DESIGN THINKING, UNIVERSAL DESIGN & DISTANCE/FORMAZIONE MOBILE: IMPATTO SULL'APPRENDIMENTO

DESIGN THINKING, UNIVERSAL DESIGN, & DISTANCE/MOBILE EDUCATION: IMPACT ON LEARNING

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Sommario/ Abstract Prospective service providers in education require an active understanding of Design Thinking (DT) and Universal Design for Learning (UDL)/Universal Instructional Design (UID) to be successful practitioners. As DT encourages empathetic understanding and actualization to solve problems through group collaboration and individualization within the group, implementation of UDL principles, through UID principles, enables DT to occur in a supportive and empathetically designed environment. Creative aspects of teaching and learning need to be identified, modeled, and understood to affect the behaviors of educators. Instructional practices are presented, analyzed, and reflected upon as exemplars of learning are identified through expressions of knowledge presented through a variety of approaches and in various formats and contexts. Discussion of how the uses of the information and communication technologies (ICT) of distance education (DE) and mobile learning (m-learning) pedagogies can support DT are presented via investigations of problems and opportunities in a case study format (Elias, 2011).

I potenziali fornitori di servizi in materia di istruzione richiedono una comprensione attiva di Design Thinking (DT) e Universal Design per l'apprendimento (UDL) / Universal Instructional Design (UID) di essere professionisti di successo. Come DT incoraggia la comprensione empatica e attualizzazione di risolvere i problemi attraverso la collaborazione di gruppo e individuazione all'interno del gruppo, attuazione dei principi UDL, attraverso i principi UID, permette DT a verificarsi in un ambiente favorevole e empaticamente progettato. Aspetti creativi di insegnamento e di apprendimento devono essere identificati, modellati, e intendono influenzare i comportamenti degli educatori. Pratiche didattiche vengono presentati, analizzati, e riflette sulla come modelli di apprendimento sono identificati attraverso le espressioni del sapere presentati attraverso una varietà di approcci e in vari formati e contesti. Discussione su come gli usi delle tecnologie dell'informazione e della comunicazione (TIC) di formazione a distanza (DE) e mobile learning (m-learning) pedagogiche in grado di supportare DT vengono presentati attraverso le indagini dei problemi e delle opportunità in un formato case study (Elias, 2011).

PAROLE CHIAVE: UNIVERSAL DESIGN FOR LEARNING, DESIGN THINKING, MOBILE EDUCATION TECHNOLOGIES
INTRODUCTION TO UNIVERSAL DESIGN FOR LEARNING, DESIGN THINKING, AND MOBILE TECHNOLOGIES 1

The theoretical intersection between Design Thinking and Universal Design for Learning should be direct, yet, there are limited materials published demonstrating the linkage and/or practice resulting from the integration of both theoretical ideas, especially the combination of the two with the integration of mobile learning. Creative techniques for supporting inclusion and empathy through distance education practices are discussed in relation to the design of courses/programs and the design acceptance of responses and assignments. As many of our service providers will receive their training through distance education, breaking down the barriers that lead to creative empathetic teaching and learning in online and hybrid classes will be identified. In order to provide direct insight on the merge of the two concepts, clear definitions are provided to allow for a better understanding. A case study approach will be used to present the integration of the principles associated with Universal Design for Learning and Design Thinking with mobile technologies.

**Universal Design for Learning (UDL)**

The definition of Universal Design for Learning is a framework whereby the design of the environment, which includes materials, human resources, curriculum, and space, along with the design of the pedagogy is developed to support academic achievement for any and all students through ensuring equal access. The term UDL was created by Ronald Mace in 1989. His premise was to create environments that supported individuals with disabilities that would allow for maximum opportunities. His idea, stemming from the field of architecture, guided instruction and instructional designers to develop products and services for both face to face and online instruction (Burgstahler, 2002). And, while the concept of UDL is widely known and familiar with educators in the US, its application in the US has been lagging (Rose, Harbour, Johnston, Daley, & Abarbanell, 2006). However, the concept and application of UDL has been highly embraced in the European Union through the support of an Erasmus Project to develop a unified system of practice (http://www.udlnet-project.eu/, 2015). UDL theory encompasses the access of knowledge for all individuals but it also must include the need to have an available

**Design Thinking (DT)**

The definition of Design Thinking (DT) in education, as a concept, is of moving thoughts and actions forward to find a solution to a problem or question in an empathetic, creative, and innovative manner. It is a way to find answers to complex, unique problems with multiple solutions, where there is not only one result or correct answer. The process develops pupils’ and teachers’, students’ and instructors’ ability to act as change agents. It is a concept that is counter to the American and European established competitive model of learning; empathy through active engagement is fostered within groups or teams to work collaboratively to accomplish a task. While working in groups is most often the way that DT is implemented, it also enables the individual to develop insights about oneself and the processes of collaborative self-reflection. It is a concept that can be assistive to the enhancement of teaching practices (Alrubail, 2015). It is not problem based instruction (PBI) as PBI is often focused on coming to one clear point or development of one solution (McIntosh, 2012). Design thinking seeks to develop multiple solutions, and to allow for individuals to collectively think and act tangentially to create related or new experiences that enmesh and engage the learners in a dynamic endeavor.

**Mobile and Distance Education**

Pedagogical application as applied to online teaching and learning have been and continue to be in the process of development for over 20 years, with mobile devices recently identified as an educational practice technology. It is at this point in time that the institutions of higher education and local school systems have identified that the need to integrate technologies for more interactive teaching and learning, rather than merely as a tool to learn. Mcloughlin and Lee (2011) have indicated that the time is right to move the technology facilitation to a more personalized pedagogy. Network and mobile technologies (NMT’s), as teaching and learning devices, need to be integrated by first identifying key variables that will be associated with successful implementation. Trentin, 2013, has identified three necessary caveat’s that must be adhered to for NMT’s to be effective in teaching: a clear definition of the purpose of the NMT to
meet a specific educational outcome, activities identified by educators that can be implemented more effectively by the use of an NMT, and that sufficient training is provided for instructors to successfully integrate the instruction with the system. The use of NMT’s may be used as an enhancement to instructional pedagogy (Beetham & Sharpe, 2013). Use of mobile devices, including but not limited to phones, iPads, tablets, digital pens, increases the opportunity to develop and adopt flexible instruction and pedagogy that embraces UDL principles. Accessible technology implementation for learning that follows the three caveats listed above, can be vetted through DT to achieve a desired student centered approach to meeting goals and objectives of a course (Izzo, 2012). As students typically select to learn on their own mobile learning devices (Bradely et. al., 2009), the variability of devices may constitute a dilemma if ideation of how to effectively utilize each device is not determined ahead of instructional design. Portability is an integral to allowing opportunities for all individuals to have access to content and learning opportunities and provides flexible use in a choice in presentation to the individual.

Integration of UDL and DT and MT’s: An Example in Practice

Since Design Thinking (DT) is a set of processes which involves an understanding of the concept to engage in creation through empathy while working with others, it requires the ability to acquire the dispositions to work effectively in a collaborative manner. So, working on or solving a problem, i.e.: construction of accessible teaching and learning for all in a college or a university, Universal Design for Learning (UDL) (and teaching), would be best developed through use of DT processes. The overall outcome of design thinking is to be able to collectively problem solve through innovation and creativity. It also involves iteration of different outcomes with the ability to recognize a problem, and apply an empathetic understanding to the definition and ideate solutions to the problem. Universal Design for Learning is a theory that was devised to meet the challenges of a problem, the problem being primarily equal access to educational opportunities in the form of instruction, content, and understanding of knowledge and skills and through the use of mobile technologies as an optional platform. The audience for whom the design is geared is all, in terms of UDL, to enable anyone to be able to take part in learning. Adding DT which includes empathy , the ability to put oneself in another’s shoes and ‘feel’ how that individual can and will be able to learn, the essence of UDL, enables the problem
to be vetted and redefined in operationally effective terms. Not one person is responsible for a definition but a group, as in a school board, an editorial board, a research & development (R&D) group, or any interested members of an organization that provides a service that informs clients/learners in the form of new knowledge sharing, generation, and acquisition. The discovery of a need for change is the first step in design thinking. The change to mobile devices is part of the identified ‘problem’ that would be addressed. The next step is to define through empathy and interpret what has been learned by recognizing that change is needed (Simon, 1969). Many corporations and companies that developed learning management systems (LMS) were familiar with, understood the value of, and tried to integrate UDL principles into their systems.

Many school systems and institutions of higher education have recognized the need to apply UDL principles and have integrated some of those practices both successfully and some not so successfully. Both United States and European institutions are now starting the process of ideating towards the integration of DT, UDL and mobile learning. Part one of the process is the DT. First, understanding that the problem is to create an environment that is fluid, can accommodate any and all participants, and will allow for equal means of representation, expression and engagement in an online system. The next step in the DT process would bring a group together to empathize with the problem through discourse and actual engagement, through experiencing what a lack of vision, lack of hearing, lack of integrative sensory inputs, and lack of cognitive association would be like within the learning management system. So to identify a methodology for applying a systematic form of creativity/innovation, as identified by Papanek, to the selection and the use of, or creation of, e-pedagogy that can be combined through the use of design must facilitate all learners. The planning and developing of a creation that results in an achievable outcome constitutes the design process (Kress, Schar, 2012). Understanding unique ways to view a situation often elicits greater imagination, critical thinking and the development of more than one solution (Cross, 2006). To illustrate the process, a model of how this process can occur is presented below.

Example of Process:
Initially, the introduction of a question/topic is presented by a person who has had some experience with the perspective or the situation or the need for a problem to be solved. Or, an
individual has worked with or for persons who have been effected by, in this case, the lack of adequate service (a problem) in an online course, and have indicated what they would want in the best of all possible worlds.

- **Empathize**: Empathy would be with, not for, individuals who learn via alternative modes of delivery and engagement and who need to demonstrate their learning and knowledge through non-standard methods of representation and for those who require.

- **Define the specific problems through an empathetic lens.** Use of positive language to define a problem provides for greater openness to choices of possible solutions. Recognize that technology can be used pedagogically rather than just as a tool to learn. As such, the mobile devices that can be utilized as empathetic mechanisms that enable face to face engagement through VIOP, ensure that the processes involved that include the three concepts works seamlessly.

- **Use brainstorming to generate multiple ideas from multiple sources.** This can include the use of face to face meetings of multiple constituents and/or virtual discourse by practitioners as well as the possibility of using survey groups, and/or review of data and data sources on hand held devices. In this case, the college in the university, departments within the college of the university, both individually and collectively, have identified a greater need to include all individuals in instructional practices. As aligned with UDL, the environment and the instruction and the representation of learned material must be accessible without knowing who will be participating in the class.

- **Begin to ideate and provide models for successful integration of all three concepts.** Look outside higher education for successful innovations and think about how they might apply in context. The use of multidisciplinary teams to collaborate and determine flexible prototyping, in this case, would include a learning management system administrator, consumers, instructors/teachers/preceptors, educators, parents.

- **In the best of all possible worlds...creation of the impossible can become reality with multiple minds, resources, and supports available.** All ideas are put into practice through prototypes. Prototypes can include the use of real time, tactile deliverables or can be through the use of technology assisted computer simulations on multiple platforms. By utilizing the later, members from multiple sites can jointly develop meaningful collaborative integration of knowledge, tools, and communication. The groups
internalize the process and takes ownership of their discovery and applications of their understandings.

- Expression of knowledge enables usefulness of instructional practices. Application is essential to the development/understanding and integration through ideation to prototyping.
- Delivery of content, instruction and learning – assess the accessibility of the prototypes through implementation and data collection.
- Develop new prototypes or implement with different populations and re-assess.

**CASE STUDIES THAT INCORPORATE UDL, DESIGN THINKING & DISTANCE LEARNING**

In recent years schools and Universities in Europe have started to embrace Design Thinking and Universal Design for Learning to replace more traditional views on teaching and learning. The following case studies are practices that have been developed, implemented and evaluated at and in collaboration with NHL University of Applied Sciences in the Netherlands, and, in some cases, with Universities abroad. NHL University is one of approximately 10 Institutes of Higher Education offering Teacher Training Programs for Lower and Higher Secondary Education and Primary Education in the Netherlands.

Most Universities and Colleges in the Netherlands have implemented some form of Competency Based learning or Problem Based Learning, combined with more traditional teacher-centered approaches. There is, however, a growing demand for more personalized forms of learning and a more holistic and design-based approach to curriculum development. Blended or Hybrid learning in combination with the UDL Guidelines and Design Thinking principles seems to go a long way providing the answers.

The first case study describes a pilot carried out collaboratively in the spring of 2013 by a University in Maryland and NHL University.

*Case Study 1:*

Lecturers and student-teachers of NHL University have developed the educational social network platform MySchoolsNetwork.com to facilitate international communication and collaboration between pupils in elementary and secondary education. Student teachers act as moderators, content developers and e-mentors. Although the platform is a Dutch initiative the
language of communication is English. In 2013 a pilot was initiated, involving a group of Master’s level graduate students from University of Maryland University College’s Master of Arts in teaching program and approximately fifty 14-year old secondary school pupils in the Netherlands. The US students were to work on their intercultural and e-mentoring skills while the young Dutch students were expected to benefit from the authentic English communication with native speakers.

The preparation for the project came about by following the theoretical guidelines of UDL and DT. The process began with ideation between faculty members from both universities. The problem identified was the needs of the university students to embrace global understandings through direct international experience and for pupils of English in the Netherlands to engage with pre-service teachers in an authentic use of English language. The ideation process determined that the use of the www.myschoolsnetwork.com platform would be a stellar vehicle to employ for both groups as it is a safe, UDL friendly operating system. The joint understanding of the project promoted the eight UID principles (Elias, 2010) of equitable and friendly use in an instructional climate that had supports and was user friendly for a community of practice.

Although there were some individual successes the pilot on the whole showed many weak points.

Here is a quote from the communication between a US Master student and a Dutch pupil (14)

Hi Janneke,

As promised, there is now a chart for you to review. I understand that English is not your first language, so please don't be afraid to ask questions, as both the introductory article and the chart are written for a native English speaker. What I'd like you to do is develop a similar chart. What Knowledge, Skills, Abilities, and Dispositions (beliefs, values, attitudes) do you think are essential for a good teacher? I'll be looking to compare and contrast your thoughts with mine.

Best,

N...

(www.myschoolsnetwork.com)

Two schools participated in the pilot with a total of 50 students between the ages of 13-15 years. The younger pupils were attending lower vocational education and had a poor command of
English. The older group was in high school and had a reasonable command of English as a second language. The first group was so overwhelmed with the academic level of the communication that they didn’t respond at all. The second group tried but their teacher had to step in to inform the US students about the effect their mentoring attempts had:

Hi Nathaniel,

I'm Jelmer's English teacher. I am currently sending a message to all the American students with the request to not overwhelm my students with questions that are almost on an academic level. Please be aware that you are chatting with a 14/15 year old and if you want them to respond to your questions then you have to present it in small chunks and in language that is appropriate to their age group and proficiency level. I can see that Jelmer has really enjoyed some of your conversations and that he is more than willing to continue contact with you. I feel he can benefit so much from having contact with you (and already has) just don't frighten him off!

Kind regards,
Jeanine
(www.myschoolsnetwork.com)

Here is a response from one of the US students to the teacher:

Hi Jeanine,

I am sorry that my questions have been so broad. Unfortunately our course is structured in such a way that we are asked to have our mentee comment on our version of teaching and various questions related to that. I've tried to tone it down but will refrain from asking more than 2 questions in the future. I think that since this is the first time this is being done the curriculum is not in the best shape. I can delete some of my posts from Frank's page and then recraft my questions.

Best,
Marla

An analysis of this pilot, using the concepts of DT and UDL, will bring out the following points for improvement:

1. UDL assumes firm goals through flexible means. In this case there were very firm goals for the Maryland students (as described in a rubric); the learning outcomes for the Dutch
pupils, however, were quite vague. (Benefiting from authentic communication with native speakers). The US students indicated that they did not feel any freedom in the way they were to achieve the desired learning outcomes.

2. The empathy phase was largely lacking in this pilot; the US student were assuming much more language proficiency and metacognitive competencies than the Dutch students actually possessed. Since the current methodological approach at the time did not include the empathy phase the US students went straight for the indicators in the rubric, whereas most Dutch students just backed off and did not respond.

3. Develop an ongoing method to create new prototypes and have the flexibility to utilize different mobile devices as supports throughout the implementation of the project

Conclusion: To improve the course’s success and feeling of autonomy and competence with students in this online course it will be helpful
   a. to apply the principles of UDL i.e. firm learning outcomes for both parties, to such an extent that :
   b. the Design of the learning environment for both parties is an essential part of the learning process on both sides, preceded by
   c. a phase in which Empathy and definition of the problem or issue is reached through empathy.

Case Study 2:
Two European Universities (NHL University Netherlands and Odisee University Belgium/Brussels) have worked together in a 2 European Credit Program for third-year students in the respective teacher training departments. Until 2013 the program consisted of a mutual exchange program, Belgian students visiting the Netherlands for one week and Dutch students visiting Brussels. Staff delegations from both universities used to design the programs for the two weeks, which invariably resulted in complaining students with a consumer attitude. In 2013 it was decided to try and introduce DT, UDL and DL into the concept. Groups were formed at the start of the academic year, consisting of 3 Brussels and 3 Dutch student teachers. Learning outcomes were clearly formulated and published on a specially designed Community of Practice Online Platform that could be accessed by multiple mobile technologies. The groups were responsible for the design of an attractive and educational programme both in the Netherlands
and in Belgium that would suit the needs and preferences of all participants. The Empathy and Ideation phases would take place through the online social platform www.myschoolsnetwork.com. Students have to put themselves in the position of a foreign professional visiting their country (empathy) after which the draft program is posted online in the form of a wiki. The online rubric for this program establishes the necessary firm goals. It is up to the individual groups how these goals are reached (UDL). All of the preparation for the cultural-educational programs the students develop takes places though DT. On the final day of their one-week visit to Belgium and the Netherlands students present their “week” and everything they have learned and discovered about each other’s culture in a creative and entertaining presentation.

Figure 1:
Figure 1: The two images show the websites created by two of eleven mixed groups to present the respective programs and budgets for the week in The Netherlands and the week in Brussels. The websites are created collaboratively through DT.

Exercise: Online barriers for individuals with disabilities - Ideate

Problem: Images online do not have text equivalents

Step 1; bring together an effective work group made up of experts from the areas of IT, individuals with vision impairments

Step 2: (What would the next step be?)

Problem: Documents are not posted in an accessible format

(What would you do next?)

CONCLUSION & RECOMMENDATIONS

As new mobile technologies and tools continue to be developed, it is necessary to ensure that all are able to not only be accessible but engage effectively with the technology. By including
multiple participants in the creation/ideation, development, through integration of DT and UDL principles, allows for greater inclusion with newly developing pedagogies of content and technology. Disintermediation lends itself to creating instructional formats that are space-free and timeless, to allow for personalization and individualized assessment of learning through a technology of choice. It is clear that data focused research which defines the best uses of the principles in practice is necessary. The future of on demand education that is accessible and empathetic in delivery and output is a consideration that is both ongoing and will allow for even greater viability and use as it continues to develops. Multi-platform relationship across students and teachers is current but fluid in development in continuous and situated learning. But, it is important to remember that ideation is limitless and ideation will guide the future successful integration of UDL, DT, and m-learning.

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gs.ucre.edublogs.org


