Alquraini & Shaila M. Rao (2020).

Starting from these studies, I developed my research questions, which aim at investigating first which strategies teachers apply that recall UDL and whether special education teachers have more knowledge on the approach than general education teachers. Successively, which percentage of teachers have effectively applied the approach in their classrooms and which are the main constraints in the implementation.

The sample was selected among my school's colleagues, and teachers were asked to fill a questionnaire, which results were then categorised into tables and graphics.

An investigation on the topic had been carried out by Ghedin E, Silvia M, (2017), between Padua and Pordenone, so this research could be a starting point to investigate the approach in the province of Treviso.

The following dissertation is divided into five chapters, three chapters will introduce the theoretical aspects behind Universal design for learning, while the last two chapters will report my research.

A few pages are firstly dedicated to the literature review that reports a national and international panoramic of the research carried out concerning the investigation of knowledge, readiness and UDL implementation.

In the first chapter, I will first define Inclusive Education and the elements that characterise inclusive education according to Cottini L. (2019). Secondly, it will introduce the concept of inclusive curriculum according to the UDL approach, and finally, it will report the theoretical foundations at the basis of UDL.

The second chapter gets to the heart of the topic, by explaining the three principles that characterise Universal Design for Learning. The first part will explain the principle of providing

multiple ways of representation, secondly the principle of providing multiple ways of expression and finally the principle of providing multiple ways of engagement. For each principle will be also explained guidelines for the implementation of the approach will be provided.

The third chapter switches the attention to the Italian context. First it will be provided an historical background that retraces steps that have been taken towards inclusion and inclusiveness in the Italian school framework. Following this, I will report an empirical research conducted by Savia G. (2018) and then a research carried out by Ghedin E., Silvia M, (2017), and then we will analyse the main constraints to implementing UDL. At the end of the chapter I will present " Piano Scuola 4.0", which can be considered one of the more significant steps toward UDL implementation in the Italian context.

In the fourth chapter, I will present my research. Starting from an introduction which includes research premises, research questions, and an analysis of advantages and disadvantages of the research. To then proceed with the presentation of methods, instruments, and results analysis.

Last chapter will present discussions and conclusions.

CHAPTER I

THE UNIVERSAL DESIGN FOR LEARNING AND INCLUSIVE EDUCATION

1.1. Literature Review

"UDL approach is progressively becoming the educational framework that teachers use to apply inclusive teaching and learning strategies in the classroom to involve students with and without disabilities" (National Center on Universal Design for Learning, 2014 cited in Scott, 2018). However, challenges still prevent a significant spread in school frameworks. An investigation carried out by Scott (2018) has highlighted that some barriers are still present to UDL implementation.

Austin (2001) noted that inclusive practices are often not as valuable in the actual implementation, despite being thought-provoking. For this reason, there is a need for " more researchers to examine beliefs and attitudes about more targeted inclusive frame-works, like UDL, to gather information prior to widespread implementation and possible disappointment by teachers regarding implementation" (Austin, 2001 cited in Scott,2018)

Scott (2018), through phenomenological research that is research that "allows for a description of the experiences for individuals around a phenomenon" (Scott, 2018) has investigated the experiences teachers had in implementing UDL. This study aimed to discover teachers' attitudes towards this approach and potential barriers that can be encountered. Findings have evidenced that inclusive practices are not so valuable in the actual implementation for several reasons. Universal design for learning is an approach that is still taught in special education courses, while general education colleagues show little or no knowledge on the approach. The study evidenced that general education teachers need more training on the topic, and educational teachers that had training experience have shared their insecurities in the application of the approach. Participants have also evidenced how professional training should be also developed for all staff members and not only teachers, thus administrators too. In fact, respondents highlighted how there is a lack of support by school administrators and that to apply this approach this support is fundamental since it requires amounts of investments both in innovative environments, digital devices and professional training courses. Starting from these research studies who have brought to light possible constraints in the implementation of UDL I have selected research studies that have investigated teacher's knowledge and readiness for the implementation, considering both attitudes towards the approach and the advantages and

barriers that can be found. In this regard, several research has been carried out at international level. Following first an international overview several studies have investigated teacher's knowledge and attitude towards inclusive approach like UDL. In South Arabia a research study has been conducted to investigate teacher's knowledge, readiness and needs to implement UDL. (Alquraini & Rao, 2018) South Arabia has a different context in comparison to Italian context, since for example students with intellectual disabilities are taught in special education schools while SEN students or students with visual or hearing impairment are taught in general school with support teachers and supplementary devices. South Arabia in comparison with the Italian context is still under developmental stage concerning inclusive education. This study aimed to explore knowledge of practising special education teachers in the schools of Riyadh and asked what could have been done to a successful implementation of UDL 130 practising students were selected and provided with "an online survey with 19 statements seeking teachers perceived knowledge and use of UDL in their classrooms". (Alquraini & Rao, 2018) The aim was to investigate how teachers perceive themselves knowledgeable about UDL and whether they believe in using UDL in the classroom. In the end what were the perceived needs in order to implement UDL. Results evidenced as teachers need more " training, more technology, more teaching resources, and help of an additional person, assistant, to plan and deliver lessons" (Alquraini & Rao, 2018)

In the Australian context, a research study has been carried out among secondary school teachers to investigate teacher's attitudes towards the UDL framework.(Chen et al., 2023) Starting from previous research that affirms "teacher attitudes towards inclusive education and inclusive practices have been the focus of numerous studies for decades throughout the world (e.g., Boyle et al., 2020; Goddard & Evans, 2018; Page et al., 2022 as cited in Chen et al., 2023) The aim of the research was to identify which factors influence attitudes toward UDL and what was the level of attitude toward UDL. They were selected from 120 primary school teachers in Sydney metropolitan areas with different levels of training backgrounds in inclusive education. Teachers were first asked to answer questions concerning their general background and then they were asked to complete a 18-item questionnaire to measure their attitudes towards the UDL approach. Results evidenced an overall attitude towards UDL and some explanations for these results may be the level of preparation of Australian teachers, most of them had completed professional learning workshops or seminars about inclusive education. For what concerns school framework, Australian curriculum already " promotes education for all and provides an

illustration of how the curriculum can be used to design learning opportunities for all students"(Chen et al., 2023)

Teacher's knowledge and use of UDL has also been investigated in the metropolitan areas of Chicago. The study aimed to investigate " both General Education Teachers' and Special Education Teachers' knowledge and use of Universal Design for Learning as a way to instruct diverse learners successfully". (Mavrovic-Glaser, Katherine D., 2017) Apart from investigating knowledge on UDL, the aim of this study was to investigate whether both current teachers and special education teachers use UDL in their classes and which strategies do they use that align with UDL. The research study was conducted through a cross- sectional survey divided into demographics, survey on use of the UDL and survey on knowledge of the UDL.

Data were collected via email and analysed by transferring data in graphical, tabula and narrative form.

Results on the knowledge of UDL highlighted that more than half of the respondents are familiar with the term, but they also evidence they lack professional training. Special education teachers evidence more knowledge of UDL in comparison to curricular teachers, the study in general highlighted how special education teachers are much more likely to use the UDL approach in the classroom since they have a major training in comparison to general education teachers.

Before deepening into Universal design for learning as an inclusive approach, it will be given a general overview of what inclusive education is. A school system can be defined as inclusive when it welcomes diversity and guarantees formative success for each student. Inclusive education should bring to each student curiosity, self-determination, a perceived sense of personal competencies, and social relations through sharing and cooperation to each student. Inclusive education aims to respond to the variety of needs of students through a flexible didactic organisation that can adapt to every student's needs. The principal aim of the inclusive didactic is to promote responsible learning and harmonical social development in a student-centred approach. Inclusive education is defined in terms of presence, participation and achievement. Presence refers to the access to education for all students; Participation refers to the quality of learning where students are engaged in activities that they perceive beneficial. Achievement refers to educational and academic success that everyone can reach. Inclusive education is also motivational since fostering confidence in students' learning capabilities is essential.

The guiding principles of inclusive education can be resumed as follows:

- Respect for diversities: In the learning process, cultural diversities, and cognitive diversities
- Personalisation: a didactic strategy to enhance each student's talents. Every learner reaches his target based on their potential. The role of the teacher is to discover each student's potential, their excellence areas and plan personalised activities so that the learner can reach his maximal aim based on their peculiarities. Personalisation is about valorising a person's cognitive and learning styles.
- Individualization: a didactic strategy that aim at planning differentiated didactic strategies but the aim is to reach common goals
- Flexibility: Flexibility in goal setting, teaching methods and materials
- Accessibility: a place, environment, or event set up from the start to be accessible to all individuals. Accessibility that concerns accessible spaces, separate places, and visual and non-visual items
- Innovation: in the way of teaching and evaluating
- IT and Ta: use of digital technologies and assistive technologies, compensative devices
- Scaffolding: planned, constant, gradual support that leads students toward independence

An inclusive classroom supports cooperative learning and requires on behalf of teachers continuous training courses.

An inclusive teacher evaluates diversities as a resource for the class. It is misleading to consider diversities only in the presence of SEN students, because, according to innovative, inclusive didactic principles each student has his own diversity. Diversity is an undeniable resource where inclusive practices should be pursued for each student. An inclusive teacher should avoid student categorisations and be able to teach each student to focalise on their strengths. Being an inclusive teacher means supporting students and growing expectations that every student can reach academic success following their potential. To implement an inclusive didactic, teachers should be aware of the materials, instruments they have at their disposal and their employment. Teachers should be trained and informed about appropriate teaching methods and their application and ultimately be acknowledged for the learning contents.

[1]*Figura 1 Figura relativa al ruolo del docente nella didattica inclusiva*

Based on the general definition of inclusive education previously addressed, it is possible, according to Cottini (2019) to identify the lines of action that, if integrated, characterise inclusive education. We will briefly mention some of these lines to then prioritise the elements of the planning of an inclusive curriculum. Strategies that should be implemented are the following: Cooperative strategies, Cognitive and metacognitive strategies, Social and emotional learning, TIC and strategies to handle the classroom climate.

[2]*Figura 2 Strategie a fondamento della didattica inclusiva*

[1] Dal profilo di funzionamento alla stesura del PEI per l'inclusione di studenti con disabilità file:///C:/Users/loris/AppData/Local/Temp/Temp1_materiale_terzo_incontro_infanzia_primaria%20(2).zip/Prima%20lezione%20-%20la%20didattica%20inclusiva.pdf

[2] Cottini, L. (2019). *Universal design for learning E Curricolo Inclusivo*. Giunti Edu.

Cooperative strategies like peer tutoring and cooperative learning help students share knowledge, experiences and emotions. Peer tutoring foresees the role of a tutor and tutees where tutors can reinforce their abilities and confidence and acquire a significant sensitivity. In comparison, tutees benefit from peer support, additional time, immediate feedback and individual attention. Cooperative learning favours social competencies that reflect on the school's achievement. Cooperative learning involves groups of students working together to reach common goals. Roles are well-defined, and the result is a positive interdependence. Cognitive and metacognitive strategies to develop a strategic approach towards assignments, enhancing metacognitive reflection and promoting inclusive contexts. Some examples are memory-enhancing strategies, metacognitive didactics and procedures for effective study methods, and flipped classrooms.

Social and emotional learning is described as programs to develop " the ability to manage, understand, and express the social and emotional aspects of one's life in ways that enable the successful management of life tasks such as learning, forming relationships and solving problems" (Elias, 1997) It means for a child or an adult to acquires social and emotional competences like learning to be emphatic, to work cooperatively, to control impulsiveness.

TICs are essential to promote an inclusive classroom. TIC is divided into AT assistive technology and compensatory devices. Assistive technology is used by learners that present psychic, sensorial and physical disabilities and are generally fixed. Compensatory devices are indicated for SEN students but may be helpful for all students. Some examples are digital maps, audio lessons, and speech synthesisers. Tic in inclusive education are fundamental to reaching equity in learning. Students are offered the same opportunity to reach their goals through assistive technology and compensatory devices. Apart from compensative and assistive technology, inclusive education implementation also provides instruments with relational-dialogic and sharing functions. For example, Non-fixed devices like tablets and smartphones, web services for sharing content.

Furthermore, instruments for online teaching and sharing are like "Moodle" or " Edmondo". (Cottini, 2019). These are technologies functional to co-participation in class and at distance. In the end, inclusive technology includes interactive multimedia and manipulatives functions. This framework comprehends the Open educational resources. "Open Educational Resources are digitised materials offered freely and openly for educators, students and self-learners to use and re-use for teaching, learning and research." (Hylén, 2006) Open educational resources

include an autonomous and modular didactic unit that includes media collections like maps, time-line, ebook. Furthermore, interactive collections like didactic software and videogames or simulators. It is essential to examine what digital resources are offered in books to integrate them. Digital versions of the books help students follow more easily indications to learn the number of advantages they can offer for autonomous learning. The digital version of the book offers vocal synthesisers, audio and textual notes, bookmarks and search mode. In conclusion not only assistive and compensative technologies for SEN and students with disabilities but a series of functions that makes learning more accessible to anyone.

In conclusion, another crucial element of inclusive education is creating a supportive and welcoming social environment, a welcoming group class. The group dynamic is essential in the learning and teaching process. Cognitive activities have solid social components and are linked to social interaction contexts. An individual learns with others and from others, so the learning process is also the result of social interactions in the classroom. Inclusive education should also support co-building. Group classes can provide support in different ways, and when each individual contributes to a decision-making process, we can speak of co-building. Each student contributes by adding their own ideas. To create a supportive group class, for example, the teacher should initially form casual working groups for a certain amount of time so that students become accustomed to working with each other.

UDL and inclusive curriculum

Several theoretical foundations are called into question when approaching the topic of an inclusive curriculum. Since it is a vast and articulated topic, in this chapter, We will focus chiefly on the Universal design for learning as a scientific frame that guides inclusive practices. One of the strands of action to promote inclusive education includes planning an inclusive curriculum, which is fundamental to promoting individual diversities within each classroom and in the next chapter. We focus on the theoretical basis that Universal Design for Learning takes into account when planning an inclusive curriculum.

The curriculum generally identifies the learning content and the didactic planning. A curriculum becomes inclusive when the learning objectives, didactic strategies, and evaluation criteria are organised to allow each student to reach educational success.

Implementing an inclusive curriculum, however, follows various paths, but according to Cottini (2019), there are two lines of thought. The first implementation line is also the most common and frequently applied. It consists of creating a school curriculum for the class, which can be modified later to meet special students' needs. The modification implies learning objectives, methodologies, and evaluation criteria. In other words, starting from the general curriculum, a particular curriculum is built for special needs students. On the other hand, more recent empirical research on inclusive education encourages the intentional and systematic planning of educational curricula, which considers diverse students' needs from the beginning. It does not consist in creating a particular curriculum for special needs students.

On the contrary, from the beginning, Universal design for learning foresees the planning of a general, flexible curriculum which provides various options to meet all students' needs. The broad curriculum is not standard, and at the same time, it allows for further adaptation.

An inclusive curriculum has the centrality of the student in the learning process. It is based on the idea that each student is different in their learning process, and an inclusive curriculum should allow each student to express their potential. It is often believed that an inclusive curriculum is implemented in the presence of special needs students. Still, an inclusive curriculum following UDL principles should be inclusive to all so that each student can follow their learning path at their own pace. Thus, the challenge is to plan instruction, activities and courses that offer students different options according to various factors. The planning of an inclusive curriculum according to the Universal Design for Learning approach should consider each student to have a different type of intelligence cognitive styles and should promote self-determination.

1.2 Theoretical Foundations to build an Inclusive curriculum according to the UDL approach

Theories of multiple intelligences

According to Gardner and the theory of multiple intelligences, intelligence is not a general ability, but mental functioning is articulated in distinct areas with its own functioning rules. He opposes the concept of general intelligence, theorised in the past, to the concept of multiple intelligences. Based on this theory, there is no unique type of intelligence but a series of intelligence characterised by their modality of information processing.

Gardner's approach theorises that " the human organism has seven distinct units of intellectual functioning. He labels these units intelligence, each with its own observable and measurable abilities" (Morgan, 1996)

The theorisation of multiple intelligences is essential to planning an inclusive curriculum because it should be considered that each student perceives and processes their reality differently. Thus when designing a curriculum, it is crucial to consider the existence of differentiated profiles. "Gardner considers the assessment of intelligence as a procedure which should be understood as a part of the teaching and learning process" (Almeida et al., 2010, cited in González-Treviño, Núñez-Rocha, Valencia-Hernández, & Arrona-Palacios, 2020) and still " intelligence assessment on MI should (i) turn to diverse and attractive material to evaluate the different bits of intelligence; (ii)" (Almeida et al., 2010)Teachers should be informed about student's weaknesses and strengths "to foster the transfer of those competencies to curriculum domains;" (Almeida et al., 2010)

Examples of multiple intelligences are Linguistic, Mathematical, kinesthetics, musical, and spatial-visual.

- Linguistic intelligence: This intelligence includes the ability to effectively manipulate language to express oneself rhetorically or poetically. It also allows one to use language as a means to remember information. (Brualdi T., Amy C.; 1996)
- logical-mathematical intelligence: representation of the analytical thinking
- Spatial intelligence: the ability to visualise objects and environments
- Kinesthetics intelligence: -is the ability to use one's mental abilities to coordinate one's own bodily movements (Brualdi T., Amy C.; 1996)
- Musical intelligence: the ability to perceive, transform, and express sounds and musical forms
- interpersonal and intrapersonal intelligence: can be resumed as the capacity of introspection and being empathic on the other side

1.2.1 Triarchic Theory of Intelligence

Stenberg theorises the triarchic theory of intelligence that belongs to plurality intelligence. Stenberg theorises that intelligence develops from 3 ways of thinking: analytical, creative, and practical.

- Analytical thinking: the ability to examine, go into details, compare, and memorise. Analytical thinking is typical of those who excel in abstract thinking and obtain good results in tests that value cognitive competencies. It is taught through text analysis, comparisons, and term explanations.
- Creative thinking: belong to imaginative people who create a hypothesis that relies on intuition. Creative thinking can be stimulated by creating a text or a poem. Imaginative activities, supposition activities.
- Practical thinking is typical of those who excel in practical competencies and pragmatic thinking. To promote this thinking, teachers should plan activities that encourage students to practise their acquired knowledge and abilities in a real context and implement a plan with different purposes.

Unfortunately, school curricula tend to plan courses and activities that promote analytical thinking. Still, the instructional design must foster other types of thinking to meet all students' needs.

Overall, Gardner's theory of multiple intelligence and the Triarchic Theory of Intelligence by Stenberg are one of the pillars of the inclusive curriculum according to UDL. They both support student-centred learning, emphasising that each student processes the input differently. This is why instructional design should provide differentiated options in the content presentation and the expression of knowledge.

1.2.2. Cognitive Styles

To plan an inclusive curriculum implies also considering various cognitive styles. Cognitive styles describe how a person intakes, recollects and processes information.

Recognising the existence of different cognitive styles that can regulate learning should entail diversifying teaching methodologies. According to Cornoldi, De Beni e Mt Group (2001 cited in Cottini, 2019), certain cognitive styles are significant for instructional design since they are central to understanding information processing.

According to Cottini (2019), planning an inclusive curriculum that can respond to differentiated student requirements entails the adaptation of various proposals and also to the different cognitive styles.

Principal cognitive styles are systematic/ intuitive, global/ analytical, impulsive/ reflexive, verbal/ visual, field dependent or independent.

- Systematic/ intuitive: Describe how an individual tends to classify and formulate a hypothesis. A systematic approach foresees a gradual analysis of the variables, while the intuitive type develops a hypothesis and then tries to confirm it.
- Global/ analytical: This cognitive style is linked to perception. Some students focus on the general aspect of what is presented, trying to grasp the general meaning. In contrast, others direct their attention towards details.
- Impulsive/ Reflexive: It resumes how an individual elaborates on the information. Whether through immediate action or through an accurate reflection.
- Verbal or Visual: This cognitive style differentiates the preference between linguistic and verbal codes. Students who are better oriented towards a verbal code prefer oral explanations and written texts. At the same time, visual students will opt for the use of images, graphic maps, and schemes.
- Field dependent or independent : "Field Independent learner is considered as one who does not limit his learning to the immediate environment and provided materials, can extend and his experience to the wider environment while, Field Dependent learner is a learner who is mostly dependent on the materials given to him in his environment "(Muhammad 2010 cited in Takur et al., 2015)
- levelling-sharpening: levelling students recurs to a great amount of previous memory, good at activating the expectancy grammar. Sharpening students are more intuitive

1.2.3. Self-determination theory

Cottini (2019) supports the self-determination theory as one of the basis of an inclusive curriculum. Cottini, in particular, refers to the functional- determination theory theorised by Wehmeyer (1999). Self-determination theory in the education frame refers " to the attitudes and abilities necessary to act as primary causal agents in one's life" (Wehmeyer, 2005,p. 117 as cited in . Sergeant et al., 2009). Cottini claims students should be the protagonists of class life and involved in the organisation and management of teaching. Students should be involved

in the choice of activities and selection of assessment criteria. Cottini prompts significant autonomy for students to work on the choice of learning objectives, teaching programmes, and evaluation procedures. Wehmeyer focuses on the individual dimension defined as the "behaviour, the volitional actions that enable one to act as the primary causal agent in one life and the environment". (Sergeant et al., 2009) The environment is the context that can provide the individual with the opportunities to assume the role of "causal agents" (Sergeant et al., 2009) in their life. In the school context, the environmental dimension can be emphasised by the planning of an inclusive curriculum. A curriculum that foresees environmental learning as a space where everyone has various spaces of actions in which people act "(a) according to their preferences, interests, and/or abilities." (Sergeant et al., 2009). According to Bruner (1966 cited in Wehmeyer, 1999), the role of education is to " assist or to shape growth" (Wehmeyer, 1999) and promote self-determination. He claims that instructional designers are usually well prepared in theories of instruction and teaching models but not in building an adequate curriculum that can support growth through self-determination.

Self-determined actions are identified by four essential characteristics: "autonomy, self-regulation, psychological empowerment and self-realisation". (Wehmeyer, 1999)

Behavioural autonomy is mainly linked to the word " individuation". (Wehmeyer, 1999) Psychologists View "the process of individuation, or the formation of the person's identity" (Damon, 1983, cited in Sergeant et al., 2009) as a critical component of social and personality development. According to Wehemeyer (2009), Behavioural autonomy is the outcome of the individuation process and "encompasses, fundamentally, actions in which people act (a) according to their preferences, interests, and/or abilities;" (Wehmeyer, 1999). In instruction planning, students should reach a significant autonomy by allowing them to learn according to their interests and abilities. Autonomy should also be expressed through recreational activities and social and vocational activities where according to Sigafoos and colleagues (1998 cited in Wehmeyer, 1999), autonomy is described as " the degree to which personal preference and interests are applied" (Wehmeyer, 1999) and "the degree to which an individual uses personal preferences and interests to choose to engage in such activities". (Wehmeyer, 1999)

Self-regulated behaviour in the instructional field is to be able to discuss and actively participate in the goal-setting and evaluation process. Students can evaluate the outcomes' desirability and

revise their plans if necessary. Self-regulation means that students are “encouraged to take responsibility for their learning as they develop a battery of strategies for intake, organization compensation” (Brown & Lee, 2015) by becoming more autonomous learners.

In other words, Self-regulated behaviours include using the so-called self-management strategies. Strategies that require the capacity of self-monitoring, self-evaluation and self-reinforcement. An inclusive curriculum's planning encourages activities that allow students to be more independent in all the processes. Wehemeyer supports the idea that not only volitional actions are fundamental for self-determination. Wehmeyer focuses on what is defined as “physiological empowerment”. (Wehmeyer, 1999) Physiological empowerment is the perceptions, beliefs, and beliefs about oneself and one’s role as the causal agent, the so-called self-esteem. Physiological empowerment refers to the “ multiple dimensions of perceived control” (Wehmeyer,1999): self-efficacy, locus of control and motivation to control. Zimmerman (1996 cited in Wehmeyer, 1999) affirms that a positive perception of control entails what is called learned hopefulness, which is the “process of learning and utilising problem-solving skills and the achievement of perceived or actual control" (Zimmerman, 1990, p. 72 as cited in Wehmeyer, 1999) Zimmerman affirms that through this process, individuals develop a “ perception of psychological empowerment, which, in turn, enables them to achieve desired outcomes”. (Zimmerman, 1990, p. 72 as cited in Wehmeyer, 1999).

1.3 Universal design for learning and its origins

Universal Design for Learning (UDL) is a “ theoretical framework developed by CAST (the Center for Applied Special Technology) to guide the design and development of learning environments that represent materials in flexible ways and offers a variety of options for learners to comprehend information, demonstrate their knowledge and skills, and be motivated to learn” (Meyer, Rose, & Gordon, 2014 as cited in Hall, T., Vue, G., Strangman, N., & Meyer, A. 2004)

The Universal design for learning is a set of principles for developing a curriculum that guarantees each learner equal learning opportunity. Individuals have different needs in terms of needs, interests and learning competencies that are unique; thus; it is essential to recognise subjective variability in the learning process and flexibility.

Universal Design principles find their foundation in architectural design. The term Universal design was first developed “in 1988 by Ron Mace and colleagues” (Gronseth & Dalton , 2019) to refer to the study of products and environments that could be accessible “ for all users, including those with disabilities”. (Gronseth & Dalton , 2019) This movement was born to promote a design with no architectural barriers and progressively spread the principles of Universal Design in other contexts. Universal design was born to design products and environments that everyone could utilise without a needing further personalisation and adaptations. So, Universal design is aimed at preventing barriers rather than solving a specific problem that could be encountered.

Ronald Mace developed seven principles that describe Universal design.

Equal use: The project must be utilised by students with different abilities and avoid stigmatisation; the design should be useful and attractive to all persons.

Flexibility: The product should be suitable for a variety of persons and products should be used differently according to the users.

Intuitive and simple use *:* An instrument should user- friendly and not resent to subjective difficulties linked to knowledge, language or a deficit

Information perceptibility*:* to include different senses and information de codification through different channels and redundantly

Error tolerance: errors can become a source of frustration if mishandled, so it is necessary to provide systems to reduce the risk deriving by errors or correct it.

Reduction of physical effort: The product must be used effectively and easily with minimum muscular effort

Adequate size and space: The product must have suitable dimensions and be surrounded by adequate spaces to allow user access

Thus, as traditional architecture creates various barriers for many citizens, traditional didactic methods were not inclusive to all students. A standard and homogenous didactic proposal and traditional materials did not respond to all student's necessities. According to traditional didactic, students have to adapt to the educational path, and when it is not possible, a special curriculum has to be built. In contrast, the challenge of the UDL is to offer a general curriculum that is adaptable to all students from its design. It is the curriculum that is adapted and not students who adapt to the curriculum. In 1984, the creation of CAST (Centre for applied special technology) to implement technologies to improve education quality and years later was finally

identified as a strategy based on the implementation of flexible methods and materials. The principle of Universal design started to be considered at a design level and physical environments and how they can be applied to " educational environments." In fact, the Universal Design movement changed how architects think about designing buildings. "Similarly, UDL calls for a shift in how educators think about designing learning environments". (Hall et al., 2014)

The Universal design for learning provides a model for creating learning objectives, methods, materials, and evaluation criteria that work for all learners. The UDL foresees flexible approaches that can be personalised and suited to all learner's demands. The most revolutionary aspect of the Universal design for learning is that the curriculum aims to suit the diverse needs of all learners, not just those students with disabilities or SEN students. The traditional definition of inclusive education tends to focus on some special students and to create a general curriculum from which it derives a personalised curriculum for students with disabilities and SEN students. In contrast, the Universal design for learning focuses on each student's differentiated potential and aims to promote a flexible curriculum that can meet the needs of all learners. UDL does not consider standard learners, but " it recognises that variance across individuals is the norm" (Hall et al., 2012) and focuses on the plurality of materials and learning modalities. The acronym UDL, in fact, resumes the basic principle of this approach.

We discuss Universal since it refers to all learners; the word Design explains the intentional and planned approach, and the term Learning aims to support learners so that everyone can become competent and reach their full potential. The purpose of a a curriculum based on UDL is to help learners to master all their learning processes and to become expert students, which means to have students prepared, motivated, target-oriented learners. Planning UDL curriculums means removing barriers that do not allow learners to become expert learners.

Four elements compose the UDL curriculum.

Goals*:* Goals in the curriculum represent knowledge, content and abilities that students should master. Goals are separated from the meanings to reach them. Goals are clear ,but the instruments to reach these goals are multiple, allowing teachers to offer alternatives.

By setting the goals and objectives, it becomes possible to identify the strategies and instruments to reach these achievement goals.

Evaluation: Formative assessment ensures the monitoring of the student's learning process but allows for the improvement and monitoring of teaching strategies. Evaluation is the information collection process about a student's output using various methods and materials to determine students' knowledge, skills, and motivation to make educational decisions.

Educational methodologies*:* Represent teachers' approaches and procedures to improve student learning that can be constantly adapted and modified according to learners' requirements.

Teaching materials and Instruments: They are used to present learning contents and through which learners can demonstrate their knowledge. The UDL curriculum is flexible and various so that students can choose the most suitable.

CHAPTER II
UNIVERSAL DESIGN FOR LEARNING AND ITS PRINCIPLES

Curriculums are turned off based on whom they can teach, what they can teach, and how they can teach. Curriculums are often planned following a standard student capacity. This a risk for all students because, according to UDL, there is no standard student, not only referred to as special students or students with disabilities, but each student is unique and an individual variability in their learning process. Students need to develop their learning strategies, so curriculums, apart from the transmission of learning content, should provide ways to support different learning strategies.

UDL bases are to be found in neuroscience, in particular two finds:

1. "Learning in the individual brain is highly diverse and distributed" (Hall et al., 2012)
2. "Learning among individuals is also highly diverse and distributed" (Hall et al., 2012)

Universal design for learning approach is based on interconnected brain networks participating in the learning process. According to neuroscience, our brain acts differently regarding how we intake information (what we learn), called the recognition network. The recognition network represents the" what of the learning." In neuroscience, the recognition network is" specialised to assign meaning to patterns we see, they enable us to identify and understand information, ideas and patterns" (Hall et al., 2014)

In other words, how do we gather information and comprehend them. "How an individual categorises what we read, hear and see—for example, identifying letters and words." (Hall et al., 2014) From this recognition network, the result is that information and contents should be presented in various ways.

The Strategic network refers to how an individual " expresses what they know." (Hall et al., 2014). Strategic networks " are specialised to oversee mental and motor patterns. They enable us to plan, execute and monitor actions." (Hall et al., 2012) It foresees task planning and execution, in different terms, "how an individual organises and expresses their ideas—some examples: writing an essay or solving maths problems". (Hall et al., 2014) This network leads to the principle that students should have multiple ways to express their knowledge. The effective network is about the "Why of the learning process". (Hall et al., 2014) Affective networks " are specialised to evaluate patterns and assign them emotional significance" (Hall et al., 2012). It is about how learners are motivated to learn and how their learning process is

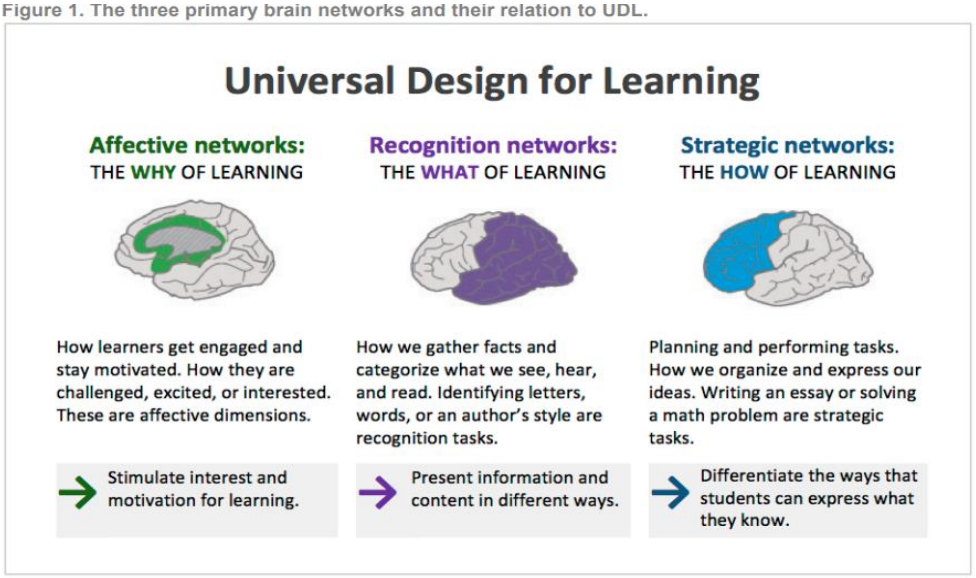
sustained through excitement, engagement. It ensues that it must be stimulated attention and learning motivation.

The three foundational principles of the Universal Design for Learning derives a from specific brain network.

- to provide multiple means of Representation
- to provide multiple means of Action and Expression
- to provide multiple means of Engagement

*Figura SEQ Figura * ARABIC 3 The three primary brain networks and their relation to Udl*

Figure 1. The three primary brain networks and their relation to UDL.



.[3]

2.1 The first principle

From the recognition network, it results in the principle of providing multiple means of representation. The recognition network that focuses on the "what of learning" (Hall et al., 2014) is supported by the principle that information should be presented variously. As mentioned, the recognition network focuses on how we gather information and categorise what our brain perceives. According to neurosciences, each individual intakes and categorises

[3] Hall, T., Vue, G., Strangman, N., & Meyer, A. (2004). Differentiated Instruction and Implications for UDL Implementation. Wakefield, MA: National Center on Accessing the General Curriculum. (Links updated 2014). Retrieved [insert date] from http://aem.cast.org/about/publications/2003/ncac-differentiated-instruction-udl.html

information differently for this reason, the first principle of the UDL provides for multiple ways of representing information. UDL supports the theory that not only students with sensorial disabilities or learning disabilities require diverse ways of approaching content but also that other students can benefit from the multiple means of representation. Following the theories of cognitive styles, multiple intelligences and the triarchic theory of intelligence, we can affirm that a learner may benefit from the representation of the information through visual representation or, differently, another student may prefer auditory representation. Thus, multiple means of representation of the information should meet all student's peculiar needs. "A range of examples can help to ensure that each student's recognition networks can identify the fundamental elements characterising a pattern". The first principle of the UDL is inspired by the Vakt model, which is, in its turn, based on the three sensorial perceptions at the basis of the learning styles theories. The Vakt model aims to determine the principal function a learner favours in their learning process: visual, auditory, kinesthetics and tactile. An individual has a dominant style that can vary depending on the presented information.

A visual learner will remember visual information, a piece of information that he can see. There is a further subdivision between visual-linguistic and visual-spatial. A visual linguistic learner will learn easier by reading and writing written text; the visual-spatial learner will prefer using graphs, tables and video projections. Students with an auditory style must listen to what they have to learn. They prefer reading and listening aloud and listening to recording lessons. They work better in dialogue situations.

The kinesthetics learner will need to touch and move around the classroom. They have limited attention spans and require changing activities frequently.

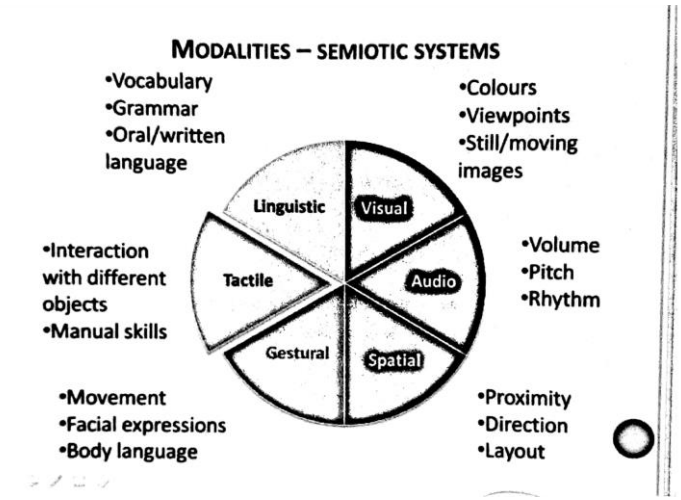
Tactile learners, in the end, will favour hands-on activities. The individual has a pragmatic way of learning, so activities like using finger and foot-writing manipulatives, building projects, and hands-on experiments will be suitable.

From this model, the Fernald method is a technique to teach reading and writing through visual, auditory, kinesthetic, and tactic styles. Initially, this method was developed for children with disabilities, but thanks to neuroscience studies, it has been discovered to be effective for all students. To support the application of a multimodal representation of information, we introduce the concept of multimodality.

"Multimodality refers to the introduction of 3 more sensory systems complex interweaving of word, image, gesture and movement, including speech, presented through a large number of

media."(Bearne, Wolschroft 2007). Multimodality refers to the interaction of three or more sensory systems in which different modes combine to achieve a single communicative intent. To represent the information according to multiple meanings of representation references to the combination of two or more semiotic systems. Semiotic systems include different modalities: Linguistic, Visual, Audio, Spatial, Gestural, and tactic. A multimodal approach is suitable to meet the needs of a heterogeneous class as it reaches out to different learning and cognitive styles.

4 Modalities and Semiotic Systems



4

The Cast drafts a set of guidelines to implement these three principles. Guidelines are "tools to help teachers and other curriculum developers in the instructional planning phase". (Hall et al., 2012) Guidelines are not compelling but should be considered suggestions to help teachers "customise instruction to individuals". (Hall et al., 2012) The planning of "adjustable scaffolds and supports" (Hall et al., 2012) and the proposal flexibility are incorporated from the beginning to avoid "modification as afterthoughts or add on". (Hall et al., 2012) Thus, the first principle is "to provide multiple means of representation." The Cast has first identified three guidelines.

[4] *New Literacies* . (2022). *Ca' Foscari: Login al sito*. Retrieved July 1, 2023, from https://moodle.unive.it/mod/resource/view.php?id=417520&forceview=1.

Guideline 1 Offering different options for the perception.

"Unintended barriers arise when information is not presented through various media" (Hall et al., 2012). Presenting a piece of information in a written format or only given in audio format creates barriers to students with impairments or who, according to the Vakt model, prefer a different learning style. Thus, according to the cast guidelines, other options should be proposed to present information like the disposition of graphs, videos, video transcripts, special models, oral and written descriptions.

Some proposed practical examples are modifying the written layout, the disposition of visual elements, and regulating sounds.

Guideline 2: To offer different options for language, mathematical expression and symbols.

Regarding language, we need to consider that students in our classes are diverse in capacity and linguistic diversity. Access to content cannot be guaranteed to everyone if we present the content in a single language. Difficulties that may be present are decoding, language comprehension and word understanding. To meet the needs of all students, it is essential to provide, for example, "pre-teaching important terms, multimedia glossary offering alternative language and translation supports…[..]" (Hall et al., 2012)

On the other hand, the language of mathematics is a proper language that not everyone is at ease with. This cast guidelines proposes, for example, using manipulatives to make more concrete activities or to meet spatial and kinesthetic learning style activities that physically involve students. The Cast also proposes supporting graphic symbols with alternative textual descriptions through hypertextual links and illustrations.

Guideline 3 provides different options for comprehension.

The instruction aims not just to make information accessible but to teach students how to transform accessible information into spendable knowledge. Studies on cognitive sciences have demonstrated that transforming accessible information towards spendable knowledge is an active process. This process depends on the capacity to elaborate information through selective attention, active memorisation, and integrating added information with previous knowledge. Learners differ in the capacity of information processing and in the capacity of acquiring new information. So, information is more accessible and easier to assimilate when presented by echoing previous knowledge. Examples of implementation can be connecting with the previous topic through maps and visual images, making interdisciplinary connections, and using advanced graphic organisers.

2.2 The second principle

The strategic network results in the principle of providing multiple meanings of representation. As mentioned above, the strategic network refers to how an individual "expresses what they know." It foresees task planning and execution, in different terms, how an individual organises and expresses their ideas. For this reason, the principle of providing multiple meanings of representation seems to be the natural development of this network. This principle aims to provide teachers with guidelines that allow learners to express their knowledge through multiple means. Each individual has their way of expressing themself both for capacity and attitude.

"Learning involves more than acquiring information; it is also a proactive and expressing behaviour". Students differ in the way they express their knowledge. There is no unique form of expression that fits everyone. Thus, it is essential to provide different opportunities.

Guideline 4 options for physical actions

Students differ from others in their capacity to interact with the environment. Learners are typically asked to express their knowledge through a written paper or respond orally. This may cause barriers for some students. Therefore, it is necessary to provide multiple response means, like joysticks, keyboards, and voice recording. To provide equity in the learning process, it is not sufficient to provide the devices, but there is the necessity for design attention where learners are offered support for using the instrument.

Guideline 5 options for expression and communication

No means of expression fits everyone. It is crucial to provide alternative modalities of expression for the interaction among learners and to allow the learner to communicate their knowledge, ideas and concepts effectively. The cast proposes to offer different composition options. Students should express themselves through illustrations, drawings, and visual arts. To use manipulatives and social media or interactive instruments like discussion forums, chat, web design and animated presentations. Using traditional instruments can be limiting because students do not keep up with the times and future work requirements. The variety of contents and teaching methods is limited and consequently restricts students' capacity to express their knowledge. Most of all, traditional methods do not permit all students to reach their full potential. Some examples proposed by the cast are the use of grammatical and vocal correctors, vocal synthesisers, calculators, web pages and instruments for concept maps.

Guideline, 6

Cast guidelines aim at encouraging executive functions. Executive functions are "the ability to self-monitor and carry out the steps of a plan effectively. We cannot think that students can choose objectives according to their work, but the aim is to develop some strategies that allow students to identify some objectives, handle and categorise information and monitor their signs of progress. Some examples are cognitive speed bumps, portfolios, guiding questions, and progress demonstrations.

2.3 The third principle

The affective network is about the Why of the learning process. It is about how learners are motivated to learn and how their learning process is sustained through excitement, engagement and interest. It ensures that it stimulates attention and learning motivation. Cast develops the principle of "providing means of engagement" from this network.

Acquisition research studies recognise motivations as the crucial element sustaining learning, but students differ from others in how they are encouraged and engaged in learning. According to Gardner and Lambert, for example, we can distinguish between 4 types of motivations

- Intrinsic: linked to the affective and emotional desire sphere
- Extrinsic: linked to external factors like compulsory education.
- Integrative: for those who want to integrate into a different culture.
- instrumental: When learning has positive outcomes, for example, in professional life.

Balboni (2002:37) then analyses motivation according to 3 macro areas:

- Dovere: when an individual is obliged and compelled to learn in a school contest.
- Need: when an individual learns for necessity.
- Pleasure: learning for the pleasure of learning.

Recovering our discussion on UDL principles, teachers have to find different ways to support engagement in student learning. According to Savia, distinct factors influence the individual motivations to learn, both neurological and cultural. Still, some students are attracted to newness and spontaneity, while others are stuck in routine activities. Other students prefer working in groups; others are more engaged during group work.

Guideline 7

Students' motivation to learn differs among students, and the same student will change over time based on age and progression in their knowledge. However, students are usually more engaged in activities closely related to their interests. Teachers should motivate students through authentic learning and highlighting the relevance of the learning. Not every student will engage in the same activities. Still, the teacher will find more student engagement if the activities are contextualised in the student's real life, culturally and socially relevant, age-appropriate and ethnically appropriate.

Guideline 8

To have motivated and engaged students, the activity must be challenging but not too difficult. Students need the right potential to complete the task, which differs among students. It would be preferable to differentiate the degree of difficulty and provide different autonomy and scaffolding in completing the task considering, for example, the scaffolding theory by Vikotsky. At the basis of the UDL, here is also the theory by Vigotzkij, who theorised the "proximal development area" described as :

*"*The distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers" (Shabani et al., 2010).

The proximal development area is the distance between what students can do and their potential (what a learner can do under guidance).

According to UDL principles, the way each student works to reach their potential area varies. Through these principles, the aim is to let each student reach these potential areas through flexible methods and materials and differentiate the grade of support a learner needs is different among students. Scaffolding is a temporal and assisted teaching that guides students to independence. Each student requires different scaffolding grades, and the UDL supports the three notions of scaffolding: contingency, fading and responsibility.

Contingency: "involves tailoring and customising the teaching strategy according to the student's capacity." (Malik, 2017) In particular, UDL focuses on micro-scaffolding, which refers to "momentary interaction between instructor and students" (Malik, 2017). This scaffolding is temporary; in fact, we introduce the concept of " fading". The instructor should

know when to reduce his support and lead students to reach more independence until they reach responsibility for their learning process.

Inclusive education supports cooperative learning and peer tutoring to foster collaboration, self-confidence, and positive interdependence.

Groups of work should be flexible for better differentiation and role division and to learn to work with all students. Still, they must be formed by defining clear objectives, roles and responsibilities. In conclusion, to support motivation, feedback is essential. Feedback that encourages perseverance, empathise effort and improvement.

Guideline 9

This guideline focuses on the intrinsic capabilities of students to self-regulate their emotions. Self-regulation capacity is the ability to regulate their moods so that students can be more efficient in handling, for example, frustration and distractions that may result from the environment.

The role of education nowadays is to master all the learning processes, not simply to learn content. Teaching should lead students from being beginner students to expert students.

Following the three principles described above, the UDL aims to create expert students. Expert students can be defined as motivated, knowledgeable and goal-directed. Expert students are engaged in learning; they know the importance of learning and find learning challenging. Furthermore, they know how to persevere through obstacles. Expert students are more self-aware of their learning styles and how they learn best. They can recover progress knowledge to set new information and recognise instruments and points of reference to help their learning. In the end, expert students can set their own goals and develop strategies and plans to reach these goals.

2.4 Is technology essential to apply UDL?

According to Savia, applying technology should not be one of many means to use the UDL. Even Though he claims that technological progress has allowed us to offer alternatives to barriers caused by the written text. Technology is one of the means through which to apply UDL. Digital devices are considered powerful because they are “versatile and transformable”. (Hall et al., 2012) Through digital media, information can be presented in different formats. Moreover, the same content can be displayed in other formats without losing the content’s property. Contents can be shown through text; the layout can be modified. For example,

information is displayed through a video where subtitles or reduced sound speeds can be used. In other words, through digital media, “learners can alter how content is presented”. (Hall et al., 2012)

Furthermore, digital media can be “networked” (Hall et al., 2012), linking various hyperlinks to access different documents simultaneously. In the US, there is growing attention towards how UDL can impact the learning environment based on the flexibility of the technology in comparison to the printed paper. Technology is not the remedy since it can be rigid whether or not it is well programmed. Technology should follow the principle of UDL to ensure a beneficial use for all students. Teachers must be resourceful and creative when presenting the materials and flexible in their teaching methods. Dalton (2002) reported that as a result of an experiment in a middle school, students who for a certain period had read digital romances, after six months, had reached significant improvement in comprehension in comparison to students who had read the same books in the printed paper in the Gates Magnitie test. Still, Coyne (2010) has studied the effect of the literacy by design program (gradual digital texts and software for letter recognition) in a kindergarten school letter recognition. The results showed better results in the Woodcock -test. Then, recently, the US National Scientific Foundation has supported the development of the UDL program in creating formative and flexible materials. Cast and the research and development centre developed a software for creating the UDL curriculum.

The use of technology does not necessarily improve learning; however, there is a need for training in the use of technology to gain the most digital devices can offer.

To gain the most from technology, both teachers and students need to master the so-called digital literacy skills. Digital literacy consists of “how new digital technologies impact on text production, and the possibilities and tools that students can access at any time, and the multimodal character of the text. or defined by Glister as “the ability to understand and use information in multiple formats”. (Gilster, 1998) Being digitally literate means understanding, creating meaning, and communicating through technology. Digital literacy is linked to multiliteracies, which is fundamental for the UDL principle application.

Multiliteracy identifies that “literacy practices are colliding with technology modes of representation”. In other words, it assimilates both technology and different modes of representation; modes of representation represent given resources for making meaning, like through the medium of print or the aural mode using a podcast. Multiliteracies instruction

considers individuals with diverse backgrounds and preferences, therefore promoting “different texts and ways of expressions”.

CHAPTER III

UNIVERSAL DESIGN FOR LEARNING IN THE ITALIAN CONTEXT

3.1 Historical backgrounds in terms of inclusiveness in the Italian educational context

This chapter focuses on the UDL related to the Italian context. It will be given first a brief overview of the Italian legislation in terms of inclusivity, and successively, we examine the diffusion of UDL as inclusive teaching practising in the Italian context.

Universal learning design is a relatively recent expression in education, even though its principles and concepts are founded and entranched in the science of learning. It was explained in the previous chapter that UDL is a scientific framework to plan instruction that guarantees maximum flexibility in reaching didactic aims, methods, materials, and evaluations. UDL suggests planning a flexible curriculum that can be effective for all students, not just students with disabilities. That is to say that this concept is relatively recent, and legislation about inclusive education for years has focused its efforts on promoting didactic instruction for "special students". The UDL concept has developed in the American context, but it is also spreading in the Italian educational system as a possible inclusive practice even though it is mainly experimental.

If the UDL can find fertile ground in the Italian educational context, it is the result of years of inclusive educational practices in constant evolution that have been legislated.

In the following few lines, we retrace some important legislation for inclusive education in the Italian educational context.

In the 20th century, the first significant step was abolishing differential classes in 1975. Until then, students with disabilities were secluded in specific classes. Sentence " 215 of 1987" (Savia, 2016) by the constitutional courts highlighted the right to education for all students as proclaimed in the constitution. The second significant step was promulgating Law 104 of 1992 (Savia, 2016), which recognised the fundamental rights of disabled people. In the school system, crucial figures and documents are introduced. Specific groups of work for inclusions and papers for the diagnosis and to plan specific curriculum planning. Successively, a major evolution in the inclusive field of education was Law 170 of 2010(Savia, 2016). This law has expanded the concept of inclusivity to SEN students by promulgating new norms. Heterogeneity, for the first time, was recognised as a natural condition; diagnosis and certifications could not be stigmatised, and unicity and imperfection is highlighted as a positive feature.

The Italian system is well prepared to welcome students with disabilities, and evidence is the number of resources available, the presence of support teachers, and the creation of individualised and personalised didactic plans. Statistics demonstrate the increasing presence of students with certified disabilities in class (3%) and SEN students (20%) and schools are increasingly implementing solutions to provide the best learning environment.

Nowadays, schools are required to evaluate their contexts and their educational and didactic practices. The first document is the self-evaluation report where each school identifies weaknesses, strong points and priorities in terms of objectives. These objectives also include a plan to improve their inclusive system. In this regard, a step towards the inclusivity for all students is the annual plan for inclusivity. This plan aims at building an educational context where to concretely realise a school for all and everyone. This annual plan for inclusivity is not a document for SEN or students with disabilities but an instrument to plan the educational offer that pays attention to each student's needs. The Annual inclusive plan can be considered the basis for implementing the UDL approach in Italian schools.

Given this long path towards inclusive education, the Italian educational system is considered one of the most solid school frameworks that could be ready to implement UDL.

The main criticism towards traditional practices of inclusive education is the risk of labelling certain students, resulting in the opposite of inclusiveness. Ianes affirms that the term Universality should have its basis in equality, which means to give students the same opportunities to reach their full potential. According to Savia, schools should represent the excellence model of respect for the unicity of each person. Carlini (Savia, 2016) states that new perspectives on inclusive education are gaining a foothold. A new perspective where there is no more the labelling of sen students, but that considers that each student has their own special educational needs. UDL does not start from the labelling of SEN students to identify special educational needs and successively to plan subsequent individual curriculum changes. UDL aims at planning from the beginning personalised educational interventions with no distinctions that could lead to discrimination and labelling. UDL highlights that the main purpose is not merely the content transmissions but to sustain the learning process and help students become expert students. UDL drives school figures to identify barriers to learning and how they can be reduced through flexible educational paths. Flexible educational path that can be reached through flexible options so that each student reaches their maximum formative success.

3.2 Empirical research on the territory

Thus, the Italian school system should take a step forward towards this new concept of inclusive education, but is the Italian school framework ready for its implementation? If we shift the focus towards the Italian context, we have to mention two research studies that are important to understand the Italian context in which this approach is situated. The specificity of the Italian context in comparison to other international contexts is the significant progress in terms of inclusions in the Italian school system. At the moment, empirical research on UDL in the Italian context results are few in number, but we can mention two significant studies for the research. A research study was carried out in Sicilian territories by Savia, (Savia, 2016),

while the second was carried out in the North East of Italy between Padova and Pordenone by Ghedin and Mazzocut. (Ghedin & Mazzocut , 2017). Savia (2016) has carried out research among 109 school teachers in Sicily to identify, analyse and deepen problems that were linked to inclusive education. This investigation aimed to investigate whether the application of UDL could improve teacher's attitudes towards inclusive education in terms of labelling language and collaboration among teachers. The research was an interpretive and quality action research project that included all teachers to see the effectiveness of the application of UDL in changing teacher's everyday practices. Initially, their opinions concerning inclusive practices are discordant from the first meetings among teachers and their express declaration and context analysis. A solid use of labelling language and a lack of collaboration among curricular and support teachers has emerged. A successive meeting was then organised. In these meetings, teachers were given a questionnaire to investigate their opinions on the possible effectiveness of UDL in improving inclusive practices. During the first semester, teacher, therefore, deepened their preparation with personal study and sharing the principles, guidelines, and tools available in the UDL approach, checked and uploaded their curricular planning with special UDL worksheets, highlighting the presence or absence of UDL characteristics, critical issue, learning barriers, and any suggestions for improvement. Each teacher recorded their own activities planned on UDL and his own reflections on personal blogs. At the end of the year, all teachers who had completed activities and used all the UDL tools were given a questionnaire 12 Likert scale and the opportunity to present their contributions.

From the initial questionnaire, it has emerged a quite homogeneous vision about the fact that inclusive education at school is a non-questionable practice and that a labelling language can

affect students' learning process. Moreover, increased collaboration between curricular students and support teachers should be prompted.

From the analysis of the second-meeting questionnaire and teacher's recordings over the year, a positive change in student's attitudes emerged, particularly appreciation for the differentiated meaning of representation. Teachers recognise that the UDL improves didactic inclusive practices, reducing the use of labelling language. On the other hand, some critics have emerged. Most teachers recognise the importance of UDL at a theoretical level, but implementation is still difficult. Some teachers refuse to participate in the program because they feel unprepared for this approach or that it is too difficult for their realities. Other teachers affirm that they are still linked to traditional practices, while others argue that they already put into practice many of the principles.

Given the aim of the research, we have to mention the research carried out by Ghedin and Mazzocut. (Ghedin & Mazzocut , 2017).

This research aimed to investigate teachers' perceptions regarding the sharing of inclusive values and practices adopted from the point of view of UDL. Furthermore, Ghedin and Mazzocut aimed to inquire about the teacher's knowledge of UDL.

The investigation aim can be resumed as to investigate the perception that teachers have regarding the sharing of inclusive values and practices adopted from the point of view of UDL and whether there is a significant difference among teachers in the application of inclusive practices according to school grade, specific institute, year of teaching, support or curricular teaching. In conclusion, the degree of knowledge of this approach.

As already mentioned, the research has been carried out among 255 teachers of different schools, grades, curricula, and background studies. They referenced two studies to carry out this research (Shelley et al., 2011; Hatley, 2011, as cited in Ghedin & Mazzocut, 2017). and the Universal design for learning guidelines to guide in the choice of the content to deepen, and questions from the index for inclusion to evaluate inclusive practices that may recall UDL principles.

They divided the questionnaire into 3 parts: demographic, 39 items to investigate inclusive practices, and one open question about the knowledge of the UDL.

Analysis has been conducted through a Likert scale analysis to investigate teacher's opinions on inclusive practices, during the second phase, there has been a confrontation taking into consideration teachers' backgrounds, school grades, specific institutes, and genre through alpha

Cronbach index and the last item about the UDL knowledge was an open question from which they interpreted the result.

Teacher's results that they share " abbastanza" inclusive practices and in general results have highlighted that teachers consider this approach a perfect theoretical model that foresees flexible learning environments, suitable for different learning modalities and an enriching and inclusive environment, but there are still too many constraints and an eventual implementation of the model is possible only whether there are changes in the Italian school context.

The main constraints that have been detected are organisational reasons like class size, lack of collaboration with institutions and communities, lack of administrative support, and too much burden on teachers. And still, insufficient financial resources, and inadequacy of classrooms both in terms of spaces and technological devices. Similar to the results gathered from Savia, teachers are reluctant to effectively apply the UDL. From this research, teachers argued that there is too much responsibility on the behalf of teachers. Following American research studies on the UDL application, according to Edyburn (2010, as cited in (Ghedin & Mazzocut, 2017)) there is no sufficient longitudinal study that demonstrates the effectiveness of UDL learning environments and Hatley (2011, as cited in Ghedin & Mazzocut, 2017) affirms that teachers do not possess sufficient knowledge on how to implement the UDL, and the Italian context evidence similar problematics. Teacher's preparation is crucial to the implementation of the model. Therefore, if we want to think of an implementation of the model on a large scale, one of the aspects to be considered is teacher training and a major collaboration among resourceful figures involved in creating an inclusive educational path. Teachers need training in dedicated courses; training courses should be provided both for in-formation teachers and tenured teachers if we want a change in the future perspective. UDL might be an effective instrument for principal teachers to complete their initial formation. Expert teachers may encounter difficulties in implementing a new model. Expert teachers in their careers may have experimented with different education steering lines and could stimulate more critics toward a relatively new model.

3.3 Possible constraints to the implementation of UDL

Savia (2016), based on his research, has listed a series of obstacles that prevent this educational model from gaining a foothold in the Italian context.

First, teachers express some doubts about the didactic choices of UDL.

UDL promotes individualisation and personalisation of the learning process, however, if teachers are not well-trained, they may be unsure of which line to pursue. Individualisation is a didactic strategy that aims at planning differentiated didactic strategies, but the aim is to reach common goals, while personalisation is a didactic strategy to enhance each student's talents. Every learner reaches his target based on their potential. The role of the teacher is to discover each student's potential, their excellence areas and plan personalised activities so that the learner can reach his maximal aim based on their peculiarities. Personalisation is about valorising a person's cognitive and learning styles. Teachers may wonder whether to implement individualisation or personalisation, or both, according to Baldacci (2014, p.117 as cited in Savia, 2016). UDL can be implemented in middle school, which aims at guaranteeing basic competencies to everyone and allowing each student to direct their own learning according to their attitudes that can be enhanced in the following grades at high school.

Another obstacle to implementing Universal design for learning is the role that still has evaluation, referring to certifying evaluation. Teachers question that it is difficult to promote an inclusive evaluation if learners face standardised tests.

UDL embraces the role of evaluation as promoted by inclusive education; evaluation is a process where the final test is just a part of the entire evaluation process. According to Cottini, evaluation is part of the learning process, not something to be added at the conclusion. Evaluation should develop over time and be generated by confronting different assessment tools. In fact, according to the National Indication of 2012, competence evaluation has been described as a process that precedes, accompanies and follows curricular paths.

It is essential to communicate from the beginning the evaluation criteria, so as for didactic aims so that students know the final purpose of the lessons. Furthermore, evaluation should be inclusive, starting from inclusive planning as much as possible. To plan an inclusive curriculum means to make evaluation inclusive. Thus, during the evaluation process, it is of the utmost importance to propose options that allow each student to express at their best what they have learned following their methods, times, and most suitable instruments. Students should have

equal opportunities also in the evaluation process, but evaluation loses its value if it is led only by teachers.

Evaluation should consider the role of the students, classmates, and teachers.

- Subjective evaluation refers to personal meanings that individuals give to their learning experiences. In the subjective evaluation, students self-evaluate their activities by completing logbooks, through self-evaluation strategies and verbal reports.
- Intersubjective evaluation refers to the social context in which the individual is inserted, and their expectations based on individual capabilities of responding to required tasks. This type of evaluation can be pursued by parents and classmates through observation protocols.
- Objective evaluation: It attests to the individual performance and its results based on the requirements.

In conclusion, following the guidelines for competence certification (Miur 2018), some indicators must be reckoned with.

- Autonomy: whether students can find the most suitable instruments and materials by themselves.
- Relation: the ability to create a positive social environment with classmates
- Participation: whether the student collaborates, calls for help or offers his own contribution
- Responsibility: Learners can take charge of their own learning, respect work phases and accomplish the task
- flexibility, resilience and creativity in the task accomplishment.

Evaluation cannot be considered the result of an arithmetic mean but a lengthy process considering each student's initial situation, progress, operative modalities and goals. Teachers should reflect on finding evaluation practices that offer the best equal opportunities.

Despite theoretical pronunciation, according to Savia, some constraints do not inclusively favour the evaluation.

In many schools, frameworks still have a traditional vision of the evaluation implied as a set of final tests that evaluate the results, not the process. That is to say, the fault does not always lay on teachers but on school legislation that is often required at the end of the year to have a standardised evaluation. Teachers question the flexibility in the evaluation supported by the

UDL when final exams then verify competencies in a standardised way. Furthermore, there needs to be more alignment between innovative school approaches and the external competencies that are required in the labour market or higher education institutions. Prominent critics, in fact, come when the topic of certified evaluation is introduced. A certification is not formative, and it does not have any pedagogical aim. Certification, for example, in the language field tests the knowledge of the language from which it derives a professional recognising or economic value. At the same time, even entry tests for higher education verify standard competencies with standard tests and instruments.

Evaluation and testing and exams are clearly different, as said, evaluation evaluates the learning process while tests and exams verify the achieved competence of a certain level. However, according to Savia, the principal constraint is if the school encourages a change in the evaluation process, even exams and tests that are part of the evaluation should follow the same principle of flexibility and inclusivity. Otherwise, whether a learner's competence is then verified through standardised tests there will be a misalignment between an inclusive and flexible formative evaluation and a standardised final test.

Other reasons that prevent the school framework from implementing the UDL is the insufficient presence of technological devices and innovative environments, but in this regard Italian school framework has the opportunity to make big changes in their didactics thanks to the " Piano scuola 4.0" (Ministero dell'Istruzione, 2022)

3.4 Steps toward Udl implementation

Piano scuola 4.0 is part of the Pnrr which was born as a national plan to recover the country after the Covid pandemic thanks to European funds. Part of this national plan is the "Piano scuola 4.0," which aims to strengthen the educational services from kindergarten to University. This plan mainly focuses on digital innovation and the creation of innovative environments.

Piano scuola 4.0 foresees 5 lines of intervention that will have a direct and indirect impact on the process of scholastic digitalisation

- integrated digital teaching and training on the digital transition of school staff to promote the adoption of digital competences curricula in school.
- new skills and new language: to develop in the school system the necessary digital competencies towards the job of the future (STEM)

- Innovative schools, new classrooms and laboratories for “the transformation of 100,000 classrooms in innovative learning environments” (Ministero dell'Istruzione, 2022) and the creation of laboratories for the digital profession of the future
- Development of tertiary vocational training system: to strengthen laboratories with digital technologies.
- Plan for the replacement of school buildings and energy development: to create modern, flexible and sustainable structure and school infrastructure capable of making teaching and learning effective.

Digitalization also invests in creating digital platforms and investments to provide all school with internet access. The investment line of the PNRR school 4.0 involves all schools and aims to transform the environment where curricular teaching takes place with advanced digital equipment and to equip second-cycle education schools with advanced laboratories.

At the European level, some regulatory frameworks have inspired the planning of the Pnrr. In particular for our discussion, the Council's conclusion on digital education in European knowledge societies. which inspired the need to empower teachers and trainers to participate in the creation of applied pedagogies in innovative, self-centred teaching methods that develop critical thinking and creative thinking. “well- trained teachers, capable of using digital technologies in a pedagogically appropriate age and gender sensitivity are a key factor in achieving high quality and inclusive education for all”.

Piano scuola 4.0 invests in training courses based on the European reference framework on teachers' digital competencies like “digcompedu”. (Bocconi, S., Earp, J., and Panesi S. 2018). Digcompedu aims to provide a coherent model that allows teachers and trainers to verify their pedagogical digital competence and comprehend 6 competencies.

Figura 5 Competenze DigcompEdu

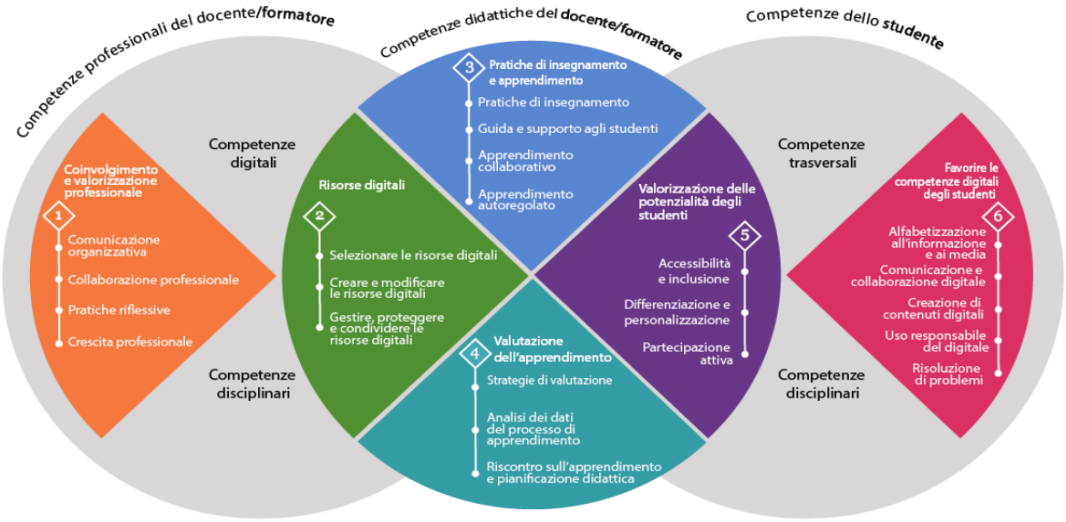


Figura 2. Sintesi del quadro delle competenze DigCompEdu [5]

The real potential of technology in teaching practices is the possibility to move from a teacher-centred approach to a student-centred approach where the teacher is a mentor that guides students to reach major autonomy and self-regulation in their learning process. With a view on UDL, the development of digital competencies both from students and teachers' favourite collaboration among students. Digital competencies make students capable of working and creating collaborative tasks, favouring cooperative learning. Through technology can be offered immediate and personalised support and to favour self-regulated learning. Technology is a useful tool to help students monitor, plan and reflect on their learning like foresees in the UDL guidelines.

The role of technology sees its effects on evaluation, too. Technology allows us to collect data in a different way apart from written forms, and the development of digital competencies allows for data analysis, selection, generation and interpretation of digital data related to student activity and progress achieved. Data collections provide students with timely feedback and help customise teaching and learning processes.

[5] Bocconi, S., Earp, J., and Panesi S. (2018). DigCompEdu. Il quadro di riferimento europeo sulle competenze digitali dei docenti. Istituto per le Tecnologie Didattiche, Consiglio Nazionale delle Ricerche (CNR). DOI: https://doi.org/10.17471/54008

In the end, always related to the UDL perspective, one of the strong points technology offers is valorising students' potentiality. Technology sustains personalisation whether a student can opt for activities based on his competence level, interest and learning needs. Digital technologies are a tool for motivating students. A topic can be deepened, new and creative solutions can be proposed to solve problems, other solutions can be explored, and students can make interconnections. Technology helps develop active participation in classroom activities and thus promoting a more student-centred approach. However, we must pay attention not to creating a disparity in access to technology. Access to technology should be guaranteed to all students considering that attitudes, abilities and competencies in relation to the digital world are different among students.

The capacity to grow digital competencies in students is directly interconnected with teachers' digital competencies for this reason, it is important to grow teachers' and trainers' digital competencies. Digcompedu is based on 6 competency levels on a progressive model from newbie to pioneer that defines a teacher's level of digital competencies. These competence levels are inspired by the taxonomy pyramid by Bloom.

Figura 6 Quadro delle competenze Digcompedu

[6]

In the first 2 levels the novice and explorer assimilates new information and develops basic digital skills. Intermediate levels there is a further expansion and reflection on his own digital practices. The expert can both share their knowledge and develops new practices

[6] Bocconi, S., Earp, J., and Panesi S. (2018). DigCompEdu. Il quadro di riferimento europeo sulle competenze digitali dei docenti. Istituto per le Tecnologie Didattiche, Consiglio Nazionale delle Ricerche (CNR). DOI: https://doi.org/10.17471/54008

Denominations attributed to each level of competence reflect typical use of technology at that level.

To conclude, in the view of UDL implementation, the more teachers will acquire digital competence, the more students will benefit from the enormous potential that technology may offer in making learning truly inclusive.

Next-generation classrooms

The greatest opportunity to implement UDL in the Italian school system is given by the number of investments that will be invested in learning environments. One of the greatest challenges of the Italian schools that prevented the implementation of UDL was the lack of a flexible and innovative learning environment, but this project may be a turning point to transform classrooms into inclusive classrooms for all students. Next-generation classrooms envisage "the transformation of 100,000 classrooms into innovative learning environments". (Ministero dell'Istruzione, 2022). These learning environments will be renovated in terms of space, furniture, and equipment that support innovative pedagogies. In fact, physical transformation must be accompanied by innovation in teaching and learning methodologies. International research has drawn attention to the process of the transition to new learning environments and innovative pedagogical practices that can be enabled by these spaces. The Organisation for Economic Cooperation and Development has identified some characteristics of learning environments that have to be satisfied.

Learning environments should be adjusted to assure comfort, health, access, and security to all; effective in order to support different learning and teaching requirements and efficient in the sense of obtaining the maximum results from a reasonable utilisation of the given spaces. Some examples provided by the OECD are the creation of learning spaces that: foster cooperative learning, active participation, and sensitivity to individual differences.

European councils affirm that there is a need for building safe, inclusive, and effective learning environments for all.

Besides physical design, it is essential to renovate the educational core, and this transformative process implies that schools become "formative organisations" (Ministero dell'Istruzione, 2022) with a strong leadership supported by innovative strategies and a partnership with families, communities and institutions.

To create flexible and learning environments it is necessary the administrative support. Headmasters are those who may introduce a change in the existing environment and encourage teachers to organise their teaching differently. Administrative support is essential in providing financial resources and collaborating with designers and teachers in the planning of innovative learning environments.

Innovative learning environments also supported by the UDL view and envisaged by the Piano Scuola 4.0 include both furniture and technologies. We can start with modular and flexible furniture and interactive monitors and connections to digital platforms. While at a more advanced level, we can talk of convertible furniture, the creation of learning areas, and projection surfaces for immersive reality. New learning environments cannot be planned without considering digital environments (e-learning or cloud) and immersive learning environments (virtual reality) to foster hybrid learning. L'eduverso, which uses metaverse in the educational field, offers new spaces for social interaction and freedom to experiment with new didactic experiences in a continuum between physical and virtual realities.

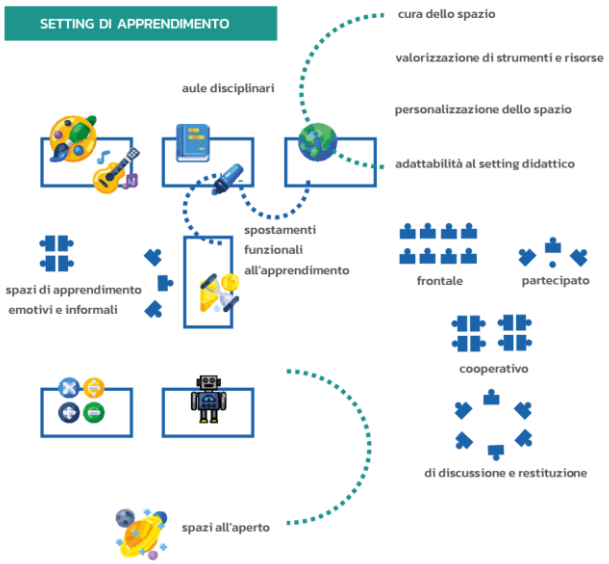
The planning of innovative learning environments involves 3 aspects:

- The design of the learning environments
- Instructional design based on innovative pedagogies that are adequate for new learning environments like UDL
- Accompany measures for an efficient use of didactic spaces.

Design

Design of innovative learning environments must be flexible and modulable to change classroom assets based on disciplinary activities with convertible furniture and versatile digital devices. The environmental setup must be adequate to learning objectives, modulated to the curriculum and student's age. The design of the physical environment must be realised and integrated with a digital learning environment.

Figura 7 Setting di apprendimento Piano scuola 4.0



[7]

Innovative pedagogies

Innovative pedagogies and related teaching methods are essential for taking advantage of the potentiality of new learning environments. Given the principles and guidelines of Universal design for learning, this approach can be one of the best to leverage new learning environments. Indeed, Universal design for learning encourages the creation of a flexible workspace where each student can have multiple means of expression and engagement and where the classroom can offer multiple means of representation. According to UDL principles, innovative learning environments meet all students' needs, even at the physical level, where students have no barriers both in movements and with the creation of modular and convertible furniture, flexibility in all senses is promoted. Innovative learning environments can be an important occasion for rethinking formative evaluation methods. Thanks for example, to different learning areas with different digital technologies that allow teachers to have in-progress feedback, monitor students' progress and change their teaching methods in the event.

[7] Ministero dell'Istruzione. (2022, July). PIANO_SCUOLA_4.0_VERSIONE_GRAFICA.pdf. Retrieved July 10, 2023

Accompany measures.

These measures for an efficient use of the learning environment must be scheduled during the planning of the innovative learning environment, and successively, schools have to provide continuous training through formative courses. Teachers will be invited to share their practices on platforms like “etwinning”, to participate in international formative courses through the Erasmus* and in conclusion, to take part in exchanges in order to improve and exchange practices.

In conclusion, according to Savia, (2016), the Italian school framework would be theoretically prepared to include UDL in their practices. Many teachers recognise their principles as valuable, but many constraints still do not allow the spreading of this approach. Teachers are not well prepared about how to actually implement this approach, so they require huge investments in training and continuous formation. Teachers have expressed doubts about some topics, such as the evaluation process and about which didactic strategies should be pursued to implement this approach. Eventually, the most significant constraints concern the lack of technology and innovative learning environments, but in this concern Italian school framework may take a big step forward in this direction due to the amount of investment that has been envisaged.

CHAPTER IV

INCLUSIVE INSTRUCTIONAL DESIGN: AN INVESTIGATION INTO PRIMARY SCHOOL TEACHERS ABOUT UNIVERSAL DESIGN FOR LEARNING

4.1 Introduction

In the previous chapter, we have introduced the topic of UDL related to the Italian context. We have reported research carried out by G.Savia (2018), who aimed to investigate whether the application of UDL in some schools in the Sicilian context could improve teachers' attitudes towards inclusive education in terms of labelling language and collaboration among teachers. Furthermore, this research aimed to investigate teacher's opinions on Udl and whether they see the applicability of this approach in their context.

Research on the UDL approach in the Italian context has also been conducted in the northeast of Italy between the areas of Padua and Pordenone by (Ghedin & Mazzocut , 2017) among 255 teachers of different school grades to investigate perceptions of the inclusive practices adopted in their classrooms and the knowledge of UDL.

In this latest research, the UDL model has not been directly presented in order to receive feedback on his work, but it investigates which inclusive practices are actually implemented in their context that recall UDL principles. The purpose was to demonstrate that in the Italian context, there are already some inclusive assumptions, and some of them recall Udl principles. Seemingly supported by Savia, the Italian context has, in the last 40 years, made big steps forward towards inclusion as we have briefly drawn a historical excursus that has shown previously. The guidelines for scholastic integration of students with disabilities have already highlighted how curricula should adapt to different styles and cognitive aptitudes to manage classroom activities in an alternative way, to favour, enhance, learn and adopt teaching materials and strategies in relation to people's needs. Even Though these guidelines refer to the inclusion of SEN students and students with disabilities, the Italian school framework demonstrates attention to providing the best equal opportunities for these students and has the basis for implementing UDL which considers each student special in its own way. UDL represents a step forward compared to traditional lines of inclusion, but having such attention to special needs students may be a good basis for fostering UDL.

Ghedin and Mazzocut (2017) provide evidence in their research literature on how there is, from teachers, a positive attitude towards UDL. The approach is recognised as it guarantees all

students' participation, increasing teaching effectiveness thanks to the improvement of accessibility to information for students and involvement in school activities.

4.2 Significance of the study

4.2.1 Research premises

Considering the premises on the UDL spreading in the Italian context, and the research carried out both by Savia (Savia, 2018) and Ghedin, Mazzocut (Ghedin & Mazzocut , 2017), it has been figured that it would be interesting to extend research in other Italian contexts.

In particular, the research carried out by Ghedin and Mazzocut has been a starting point to develop my own research on the field. Considering their results in the northeast of Italy, I thought conducting a research study on UDL in the Province of Treviso would be interesting.

A common aspect that has emerged in both investigations is about the fact that a Universal design for learning would be perfect to foster equality in opportunities given the principles on which is based Udl at a theoretical level, but most of the teachers find its application difficult in the actual Italian context. Another common aspect that has emerged is that many teachers already pursue inclusive strategies that recall UDL principles, even though many of them have little knowledge of the topic and have never consciously applied its principles.

Both Savia's (Savia, 2018) and Ghedin;Mazzocut's (Ghedin & Mazzocut , 2017) research has also evidenced common constraints that teachers have raised in the potential application of the approach. Specifically, teacher's lack of training, lack of administrative support in financial resources and space organisations, inadequacy of learning environments and lack of technological devices.

4.2.2 Research aim and research questions

Starting from the assumptions that many teachers may already put into practice many strategies without knowing UDL.

In line with what has been discovered through previous research on the field the aim of my research is first to investigate which strategies teachers apply with that recall Udl principles. Ghedin and Mazzocut's investigation (2017) is the starting point to develop my own research in the territory, however they aimed at investigating which inclusive strategies are already adopted by teachers in their research context by referring to the *index for inclusione.* In my

research, the purpose is to investigate which strategies do teachers apply that recall UDL, so the strategies that will be presented are taken from the UDL guidelines. My research aims at investigating also on teacher's knowledge on UDL the percentage of implementation among teachers and potential barriers that may prevent its implementation..
My research study is mainly based on two research studies. (Mavrovic-Glaser, Katherine D., 2017) and (Alquraini & Rao, 2018)

The survey here presented here therefore aims to answer 4 research questions:
1- Which strategies do teachers apply that recall UDL principles?
2- Do special education teachers have more knowledge about the UDL as an approach towards an inclusive didactic?
3- In which percentage do teachers have applied this approach in their classrooms?
4- In their opinion, which are the main constraints and barriers teachers could encounter in the UDL application?

4.2.3 Hypothesis

Based on the previous empirical research in the Italian context and theoretical argumentation on teacher's readiness for what concerns inclusive practices, teachers may mostly apply strategies that recall the principle of " multiple ways of representation" since the presentation of information in multiple ways may also be a diffused inclusive practice of which teachers could show more readiness since it is a common practice when dealing with SEN students too. Second, probably curricular teachers are less knowledgeable in comparison to support teachers of this approach, mainly because this topic might still be faced in special educational training courses while less in general training courses. Based on previous research, a low percentage of teachers have actually applied this approach. Both Savia and Ghedin Mazzocut have evidenced how teachers see this approach perfect only at a theoretical level since there are too many constraints in the actual Italian context, so a similar situation may result in my own research. In conclusion, the hypothesis of deficiency in terms of teacher training could be the biggest barrier in the implementation of the UDL approach.

As mentioned above in the research premises, the Ghedin and Mazzocut research has been a starting point for developing this research in the field. They have investigated the spreading of the approach in the schools of Padova and Pordenone of different orders.

The Italian context is advanced in terms of inclusivity, but UDL results, from previous research, still not that known and implemented. In the northeast of Italy, there is a research gap in the Province of Treviso regarding what concerns investigation on the topic, so the aim is to investigate knowledge of the approach and its potential implementation in two primary schools in the province of Treviso. Specifically, as exposed in the research questions to investigate strategies used that recall UDL, its knowledge and its potential implementation considering barriers and advantages.

This investigation may be a starting point for conducting another research in the province of Treviso.

4.3 Methodology and Instruments

Method

The participants were chosen through a convenience sampling. Convenience sampling happens when the researcher does not select a casual sampling or a systematic non-casual sampling but the researcher chooses a group of people for convenience. It means a group of people that, for convenience, are disposable at participating in the study due to proximity to the researcher. The participants in my research were colleagues who were part of the same comprehensive school. The accessible population I had for my research was all teachers of the comprehensive school, which comprehended 9 schools, but I selected a sample by submitting a questionnaire only to teachers of school complexes where I actually worked in 2 primary schools out of 9.

From the initial selected sample of 42 teachers, the number of final participants in the research projects was 30.

The type of research that has been carried out is quantitative research through the administration of a questionnaire. Quantitative research envisages the collection of information that is presented in numerical form and where data can be standardised. Data are categorised under graphs and tables and are measured through numerical scales. The questionnaire was administered online through non-official channels and was given two weeks to complete.

Characteristics of the sample group

To analyse the demographic section, we have calculated the percentage and the absolute frequency in relation to each indicator. In descriptive statistics, absolute frequency simply describes the number of times the observation has occurred. In other words, a simple count of the number of cases, items or things.

The characteristics of the sample reported in the method section report that the number of participants in the questionnaire was 30. There is a significant unbalancing in the genre of the participants since 86.7% of the respondents are females while only 13% are males. 100% of teachers then belong to the primary school cycle.

For what concern range, the majority of schoolteachers are between 40 and 49, following teachers in the range of 50 and 60 represent 30% of the participants. On an equal footing, we find teachers between 21-29 and 30-39, which represent 10% of the sample, while in last place, we find respondents that are 60+, which are 6% of the total.

Taking into account years of service, there is not a significant difference among participants. On equal footing, we find teachers with 0-10 years of experience and 10-20 years of work in the school. They both constitute 23.3% of the participants. Always on equal footing,

but in a lower step, we find teachers with 20-30 and 30-40 years of experience, which represents both 20% of the total, and finally, respondents with more than 40 years of teaching are 13% of the total.

40% of participants possess the " diploma magistrale", but 26% possess both diploma magistrale and another bachelor degree. 26% have a master's degree in "Scienze della formazione primaria" while 2 teachers out of 30 possess a different degree.

In the research, we included both special and general education teachers. General education teachers are 70% of the sampling (21 of 30), while special education teachers represent 30% of the total sampling (9 out of 30).

In conclusion, since we are in a primary school context, respondents teach more than one subject but we can group them as

8 teachers of scientific areas (38%), 5 respondents teach Italian(23%), 3 teachers of L2 (14%), 1 religion teacher (4%) and 4 (19%) respondents belong to the anthropological areas. In this case, we have not calculated the percentage for the total number of 30 respondents since there

are 9 respondents who are special education teachers and consequently not linked to a specific subject area.

Characteristics		***Frequency***	***Percentage***
Genre	Females	26	86,7
	Males	4	13,3
School grade	Primary school	30	100
Age range	21-29	3	10
	30-39	3	10
	40-49	13	43,3
	50-60	9	30
	60+	2	6,7
Years of service	0-10	7	23,3
	10-20	7	23,3
	20-30	6	20
	30-40	6	20
	40+	4	13,3
Qualification	Diploma magistrale	12	40
	Scienze della formazione primaria	8	26,7
	Diploma magistrale ed altra laurea	8	26,7

	Altro	2	6
Type of teachers	Curricular	21	70
	Support	9	30
Subject taught	Scientific areas	8	38 (out of 21)
	Italian	5	23
	L2	3	14
	IRC	1	4
	Anthropological areas	4	19

Instruments

To carry out the research, the questionnaire was built following research studies and the UDL guidelines.

The first part of the questionnaire was the demographic section. Participants were asked to answer questions about their gender, age, school grade, teaching years, qualification, teaching type and subject area. Teachers were also asked which updating courses they were interested in. So, the first part was composed of 7 multiple-choice questions.

The second part of the questionnaire aimed at discovering which didactic strategies teachers had already implemented that could recollect UDL principles. To evaluate the inclusiveness of the practices adopted by teachers involved in the research, in the light of the principle of UDL, I focused on strategies that UDL proposes to implement the guidelines, and I have chosen a set of strategies that comprehends all 3 principles, without specifying that they were UDL strategies. This part comprehends a grid with 10 affirmations to which teachers had to indicate their level of agreement on a scale of 1-5 from strongly disagree to strongly disagree.

The questionnaire's third section aims to discover whether teachers had effective knowledge of the Universal design for learning approach. The beginning of the third part envisaged a short,

open question of whether teachers were asked if they were knowledgeable of the UDL approach and if they have ever implemented it. Then, a second short open question asked teachers if they had implemented this approach, which principle was easier to implement. Then, a second multiple choice question in which teachers were asked which were the greatest barriers to the implementation of the UDL.

The final section of the questionnaire was dedicated only to teachers who had effectively implemented this approach in their classrooms. To conclude this section, teachers were posed with a series of affirmations that concerned UDL where teachers had to indicate their level of agreement within a Likert scale 1-5 from strongly disagree to strongly agree. In this regard, teachers were within a short open question if they could provide an example of implementation. Secondly, teachers were still asked 2 short open questions in which I demanded what, in their opinions, could be an advantage and a disadvantage of UDL implementation.

To summarise, this questionnaire is divided into 4 sections: the first section is composed of 7 multiple choice questions, the second section is composed of 10 affirmations on a 1-5 Likert scale, the third section is composed of 2 open short questions and a multiple- choice question to investigate knowledge on UDL. 4th section to investigate UDL implementation is composed of 9 affirmations on a 1-5 Likert scale and 3 short open questions.

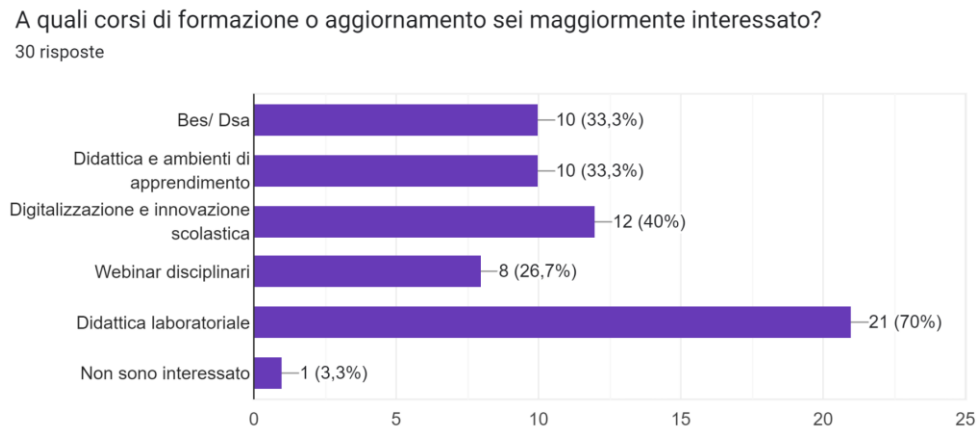
Questions on UDL were based on 9 UDL guidelines, from which I have derived 9 questions and from a research study that aimed at investigating UDL knowledge. Turki A. Alquraini & Shaila M. Rao (2020)

The choice of the instrument was given by the purpose of the research and time constraints. The questionnaire can contain both closed questions like multiple choice questions that were posed to investigate didactic strategies that recall UDL and affirmations about UDL knowledge. Closed questions force the participants to make a choice, and then open questions where there is a space for argumentation but where the participants have to select information. Open short questions were used to investigate teachers' general knowledge and perceptions they have on the UDL implementation. Given the number of participants, an interview may have been conducted, but a questionnaire was more suitable for quantitative research where data can be categorised. Furthermore, the advantage of the questionnaire is that it can easily reach many persons through technological devices and is time-saving.

4.4 Analysis of Findings

The First part of the questionnaire included the analysis of the sample, which has been presented above and then teachers were asked to indicate to which training courses or updating courses they were interested in. Participants had the opportunity to choose between different options so they could give multiple answers.

Figura 8 Interesse ai corsi di formazione



Results evidenced a prominent interest in teaching laboratory training and a slightly more interest in digitalisation and scholastic innovation. Respectively 21 participants want to receive training in teaching laboratories, which corresponds to 70% of the participants.

Slightly more interest in comparison to other topics, was demonstrated for training courses in digitalisation and scholastic innovation. 40% of participants showed interest in these courses.

On equal footing, the best teaching and learning environments raise the interest of 10 respondents, while disciplinary webinars are only of 8 persons. A respondent declared that there is no interest in attending any courses.

Section 2

Section 2 of the questionnaire aims to investigate which strategies teachers commonly use that recall UDL. This section presents 10 statements in which respondents are asked to express their level of agreement from strongly disagree to strongly agree. To facilitate the analysis of results, I have assigned a score from 1 to 5, then I proceeded with the mean.

1	2	3	4	5
strongly disagree	disagree	not sure	agree	strongly agree

	Mean
Presento l'informazione in modo multimodale attraverso video, testi, immagini e/o presentazioni.	4,5
Utilizzo schemi, mappe concettuali, faccio evidenziare i concetti chiave nel testo	4,4
Prima di presentare una nuova informazione cerco di attivare ciò che gli studenti sanno già	4,6
Permetto ai miei studenti di esprimersi con modalità differenti (testi, disegni, progetti, illustrazioni, musiche, danze)	4,2
Fornisco supporti digitali che meglio si adattano alla capacità dell'alunno (sintetizzatori vocali, calcolatrici, programmi di completamento delle parole)	4,2
Fornisco degli strumenti che aiutano ad organizzare il materiale	4
Assegno agli studenti task con difficoltà diverse	4,13
I compiti di realtà che assegno sono legati agli interessi degli studenti	3,9
Faccio scegliere allo studente se lavorare da solo o in piccolo gruppo	3,13
Fornisco dei feedback di supporto e faccio fare l'autovalutazione ai miei alunni	4,1
general mean	4,11

According to descriptive statistics, teachers " agree" with strategies that are proposed, so the strategies are pretty common in classrooms. The general mean is 4,11, close to the value 4 of the Likert scale. Findings demonstrate that although participants may not know the UDL approach, they agree with the strategies that are proposed by the UDL guidelines. However,

even though the general meaning declares that teachers agree with these strategies, there is some food for thought. Higher results have been obtained in statements linked to the first principle, " multiple ways of representations' which concerns the presentation of information in multiple ways (4,5), the creation of instruments like schemes, conceptual maps ..(4,4) and the activation of prior knowledge (4,6). On the contrary, the lowest results are linked to the principle of "providing multiple ways of engagement". In particular, tasks are not sure whether assigning tasks considering students' interests (3,9), and respondents do not often let students choose who to work with (3,19).

Possible explanations of the findings can be the fact that presenting information through multiple means has become a quite common practice, particularly after the introduction of certain digital devices in the classroom, like Lim or interactive monitors. Then, presenting the information through multiple means is usually prompted during general inclusive courses that mainly focus on SEN students and students with disabilities, of which also general education students have a quite strong background.

Conversely, most respond "not sure" on whether assigning tasks considering students' interests and group formation for completing tasks. Considering that the investigation has been carried out in a primary school, I would claim that it may make it difficult for teachers to let students choose to work on their own or in a group, but that makes it easier to have homogenous groups for classroom and activities management. Teachers then may opt for cooperative learning, assigning each student a specific role. Teachers may have expressed doubts about assigning tasks considering students' interests, this may indicate that respondents are still fixed to the class schedule.

Concerning the strategies linked to the second principle, "multiple means of expression," teachers agree with the strategies presented and are in line with the general mean.

The aim of the UDL is to form expert students who can be defined as motivated, knowledgeable, and goal-directed. Considering the answers given to strategies application, teachers lack more strategies that are mainly concerned with engaging motivation.

Section 3

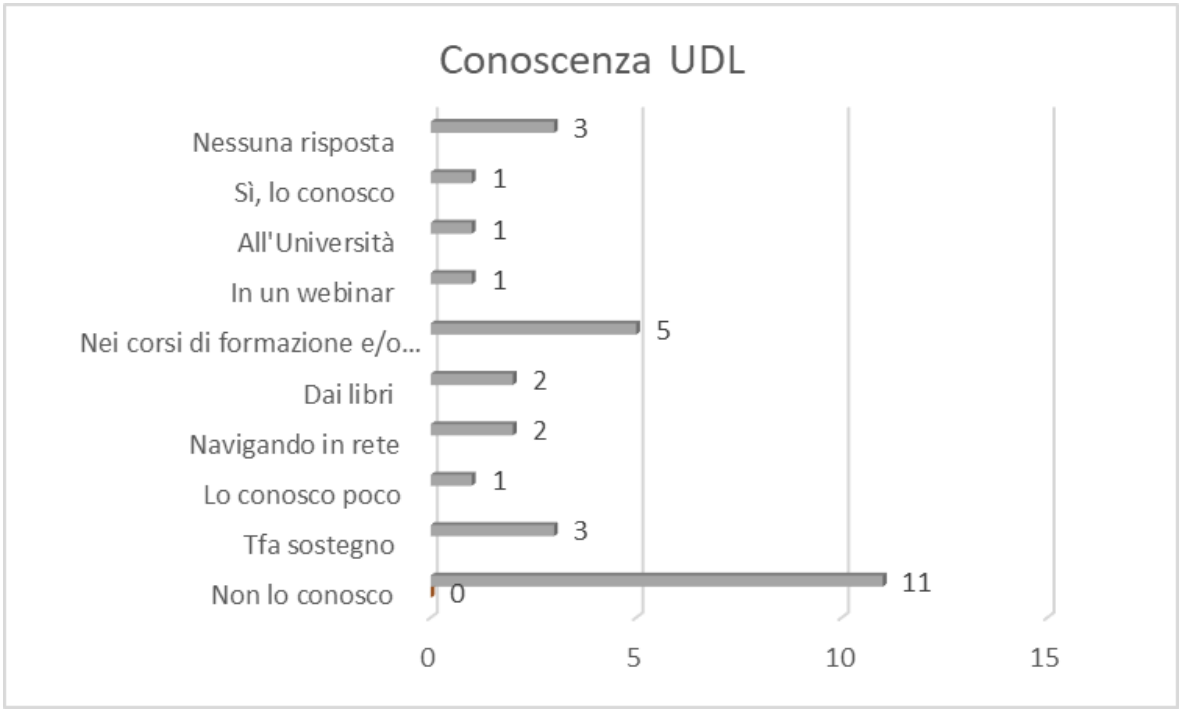
The third section of the questionnaire aims to discover whether teachers had effective knowledge of the Universal design for learning approach. The beginning of the third part

envisaged a short, open question of whether teachers were asked if they know UDL and where they have learnt about it.

The analysis procedure counts the number of units by categorising them according to answers.

.

Figura 9 Question on Udl's Knowledge

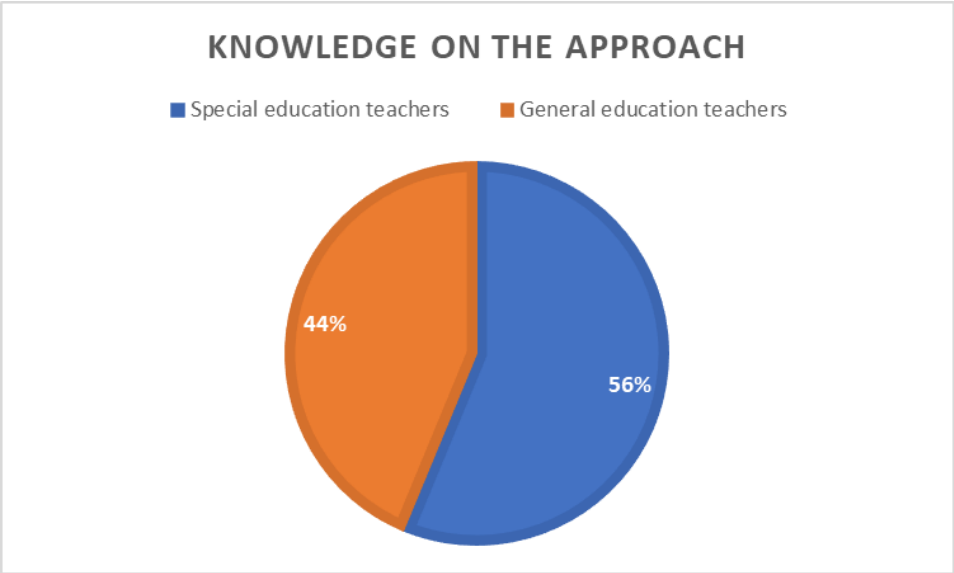


The first question on knowledge of UDL highlights that 11 out of 30 respondents have no knowledge of this approach and have never heard about it. Other participants have given various answers. Most teachers that affirm to have knowledge of UDL because of training courses are, respectively, 5 people. The other participant's answer are so divided:

2 respondents declared to have read something on the topic in books, while the other 2 participants declared to have read some articles on the web. A participant affirmed to have knowledge on the topic, but he/she has not declared how he/she has learned about it, while another participant has affirmed to have little knowledge of the approach. A respondent answered that he had come to know the UDL approach at the University, while another participant declared that he had heard about it during a webinar. 3 participants to the questionnaire have not responded, so we have in total an amount of 27 answers. The second step of this analysis is to calculate whether there is a difference between special education

teachers and general education teachers. Findings have evidenced that special education teachers have slightly higher knowledge of UDL in comparison to special education teachers. To conduct this analysis, I made a proportion between affirmative and negative answers in relation to the number of teachers. 5 support educational teachers out of 9 have declared to have knowledge on UDL, while only 9 general education teachers out of 21 have declared to have knowledge of the approach.

Figura 10 Differences among special education teachers and general education teachers



Following section 3, I then asked respondents if they applied this approach in class and which principle it was easier to apply. I calculated both absolute frequency and percentage on the total. Answers can be categorised as follows:

Appliche lo UDL in classe? Se sì, quale principio applichi maggiormente?	Af	%
Nessuna risposta	16	53%
No, non lo applicano	5	16%
Si, lo applicano	1	3,30 %
Non lo conoscono in modo specifico, ma adottano metodi didattici in linea	3	10%

Si, lo applicano fornendo diversi input per presentare l'informazione perché riconoscono che ognuno apprende in modo diverso	4	13%
Si applicano soprattutto la tolleranza all'errore	1	3,30

More than half of the participants (53%) did not answer the question that asked if they applied UDL in class and which principles. This is a strong non-response error which may affect final results. While 16% of participants declared they had never implemented the approach. In the first question that investigated general knowledge of UDL, 11 participants, so more than a third, declared to have no knowledge, and 3 had no answers to the first questions. Thus, 33.6% of the participants can be assumed to have no knowledge of the topic, while 56% of the respondents declared to have knowledge of the topic.

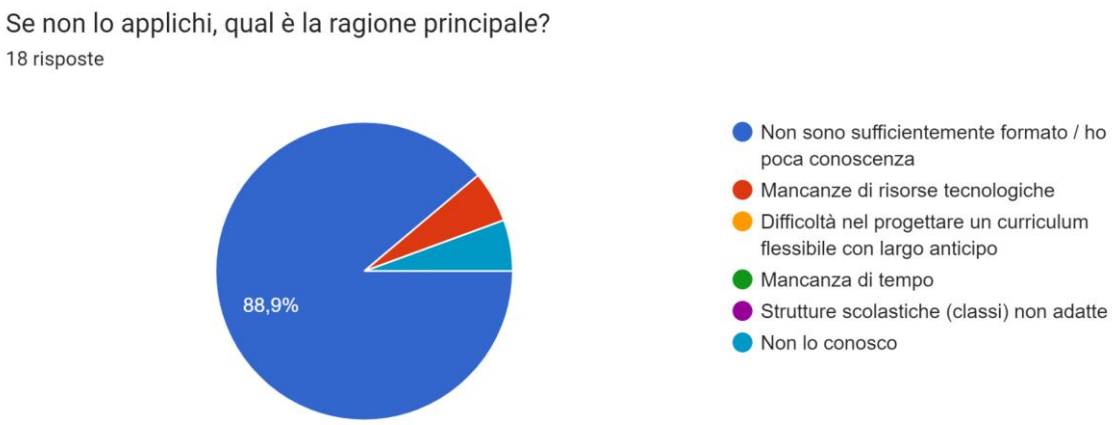
A confrontation between those who are declared to have knowledge and those who apply the UDL should be examined. In the first question, 56% of the participants declared to have knowledge of UDL, while from the data, it derives that 30% of the participants declared to have applied to UDL. This may lead to the conclusion that 26 % of respondents who have knowledge of UDL have theoretical knowledge of the approach, but they never actually applied its principles in the classroom. That is to consider, however, that more than half do not declare if they have any knowledge of the approach.

On the other side, 30% of the respondents that declared to have applied UDL can be subdivided into categories: A respondent only declared to apply the principle but without any specification in this regard, while 10% of the respondents affirm that they do not know the approach specifically but they use strategies and didactic methodologies in line with their principles. For example, foster choice and collaboration, activities in which students actively participate, creating a relaxed atmosphere. 13% of the respondents recognise that each student has a different way of learning and so they try to provide alternatives bas. on their potential. By providing technologies for more stimulating learning, maps and diagrams to stimulate memorisation of the main concepts and alternatives to visual materials. A respondent affirms that he specifically applies “error tolerance”.

The final part of section 3 asked respondents to indicate if they do not apply UDL in classrooms, which is the main reason. Participants were provided with multiple choice questions based on

previous research that had already been evidenced, which could be the main constraint on the application of the approach.

Figura 11 Main constraints about Udl implementation



In line with previous questions, 88.9% of the respondents affirm that they are not sufficiently professionally trained, or they have little knowledge of the topic. 5,6% of respondents have no knowledge at all while 5,6% declare there are no sufficient technological resources.

Section 4

In section 4 respondents were provided with affirmations on UDL to which they had to respond according to their level of agreement. So far in the second section we provided general affirmations that recall UDL guidelines but without specifying that affirmations were related to UDL while in the third section, short questions investigated more how they perceive knowledge about UDL In section 4 there have been specific affirmations on UDL to investigate whether teachers had knowledge to potentially implement this approach in their classrooms. Like in the second section participants had to express their level of agreement from strongly disagree to strongly agree in a Likert scale, to which it has been assigned a score from 1 to 5. To analyse the results then I calculated weighted mean for all items and the general mean.

1	2	3	4	5
Strongly disagree	Disagree	Not sure	Agree	Strongly agree

	Mean
I principi vanno applicati con un determinato criterio d'ordine	3,26
La tecnologia non è importante per l'implementazione	2,83
E' importante pianificare con largo anticipo	3,6
I principi sono 5	3,2
I principi possono essere usati simultanemente	3,4
E ' fondamentale durante la lezione usare la maggior parte delle linee guida	3,033
Si usa quando ci sono solo studenti con bisogni educativi speciali	2,83
E' una tecnica didattica	3,16
Aiuta a fornire specifici supporti agli studenti	3,53
General Mean	3,21

Findings in this section result are quite homogeneous and in line with data analysed in previous sections. General mean reveals that respondents are “not sure” on how to effectively implement UDL. In fact, a general mean of 3,21 corresponds to “not sure” in our Likert scale.

Given a general mean of 3,21, the majority of results are found in the range between 3,033 to 3,6, while statement 2 and statement 9 evidenced more taking sides since teachers here disagree with the affirmation proposed.

The majority of “not sure” answers concern statements on principles. To the affirmation “ i principi sono 5” there were 19 respondents who declared themselves unsure. While 18 responded “not sure” on whether principles can be used simultaneously, and still 16 respondents didn’t know if there is an order of application. Similar uncertainty has been demonstrated for statement 8, where 17 respondents were unsure of how to apply guidelines.

Teachers mostly disagree that technology is not fundamental to apply the approach, and also disagree on the fact this approach is used when there are only SEN students or students with disabilities.

Respondents then mostly agree that it is fundamental to plan in advance, in fact, here we have the highest number of "agree" answers, respectively 16 mostly agreeing and teachers mostly agreeing on the fact that it helps provide specific support, obtaining 12 agree and 3 strongly agree.

Successively, I asked participants if they could indicate a concrete example of realisation, and I asked them to respond only if they had truly applied one of the principles. I obtained 5 answers, so about 16% of the respondents.

Respondent 1

"I create collaborative activities, assigning each component a task based on its characteristics, 2 If a child is good in geography, he will create maps, if someone loves fashion, he will take care of the clothes of the Egyptians. Tests are differentiated and calibrated on student's capacity".

Respondent 2

"In reality, I apply strategies that fall within the principles such as giving the possibility of choice and making the pupils feel competent (blue box workshop or the use of writer's notebook"

Respondent 3

"After having something practical built, I also verify the context orally". The second principle

Respondent 4

"The proposed activities are always placed within the Zip. I start with very simple and intuitive activities that allow students to acquire self-confidence (in my opinion, it is a very important aspect in case a child makes mistakes). The activities are structured in such a way as to accompany the child step by step in completing the activity. I provide guiding questions where I think students may be in difficulty, I always try to offer images alongside the written part to facilitate understanding, and I provide examples before starting".

Respondent 5

"I present materials with videos, simplified maps and change layout of the text I use a computer in reading and writing".

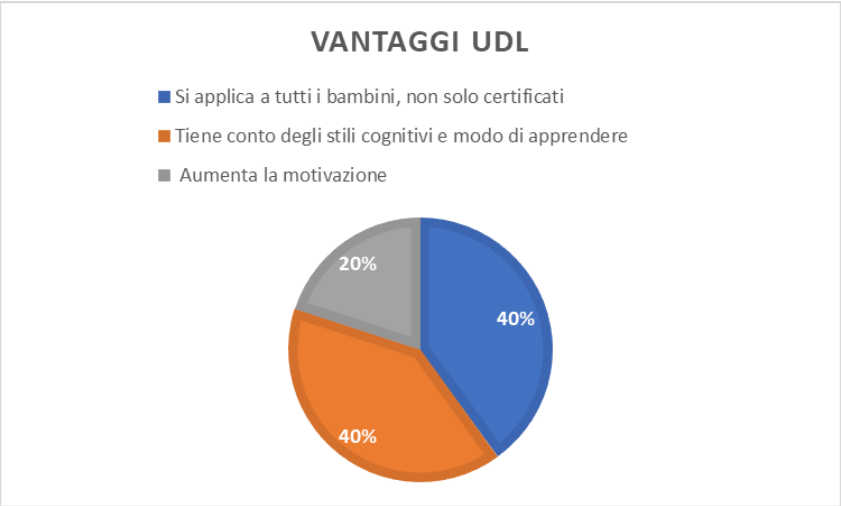
Based on answers, we can categorise answers based on UDL principles:

		number of items
First Principle	"I present materials with videos, simplified maps and change layout of the text I always try to offer images alongside the written part to facilitate understanding and I provide example before starting"	2
Second Principle	assigning each component a task based on its characteristics "After having something practical built, I also verify the context orally" I provide guiding (3) questions	3
Third Principle	"activities that allow students to acquire self-confidence" to accompany the child step by step in completing the activity I provide guiding (3) questions giving the possibility of choice and making the pupils feel competent "choice and making the pupils feel competent" Tests are differentiated and calibrated on the abilities of the children"	4

We can analyse those 4 items referring to the third principle: In particular, recovering our discussion on UDL principles, teachers have to find different ways to support engagement in student learning. Through this analysis, we can affirm that respondents are eager to give gradual scaffolding to students and by promoting self-regulation and autonomy in learning.

3 items correspond to the second principle; respondents try to assign tasks based on characteristics and let each student express differently (maps creation, Egyptian clothes), Respondent 3 affirms accompanying practical activities with oral activities so as to meet the needs of more students and the promotion of executive function through guiding questions.
Finally, principle 1 was the least practised, but two respondents affirmed giving multiple means of representation through videos or images supporting the written text.
Compared to the first question, which investigates which strategies teachers used to recall UDL, the findings are different. In the first question, the use of the first principle was prominent. In contrast, teachers who effectively put into practice the principles are more channels through strategies to sustain engagement in learning.
The last part of the questionnaire asked teachers who had experimented with UDL in their classrooms to indicate possible advantages and disadvantages of implementing UDL. I got five answers corresponding to those who provided concrete examples in previous questions.
Answers can be categorised as follows:

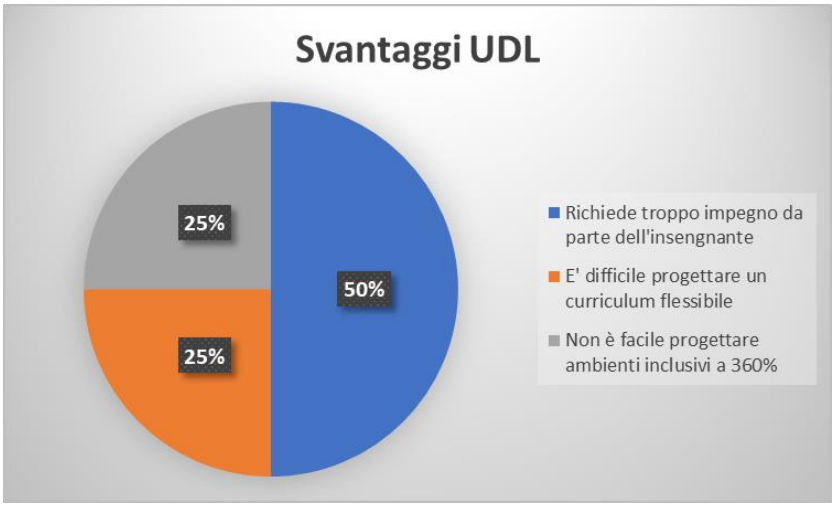
*Figura SEQ Figura * ARABIC 12 Advantages of the Udl implementation*



Considering the limited number of respondents to this section, two respondents declared that one of the main advantages is the opportunity to include all students no matter the fact it has a disability certification since each student has their own special needs. The other 2 respondents declared that it takes into account different cognitive and learning styles, while the other respondent affirmed that, according to them, it enhances motivation.

Questions on disadvantages produced interesting results, but only 4 participants responded to this question.

Figura 13 Disadvantages of Udl implementation



Two teachers have affirmed that organisations burden too much on teachers. At the same time, a respondent said that, according to her, it is too demanding to project a flexible curriculum starting from UDL principles and finally a respondent does not consider school environments not suitable for being totally inclusive. It would be challenging to plan innovative environments in all school comprehensives.

CHAPTER V

5.1 Discussions and Conclusions

The sample of our research comprises the majority of female teachers (87%), of which 21 are general education teachers and 9 are special education teachers. Most schoolteachers are between 40 and 49, while in last place, we find respondents that are 60+, which is 6% of the total. 66% of teachers possess a " diploma magistrale," of which 26,7 have together with a diploma magistrale an extra degree. 26,7 of teachers have a master's degree in "Scienze della formazione primaria"; of the few participants, 6% have another bachelor.

The sample is relatively homogeneous since participants possess a similar formative background. Primary school teachers do not specialise in one specific subject but follow a particular master's degree, so the risk of having a similar background is significant.

Respondents have highlighted an interest in digitalisation and innovation and in laboratory didactics. This interest for these training courses may evidence a willingness to change perspective in didactics from a teacher-centred approach towards a student-centred approach that guides students to reach significant autonomy and self-regulation in their learning process. Teachers may want to develop new competencies and new skills that are now gaining ground, like STEM. An interesting result is that digitalisation, innovation, and laboratory didactics are both part of the Pnrr, so an interest in these training courses can be concretely supported in the near future.

The first question of this research study aimed at investigating which strategies teachers apply for the major that recall UDL principles. Findings highlight that despite generally agreeing with all strategies, teachers are more inclined to use strategies that help present information in multiple meanings, facilitating comprehension and recollecting prior knowledge. I would argue that even though teachers may not know about UDL, they may have experience with students with learning disorders. It may be more common to present information differently in multiple ways. Creating schemes of digital maps, highlighting key concepts, and recollecting prior knowledge from students are often common practices in didactics, which may explain the high positive match.

Respondents show more "not sure" answers in strategies that, according to UDL, are necessary to sustain engagement. In particular, teachers are not sure about planning tasks close to students'

interests and autonomy is not much encouraged; specifically, teachers do not tend to let children work on their own or as a group. As mentioned earlier, in the finding sections, given students' young age, teachers may prefer to organise classroom divisions themselves. Teachers may also want to foster cooperative learning and peer tutoring, inclusive strategies, but these strategies require a defined group and role divisions. Finally, teachers agreed on providing students with multiple ways of expressing their knowledge and potential. The hypothesis has been refuted since I had claimed that teachers did not offer many opportunities to differentiate content and knowledge expression.

The second question investigates if special education teachers know more about the approach than general education teachers. The results showed that more than half of special education teachers learned the approach, while only 42.8% of general education teachers declared to know the approach.

I had hypothesised that general education teachers had less knowledge of the approach since from literature review and research on the field. Unfortunately, the topic of inclusivity is still linked to SEN students and students with disabilities, and it seems more interesting to special education teachers. Results have confirmed the hypothesis. Of the five special education teachers who have declared to know about UDL, four have declared to have learned about the approach during specific training courses for special education teachers. On the other hand, general education teachers mostly declared they learnt about UDL through books and searching on the internet; just two respondents have learnt about the approach in the school context. This evidence shows how training on inclusive education is still linked to a specific section of schoolteachers.

The third research question investigated which percentage of teachers had applied UDL in class. Considering previous research studies on the topic, specifically in the Italian context, I had assumed that a low percentage of teachers had implemented UDL. In the third section, where teachers were asked if they had ever applied the approach and which principles they apply preferably, 30% declared that they had applied it. Still, only 16% per cent of the respondents (5 out of 30) were effectively able to provide a concrete example. It might be said that we find ourselves in a sort of " social-desirability bias" where respondents tend to answer in a certain way to give a good image of themselves.

Given that the percentage of respondents who declared to have applied to UDL is low, we can confirm the hypothesis that there was a low percentage of respondents who applied to UDL.

However, concerning the most preferable principle applied, the result was upturned. Most respondents who gave concrete examples of the UDL approach apply teaching strategies to sustain engagement in learning. In contrast, in the general question at the beginning of the questionnaire, most respondents had declared to implement strategies that recollect the first principle.

The last research question aims to investigate which could be barriers that prevent the implementation of UDL. According to international and national literary reviews, several elements prevented the performance. A common feature in the research was the lack of training, so I hypothesised that this could be the possible cause. The hypothesis has been confirmed: 88.9% of respondents declared to have no knowledge or to lack professional training. This result aligns with the rest of the research, considering that around 33% had no knowledge of the topic, 25% evidence just theoretical knowledge, and only 16% of the respondents could provide concrete examples of realisation.

Generally speaking, the percentage of respondents who could complete all questions was extremely low; this may be a significant limitation for interfering results.

However, according to the literature review, results can be considered in line. Following the international overview, research studies by Scott (2018), Alquraini & Rao (2018) and Mavrovic-Glaser, Katherine D. (2017) have highlighted that most teachers have mostly theoretical knowledge but they lack professional training. Here, findings show 88.9% of respondents that the main reason not to implement UDL is their lack of knowledge and professional training. Results are also found by Scott (2018) and Mavrovic-Glaser, Katherine D. (2017), who discovered that special education teachers had more knowledge on the topic than general education teachers. Findings among teachers in the province of Treviso evidenced slightly more knowledge on the topic by special education teachers. Still, here it is to discuss that special education teachers who declare to know the approach are just a slight majority compared to general education teachers. Considering also research in the Italian context, which foresaw a high level of inclusive practice application, teachers have declared to apply many strategies following UDL without being knowledgeable of the approach, and this may be explained by the progress made in terms of inclusion in the last decades in the Italian school framework.

Overall, the results have evidenced that, despite teachers applying strategies recalling UDL, the approach cannot still be considered part of the educational action in building an inclusive instructional design in these surveyed schools. The advantages of this research have been the accessibility and the sample selection since participants are part of the same school. However, it must be considered that the investigation is limited to two primary schools of the same school comprehensive in a specific area, so there is not much variety in terms of background. Teachers may have similar experiences in terms of studies and cultural backgrounds. Still, the investigation is not extended to other schools' comprehensives, so we do not have a general overview of UDL knowledge and implementation in different realities. Furthermore, the research is limited to primary schools, while further research could include other school grades. The number of respondents is low and may be insufficient to interfere with the results and not representative of the target population. This could be a starting point for extending the investigation to other primary schools in the province of Treviso to have a broader view of the topic. This investigation may also be reproduced in other school grades in the Province of Treviso to make a confrontation between different school grades both in terms of knowledge and application of the approach. If further research on the territory will demonstrate general inexperience toward the approach by teachers, this could be valuable for education courses' organisers to think about providing specific training courses. Changing perspective on the idea of inclusivity may lead to the awareness that a truly inclusive school is Universally inclusive and does not limit the intervention to certain categories. Working on making inclusive environments for all students may be challenging, but recognising that each student has its unicity, in the long run, may lead to significant benefits in the learning environments, even for SEN students, which, according to Savia, under the traditional vision of inclusivity risks to be labelled. Finally, the spread of the Universal Design for learning will also need support from administrations and communities to invest in innovative environments which are truly inclusive and designed for all.

REFERENCE LIST

Almeida, L. S., Prieto, M. D., Ferreira, A. I., Bermejo, M. R., Ferrando, M., & Ferrándiz, C. (2010). Intelligence assessment: Gardner's multiple intelligence theory as an alternative. *Learning and Individual Differences*, *20*(3), 225–230. https://doi.org/10.1016/j.lindif.2009.12.010

Alquraini, T. A., & Rao, S. M. (2018). Assessing teachers' knowledge, readiness, and needs to implement universal design for learning in classrooms in Saudi Arabia. *International Journal of Inclusive Education*, *24*(1), 103–114. https://doi.org/10.1080/13603116.2018.1452298

Brualdi Timmins, Amy C. (1996) "Multiple Intelligences: Gardner's Theory," Practical Assessment, Research, and Evaluation: Vol. 5 , Article 10. DOI: https://doi.org/10.7275/7251-ea02 Available at: https://scholarworks.umass.edu/pare/vol5/iss1/10

Chen, H., Evans, D., & Luu, B. (2023). Moving towards inclusive education: Secondary school teacher attitudes towards Universal Design for learning in Australia. *Australasian Journal of Special and Inclusive Education*, *47*(1), 1–13. https://doi.org/10.1017/jsi.2023.1 https://www.cambridge.org/core/services/aop-cambridge-core/content/view/D795E9C764DE0B396A7BA27AF1547803/S2515073123000016a.pdf/moving_towards_inclusive_education_secondary_school_teacher_attitudes%E2%80%A6

Cottini, L. (2019). *Universal design for learning E Curricolo Inclusivo*. Giunti Edu.

Da Lio. (2023, July). *New Literacies*. Lecture.

Elias, M. J. (1997). *Promoting social and emotional learning: Guidelines for educators*. Association for Supervision and _Curriculum Development.

Fogarolo,F.(2015).Retrievedfrom http://www.flaviofogarolo.it/wp-content/uploads/2014/10/UD-e-UDL.pdf

Ghedin , E., & Mazzocut , S. (2017). Universal Design for Learning per una valorizzazione delle differenze: un'indagine esplorativa sulle percezioni degli insegnanti. *Giornale Italiano Della Ricerca Educativa, Anno X*(numero 18), 145–162.

Gilster, P. (1998). *Digital Literacy*. Wiley Computer.

González-Treviño IM, Núñez-Rocha GM, Valencia-Hernández JM, Arrona-Palacios A. Assessment of multiple intelligences in elementary school students in Mexico: An exploratory study. Heliyon. 2020 Apr 14;6(4):e03777. doi: 10.1016/j.heliyon.2020.e03777. PMID: 32322737; PMCID: PMC7163067.

Gronseth, S. L., & Dalton, E. (2019). *Universal Access Through Inclusive Instructional Design: International*. ROUTLEDGE.

Hall, T., Strangman, N., & Mayer, A. (2014). *Differentiated Instruction and Implications for UDL Implementation*. Microsoft Word - differentiated-instruction-menu-template.docx.

https://cdn-prod-pdfsimpli-wpcontent.azureedge.net/pdfseoforms/pdf-20180219t134432z-001/pdf/differentiated-instruction-menu-template.pdf

Hall, T. E., Meyer, A., & Rose, D. H. (2012). *Universal Design for learning in the classroom: Practical applications*. Guilford Press.

Hylén, J. (2006). *Open Educational Resources: Opportunities and challenges*. Microsoft Word - OpenEd PaperJH1.doc. https://www.oecd.org/education/ceri/37351085.pdf

Malik, S. A. (2017). Revisiting and re-representing scaffolding: The two gradient model. *Cogent Education, 4*(1), 1331533. https://doi.org/10.1080/2331186x.2017.1331533

Mavrovic-Glaser, Katherine D., "Teacher Knowledge and Use of Universal Design for Learning" (2017). All Capstone Projects. 343. https://opus.govst.edu/capstones/343

Ministero dell'Istruzione. (2022, July). PIANO_SCUOLA_4.0_VERSIONE_GRAFICA.pdf. Retrieved July 10, 2023,.

Morgan, H. (1996a). An analysis of Gardner's theory of multiple intelligence. *Roeper Review, 18*(4), 263–269. https://doi.org/10.1080/02783199609553756

New Literacies. (2022). *Ca' Foscari: Login al sito*. Retrieved July 1, 2023, from https://moodle.unive.it/mod/resource/view.php?id=417520&forceview=1.

Sartori C. (2016) Dal profilo di funzionamento alla stesura del PEI per l'inclusione di studenti con disabilità file:///C:/Users/loris/AppData/Local/Temp/Temp1_materiale_terzo_incontro_infanzia_primaria%20(2).zip/Prima%20lezione%20-%20la%20didattica%20inclusiva.pdf

Sartori C. (2016) La didattica inclusiva paradigma dell'insegnamento file:///C:/Users/loris/AppData/Local/Temp/Temp1_materiale_terzo_incontro_infanzia_primaria%20(2).zip/Prima%20lezione%20-%20UDL.pdf

Savia, G. (2016). *Universal design for learning: Progettazione Universale per l'apprendimento e Didattica Inclusiva*. Erickson.

Savia, G. (2018). Universal Design for Learning nel contesto italiano. Esiti di una ricerca sul territorio . *Italian Journal of Special Education Inclusion, VI*(1), 101–118.

Scott, L. A. (2018). Barriers to implementing a universal design for learning framework. *Inclusion, 6*(4), 274–286. https://doi.org/10.1352/2326-6988-6.4.274

Shabani, K., Khatib, M., & Ebadi, S. (2010). Vygotsky's zone of Proximal Development: Instructional Implications and teachers' professional development. *English Language Teaching, 3*(4), 237–248. https://doi.org/10.5539/elt.v3n4p237

Takur , M., Daniel , E. G. S., & Amnah Abdurauf, R. (2015). Cognitive Styles Field Dependence/Independence and Scientific Achievement of Male and Female Students of Zamfara State College of Education Maru, Nigeria. *Journal of Education and Practice*, *6*(10), 58–63.

Wehmeyer, M. L. (1999). A functional model of self-determination. *Focus on Autism and Other Developmental Disabilities*, *14*(1), 53–61. https://doi.org/10.1177/108835769901400107