UDLnet: A Framework for Addressing Learner Variability

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Abstract

Article 24 of the UN Convention on the Rights of Persons with Disabilities states that persons with disabilities should be guaranteed the right to inclusive education at all levels, regardless of age, without discrimination and on the basis of equal opportunity. State Parties should ensure that children with disabilities are not excluded from free and compulsory primary education, or from secondary education. Still, there is a long way ahead before reaching a society where equal opportunities are guaranteed for all. Inclusive and quality education is a key means to achieve this goal. In many special, as well as mainstream schools, however, there is still much uncertainty and a lack of knowledge. Grounded on new research in neuroscience and the Design for All principles, Universal Design for Learning constitutes an educational approach that promotes access, participation and progress in the general curriculum for all learners. UDL recognizes the need to create opportunities for the inclusion of diverse learners through providing curricula and instructional activities that allow for multiple means of representation, expression, and engagement. Yet, these developments do not necessarily result in significant, widespread changes in practice – that is, in how schools actually organise and provide learning experiences for pupils. The difficulty is in all cases translating these policies into practice. Though the policy context supports a shift to inclusion, professionals need more support to develop their practice. In order to bridge the gap between policy and practice the UDLnet network aspires to address this necessity collecting and creating best practices under the framework of Universal Design for Learning. UDLnet is a European network that aims to contribute to the improvement of teachers' practice in all areas of their work, combining ICT skills with UDL-based innovations in pedagogy, curriculum, and institutional organization. This paper presents the UDLnet project, its aims, the methodological framework, as well as the envisaged themes.

1 Introduction

Following the European Year for Combating Poverty and Social Inclusion (2010), the adoption of a headline target under the Europe 2020 Strategy (Europe 2020, 2010) on the reduction of early school leaving and the 2010 Council conclusions on the education of migrants and on the social dimension of education and training, social inclusion is promoted through education. For the school sector particularly, the issues of early school

leaving and special needs are particularly important. European legislation addresses disability in a broad range of areas: Treaty of Amsterdam (Article 13, 1997) on discrimination against disabled citizens; Article 26, EU Charter of Fundamental Rights on 'the right of persons with disabilities to benefit from measures designed to ensure their independence/social and occupational integration/participation in the life of the community.' Mainstreaming accessibility in EU policies is part of the Commission's wider drive to facilitate people with disabilities to play their full part in society. Disability is also at the core of the UN Convention on the Rights of People with Disabilities, to which the European Community is a signatory. The EU's Europe 2020 strategy has, as a priority, accessibility and economic/social participation of people with disabilities through the elimination of existing barriers. According to the EU Commission Staff Working Document Analysis and mapping of innovative teaching and learning for all through new Technologies and Open Educational Resources in Europe Accompanying document Communication 'Opening Up Education' (2013), the wider use of new technology and open educational resources can contribute to alleviating costs for educational institutions and for students, especially among disadvantaged groups. This equity impact requires, however, sustained investment in educational infrastructures and human resources

The right to inclusive and quality education for all, has come a long way over the last decades. Since the UNESCO Salamanca Statement of 1994, there is a political will within the 27 EU Member States to carry out the necessary changes in the field of legislation and school organisation. Both on European and national levels, authorities worked on the realisation of legal frameworks facilitating inclusive education for all within the framework of their competence. These declarations and policy documents clearly state that all children and adults have the same right to high quality and appropriate education. While there have been numerous successful efforts to reduce barriers to access, participation, and progress within the general education curriculum, students with disabilities still experience significant difficulty obtaining accessible and usable educational resources in a timely manner. As a result, students with disabilities are chronically at high risk for school failure and under-performance (Blackorby & Wagner, 2004; Frieden, 2004).

There is a long way ahead before reaching a society where equal opportunities are guaranteed for all. Inclusive and quality education is a key means to achieve this goal. In many special, as well as mainstream schools, however, there is still much uncertainty and a lack of knowledge. Strong legacies of institutionalization, charitable special provision and segregated systems exert a powerful negative influence on expectations and assumptions. Though the policy context supports a shift to inclusion, professionals need more support to develop their practice. Over the last twenty years, educators have been searching for ideas and techniques to address access and equity issues that create barriers to effective learning for a variety of students. In Ireland, the critical importance of the *Report of the Commission on the Status of People with Disabilities* in 1996 was underlined by a significant wave of legislative and administrative measures tied in to acceptance of the social model of disability, the mainstreaming of services and significant new legislation. While linkage to other areas of social discrimination and human rights was not consistent, the importance of the *Equality Act 2004* cannot be overestimated in promoting a legal basis for inclusion for the pursuance of anti-discrimination actions.

Educators recognise that every child has unique strengths and needs not served well by a traditional, standardized instructional approach. The challenge, according to Universal Design for Learning (UDL) is not to change the students, but rather to redesign, adapt and personalize curricula and instructional methods and create a learning environment that

helps each student develop his or her full potential. Thus, Designing for All (D4All) and promoting inclusion benefits all children and not only those with disabilities. "Universal Design for Learning is a "research-based set of principles that forms a practical framework for using technology to maximize learning opportunities for every student (Rose, et al. 2002)". UDL along with the associated Guidelines is grounded on the D4All principles and constitutes a quite generic framework that has not significantly been introduced in Europe.

2 State of the art

2.1 What is Universal Design for Learning?

Grounded on new research in neuroscience (Hall, Meyer & Rose, 2012) and the Design for All (D4All) principles (Stephanidis, 1999), Universal Design for Learning (UDL) constitutes an educational approach that promotes access, participation and progress in the general curriculum for all learners (CAST, 2014). Individuals bring a huge variety of skills, needs, and interests to learning. Neuroscience reveals that these differences are as varied and unique as our DNA or fingerprints. Three primary brain networks come into play: (Meyer & Rose, 2000, Rose& Meyer, 2002; 2006):

[Table 1] Brain networks and Universal Design for Learning

Recognition Networks	**Strategic Networks**	**Affective Networks**
The "what" of learning	***The "how" of learning***	***The "why" of learning***
		
How we gather facts and categorize what we see, hear, and read. Identifying letters, words, or an author's style are recognition tasks.	Planning and performing tasks. How we organize and express our ideas. Writing an essay or solving a math problem are strategic tasks.	How learners get engaged and stay motivated. How they are challenged, excited, or interested. These are affective dimensions.
Present information and content in different ways	Differentiate the ways that students can express what they know	Stimulate interest and motivation for learning

UDL recognises the need to create opportunities for the inclusion of diverse learners through providing curricula and instructional activities that allow for multiple means of representation, expression, and engagement (King-Sears, 2009).

2.2 The Three Principles

Three primary principles, based on neuroscience research, guide UDL and provide the underlying framework for the Guidelines:

- **Principle I: Provide Multiple Means of Representation** (the "what" of learning). Learners differ in the ways that they perceive and comprehend information that is presented to them. For example, those with sensory disabilities (e.g., blindness or deafness); learning disabilities (e.g., dyslexia); language or cultural differences, and so forth may all require different ways of approaching content. Others may simply grasp information quicker or more efficiently through visual or auditory means rather than printed text. Also, learning and transfer of learning occur when multiple representations are used, because it allows students to make connections within, as well as between, concepts.
- **Principle II: Provide Multiple Means of Action and Expression** (the "how" of learning). Learners differ in the ways that they can navigate a learning environment and express what they know. For example, individuals with significant movement impairments (e.g., cerebral palsy), those who struggle with strategic and organizational abilities (executive function disorders), those who have language barriers, and so forth approach learning tasks very differently. Some may be able to express themselves well in writing text, but not speech, and vice versa. It should also be recognized that action and expression require a great deal of strategy, practice, and organization, and this is another area in which learners can differ.
- **Principle III: Provide Multiple Means of Engagement** (the "why" of learning). Affect represents a crucial element to learning. Learners differ markedly in the ways in which they can be engaged or motivated to learn. There are a variety of sources that can influence individual variation in affect including neurology, culture, personal relevance, subjectivity, and background knowledge, along with other factors presented in these guidelines. Some learners are highly engaged by spontaneity and novelty. Others are disengaged, even frightened, by those aspects, preferring strict routine. Some learners might like to work alone, while others prefer to work with their peers.

In fact, two aspects in UDL can be identified: a) a conceptual model from which a set of principles (see above) and practices are derived and b) a set of specific practices and guidelines by which universal design is actually accomplished. In the first decade of its development, the emphasis in the domain of UDL was on the use of technology to inclusive education and accessibility for the disabled. Rose and Meyer (2002) proposed that UDL is a research-based set of principles that forms a practical framework for using technology to maximize learning opportunities for every student.

The UDL Guidelines are organized according to the three main principles of UDL (representation, action and expression, and engagement). These are arranged differently depending on the purpose of the representation, but the content is consistent. To provide

more detail, the principles are broken down into Guidelines, which each have supporting checkpoints.

[Table 2] Universal Design for Learning Guidelines & Checkpoints (CAST, 2011)

I. Provide Multiple Means of Representation	II. Provide Multiple Means of Action and Expression	III. Provide Multiple Means of Engagement
1. Provide options for perception	4. Provide options for physical action	7. Provide options for recruiting interest
1.1 Offer ways of customizing the display of information 1.2 Offer alternatives for auditory information 1.3 Offer alternatives for visual information	4.1 Vary the methods for response and navigation 4.2 Optimize access to tools and assistive technologies	7.1 Optimize individual choice and autonomy 7.2 Optimize relevance, value, and authenticity 7.3 Minimize threats and distractions
2. Provide options for language and symbols	5. Provide options for expression and communi-cation	8. Provide options for sustaining effort and persistence
2.1 Clarify vocabulary and symbols 2.2 Clarify syntax and structure 2.3 Support decoding of text, mathematical notation, and symbols 2.4 Promote understanding across languages 2.5 Illustrate through multiple media	5.1 Use multiple media for communication 5.2 Use multiple tools for construction and composition 5.3 Build fluencies with graduated levels of support for practice and performance	8.1 Heighten salience of goals and objectives 8.2 Vary demands and resources to optimize challenge 8.3 Foster collaboration and community 8.4 Increase mastery-oriented feedback
3. Provide options for comprehension	6. Provide options for executive functions	9. Provide options for self-regulation
3.1 Activate or supply background knowledge 3.2. Highlight patterns, critical features, big ideas, and relationships 3.3 Guide information processing, visualization, and manipulation 3.4 Maximize transfer and generalization	6.1 Guide appropriate goal-setting 6.2 Support planning and strategy development 6.3 Facilitate managing information and resources 6.4 Enhance capacity for monitoring progress	9.1 Promote expectations and beliefs that optimize motivation 9.2 Facilitate personal coping skills and strategies 9.3 Develop self-assessment and reflection

2.3 Needs being addressed by the UDL

When educators hear the term UDL, most associate it with technology (Zascavage & Winterman, 2009). However, UDL is not solely about the use of technology in education. It is also about the pedagogy, or instructional practices, used for students with and without disabilities (King-Sears, 2009). New developments on the theory and practice of UDL that have emerged underline the importance of instructional pedagogies that facilitate accessibility for diverse learners (Burgstahler, 2009). Recent research findings have proved that UDL can support access, participation and progress for all learners (Jimenez, Graf, & Rose, 2007; King-Sears, 2009; Kortering, 2008; Meo, 2012). However, few have provided a comprehensive framework to put the UDL pieces together, in a practical, research grounded and efficient way (Katz, 2013). UDL is much more complex than we originally thought (Edyburn, 2010).

Understanding the potential of UDL is seductively easy. Its exponential growth indicates that it may be the right idea at the right time. However, it has proven far easier to help the various stakeholders understand the potential of UDL than it has been to implement UDL on a large scale. Now that more people are "doing UDL," it is not clear what the outcomes are. Udvari-Solner et al. (2005) illustrate ways to apply UDL principles to provide all students with multiple means of representation, multiple means of engagement, and multiple means of expression. To initiate a universal design approach, they advise secondary educators to think about three distinct curriculum access points: content, process, and product. UDL requires collaborative planning amongst teachers with different curriculum knowledge and skills (Nevin et al, 2004). Complaints that are often raised include lack of time to co-plan and lack of resources to teach a differentiated curriculum. With the term Web 2.0 we describe a broad spectrum of digital tools to create, edit, share, discuss, engage, collaborate, and communicate in online media sharing spaces (Solomon & Schrum, 2007). These tools are used to edit, mix, remix, record, and publish content. Web 2.0 tools are interactive and multisensory. These technologies, therefore, are ideal for teachers wishing to apply UDL, i.e. craft flexible, scalable, differentiated activities that are accessible and engaging for reluctant and eager learners alike (Kingsley & Brinkerhoff, 2011). The Open Discovery Space portal (2013) is a repository, harvester, a place to search and build resources, lesson plans and learning scenarios collaboratively among teachers' networks with the use of the ODS Authoring tool. CAST UDL Exchange (2014) is a Web 2.0 base place to browse and build resources, lessons and collections. These materials can be used and shared to support instruction guided by the UDL principles. UDL Exchange facilitates the power of networking to create, remix, and share UDL-informed lessons and activities. According to Edyburn (2010) "as we head into the second decade of doing UDL, it is time for a new generation of thinking about UDL. We need to clarify the core stakeholders (developers or teachers) who will be trained to create UDL products. We need to understand what it means to implement UDL. We need to understand how to measure the outcomes of UDL. Finally, we need to renew our commitment to equitably serving all students in the event that our UDL efforts fall short".

While UDL emerged in the context of disability, disability (and the associated services provided for people with disabilities) has come to be viewed in the context of a wider rights and equality agenda. This agenda addresses the whole range of exclusionary and discriminatory practices that marginalize other kinds of groups. Disability has much to learn from locating itself in this wider context of social exclusion. This applies both to the

understanding of social injustice and differential access in Europe and to the creation of innovative methods to combat discrimination.

3 The UDLnet network

In order to bridge the gap between policies and practice in applying UDL and to face the associated obstacles identified above, we present here the design and development of the UDL Network (UDLnet). UDLnet aspires to address the necessity of collecting and creating best practices under the framework of UDL from a wide range (generic guidelines down to more specific ones) of four envisaged themes: inclusive learning environments, accessible resources, teachers' and school leaders' competences, examination of barriers and identification of opportunities. Moreover, it investigates current needs related to the use of mobile devices in UDL practice. Furthermore, accessibility options emended in the mobile devices under the D4All approach is explored along with the application of the UDL framework in real inclusive educational practices. UDLnet targets 3,500 users in seven countries across Europe (Greece, Ireland, Cyprus, Finland, Netherlands, Germany, Spain) and in six languages.

In general, UDLnet aims to improve teachers' practice in all areas of their work, combining ICT skills with UDL-based innovations in pedagogy, curriculum, and institutional organization. It is also aimed at in-service and pre-service teachers' use of ICT skills and resources to improve their teaching, to collaborate with colleagues, and perhaps ultimately to become innovation leaders in their institutions. In addition, it aims to train school leaders and other school staff about the ways they can adapt, personalize and select some of the existing, easy-to-use, and free-of-cost software tools that various organizations around Europe offer. The purpose of this is to set up tailor-made learning tools and lesson designs (at their institutional or regional level) and to interconnect these with existing infrastructures. The overall objective is not only to improve classroom practice, but also to raise awareness of the European educational community on the need for UDL based teaching and learning practices. The innovation of UDLnet lies within the connection of best practices from various European countries on school/university education and training, open to wide teacher and student communities who will then effectively provide UDL in education.

3.1 UDLnet Methodology

The envisaged procedure of UDLnet Network consists of the following basic phases:

- **Good Practice Thematic Search and Organization:** good practices shall be collected from partner countries, as well as from affiliated institutions in the areas of inclusive education all over Europe with emphasis in UDL, through focus groups, as well as through the practice exchange forum. A set of guidelines and criteria will be set and followed in order to ensure the quality of these practices.
- **Implementation:** a number of events shall be organised for the exchange, validation and evaluation of the collected UDL best practices: such as training sessions, contests, summer schools, webinars, as well as workshops organized in local and European level. The specially developed web-based inventory that will allow all interested parties to access ideas and best practices on effective use of

accessible eLearning resources will contribute to this. All these actions aim to create a European network of teachers discussing, testing, implementing and eventually even developing inclusive practices.

- **Valorisation:** The formation of a set of recommendations to policy makers and regional authorities shall indicate ways European policy makers can use the UDLnet Inventory and UDL good practices to support the inclusive education and training of their citizens. Moreover, a concrete guide of good practices for teachers (Pathway to Universal Design for Learning) will be disseminated through teacher communities across Europe.

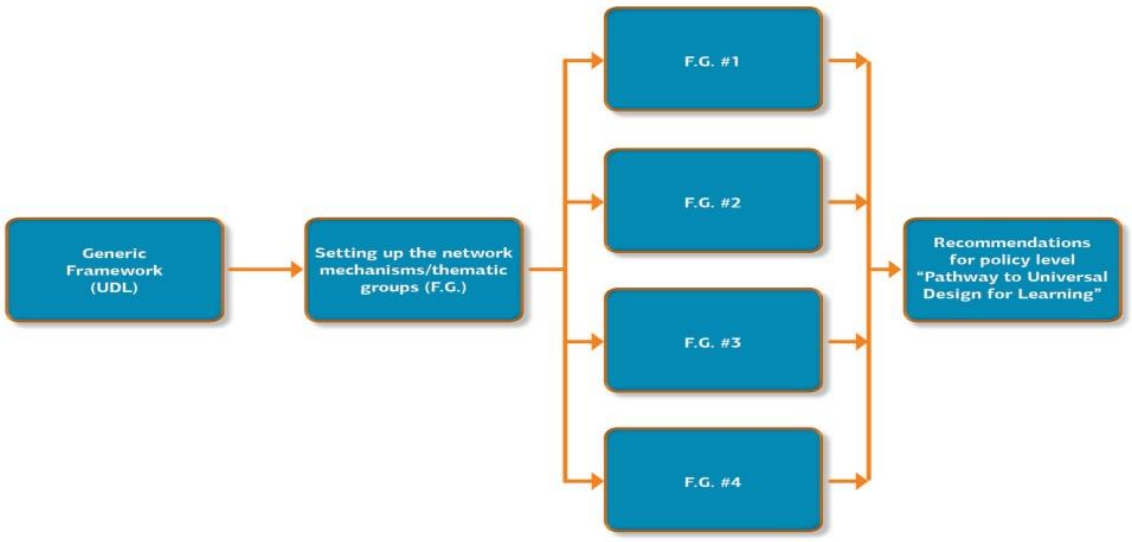
The UDLnet approach includes:

- Development of a detailed and systematic methodology to define the criteria for identifying best UDL practices and then operate as the frame for collection and formation of exceptional UDL based teaching and learning approaches.
- Design and development of a Web 2.0 inventory, with a collection and categorization of UDL best practices that can support a learning community where users will be able to find, exchange and adapt inclusive teaching and learning practices and exchange ideas and best practices.
- Establishment of a constantly-expanding network of educational communities informed on the necessity of UDL based innovative teaching and learning practices and trained accordingly. This network will operate in an independent way, with teachers supplying the educational material and ultimately being responsible for the preservation and further enhancement of the inventory and through Web 2.0-based approaches and tools.
- Collection and development of innovative, relevant and multilingual content that will support the UDL approach, which is described and stored (in the form of learning objects) in the Inventory's repository of content.
- Development of teachers, school leaders, school staff skills and attitudes to ensure the access to and use of UDL based teaching and learning practices under the umbrella of community building. Community building is critical component that enables their success in learning programs by reducing isolation, mentoring success, transforming experiences of exclusion to ones of inclusion, offering encouragement and hope, and fostering group dialogue and peer learning.

3.2 Themes addressed by UDLnet

Methodologically, *UDLnet* addresses the following four main themes (Figure 1):

1. UDL-based learning environments,
2. UDL resources,
3. Teachers' and school leaders' competences,
4. Examination of barriers and identification of opportunities.



[Fig. 1] Methodology/themes addressed by UDLnet network

3.3 UDLnet evaluation methodology framework

An evaluation methodological approach will be set in order to assess the impact of the major intervention designed and implemented in the context of UDLnet, on the participating school communities and identify barriers to adoption. Evaluation will have both a formative and summative nature. The formative evaluation component will be related to the monitoring activities of the project. Summative evaluation will focus on assessing the impact of the project activities. UDLnet is going to achieve the objectives addressed by the following coordinated actions:

- By contributing to the openness and inclusiveness of education in Europe;
- By letting teachers and students acquire Competences;
- By stimulating the demand for accessible eLearning resources, designed based on the UDL approach.

In order to measure the impact of using eLearning resources in aspects that need to be addressed, UDLnet will measure impact on the three axes: on students - teachers; on school level (mainstream and special); on educational systems.

The means of achieving this will be:

- an Evaluation and Quality Assurance Plan, the methodological guide for all evaluation activities that will take place taking into account all foundation work in the areas of educational design, technological specifications, implementation scenarios, and the emergent development of Communities.
- Evaluation instruments: necessary instruments in order to evaluate the network outcomes and process, including questionnaires, surveys, and interview guides.

4 Conclusion and further work

It has proven far easier to help the various stakeholders understand the potential of UDL than it has been to implement UDL on a large scale. UDL requires collaborative planning amongst teachers with different curriculum knowledge and skills. The methodological approach of UDLnet has been presented. UDLnet is in the process of collecting practices of universal design for learning with focus groups where stakeholders and experts might attend and contribute and we hope that the recommended approach will contribute towards creating and sharing inclusive open educational resources. An implementation/training period will follow, as well as annual reports documenting the findings. Further work remains the presentation of outcomes, as well as the design of the web inventory with the UDL practices according with the UDL Guidelines and Checkpoints (CAST, 2014).

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