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The book "Innovations, Technologies and Research in Education" includes studies presented at the ATEE Spring Conference 2017 on emerging trends of the use of technology in the educational process, the use of robotics to facilitate the construction of knowledge, how to facilitate learning motivation, transformative learning, integrative learning, constructivism and constructionism, novel approaches, and innovative educational solutions. Some chapters are devoted to studies on the didactic aspects of technology usage, how to facilitate learning, ensure knowledge construction, social aspects affecting acquisition of education, etc. The ATEE Spring Conference was organized by the University of Latvia on 12-13th of May 2017 at the University of Latvia (Latvia).

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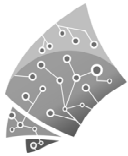

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CHAPTER ONE

EVENT HORIZON: HELPING STUDENTS TO LEARN WHAT NOBODY KNOWS YET

NEUS LORENZO GALÉS
AND RAYMOND GALLON

Abstract

In this article, the authors compare traditional learning and communication processes and contexts to new strategies and learning situations adapted to a hyper-connected world, and propose universal pedagogical principles designed for a globalised society where human-machine interaction is becoming commonplace. The development known as Industry 4.0, which merges the Internet of Things with Big Data and Artificial Intelligence, means that robotics, artificial intelligence agents, and hybrid reality universes are expanding and creating their own hypermediated transmedia ecosystems, where some sort of machine intelligence is involved in at least one end of an exchange. The informational component of Industry 4.0 has been called Information 4.0.

The main goal of the research presented here is to identify the educational skills needed for learning in Information 4.0 ecosystems. We are interested in identifying the communicational competencies teachers and students will need in a world where humans and machines will be extremely connected and permanently updating. Our central hypothesis is that in the era of Information 4.0, skills for communication and information management must be related to the highest level of PISA reading competence and global literacy: reflecting on content and form, drawing upon one's knowledge, opinions, or attitudes beyond the information provided, and accepting different perspectives and viewpoints.

The authors' initial studies mentioned in this article have helped them design an operative roadmap for Information 4.0, designed to help students learn what nobody knows yet. They suggest clear steps for a roadmap and have developed a three-level approach to learning and communicating in Information 4.0 ecosystems that incorporates principles from Bloom's Revised Taxonomy, and

proposals for developing global competencies that include support for values and ethical sustainable action, from the OECD and UNESCO.

Key words: *Information 4.0, Industry 4.0, transmedia, artificial intelligence, robotics, Internet of Things, deep learning, machine learning, Big Data, lifelong learning, ethics, neuroscience, social constructivism*

Introduction

An important tenet of education states that the limit of children's performance, when demonstrating what they know, is their ability to communicate (Wittgenstein 1922). Language mastery is crucial for developing cognitive skills and allowing hidden mental processes to emerge (Council of Europe 2015). We only know about children's reading abilities if they can speak, write, or produce kinetic feedback about a text, which reveals the invisible processes to the teacher. In digital environments, hidden learning processes are revealed by production, participation, and sharing on social media platforms. The main difference between these two situations is that in the digital context, there is an important component of technological mediation and connectivity. The hidden processes already exist in human cognition, and we can see them proliferating now in the digital ecosystem built through machine interactions, known as "Information 4.0" (http://information4zero.net).

The proliferation of connected, autonomous objects known as the Internet of Things is leading us toward an uncertain and unseen horizon of interconnected wearable, embedded, and implanted devices. The development known as Industry 4.0 means that robotics, artificial intelligence agents, and hybrid reality universes are expanding and creating their own transmedia ecosystems. The proliferation of human-machine and machine-machine interactions that take place in this environment are not simply mediated processes, they are hypermediated. We define hypermediated communication as involving some sort of machine intelligence on at least one end of an exchange. Google's personalised, targeted advertising is an example of automated hypermediation.

In this world, the role of hidden processes is growing and the visible part of communication is ever more fragmented. As teacher educators, we face the immense challenge of preparing young teachers not only to face this unknown world, but also to help their pupils learn to navigate in it and decide how it should evolve. How can we clearly identify the challenge for future educators?

The authors propose that in this fragmented, hypermediated world, the most valuable strategy will be to create meaning by building connections.

They propose a theoretical framework for Information 4.0, aligned with the most recent OECD studies for assessment and evaluation. It is based on the recommendations for governance of human-robotic interaction (European Parliament 2017), the mainstream vision of the PISA 2018 global competencies (OECD 2016a), and UNESCO 2030 goals for global sustainability (UNESCO 2015).

Today's technological challenges are not just about adding computers to traditional pencils and notebooks in a linear accumulative learning paradigm, where content is the golden treasure. We need to empower pedagogy to develop more dynamic strategies where the objective is exploring different ways of using technology. Beyond that, it is crucial to find principles that help us identify the best purposes, values, and ethical practices for its usage. Education should be about how human beings will relate to each other in an Information 4.0 ecosystem, and how we create new community experiences to make technology more useful, inclusive, and meaningful for everyone.

Goals and Methodology

The main goal of this research is to identify the educational skills needed for learning in Information 4.0 ecosystems. We are interested in identifying the communicational competencies teachers and students will need in a world where humans and machines will be extremely connected and permanently updating. In order to specify an operational hypothesis in this complex context, the authors have addressed three questions from a variety of angles, in the last three years:

a) What are our main concerns when dealing with communication, interaction and exchange in Information 4.0 ecosystems?

   Action-research methodologies were used to identify the main concerns people have when approaching hypermediated interactions (Gallon and Lorenzo 2015). Results show different concerns that people have (e.g. loss of decision making), that should be considered when defining new characteristics of Information 4.0. (e.g. transparency, knowledge management, partnership with intelligent machines).

   The next step would be to elaborate a framework of indicators that define the perimeter of Information 4.0 interactions.

b) What are the essential competencies that students need to be able to learn in this context?

Collective debate and action-reflection on practices has promoted critical views on learning processes, professional development and educational systemic evolution (Lorenzo 2017). These reflections include teachers' opinions about trends and tendencies of thought regarding how students learn (neuro-learning processes) and how they can be engaged in learning. Our present project emphasises correlating OECD-PISA skills with competencies for learning to learn in Information 4.0 ecosystems.

c) What are the professional techniques, skills and attitudes we need to put in motion for teachers to help students learn in hyperconnected, hypermediated environments?

Case studies were used to explore different types of transmedia training experiences (Gallon and Lorenzo 2014). Results include different models of teacher training transference, where networking and inter-institutional collaboration are significant characteristics. New quantum data analysis techniques, such as Nemetics sequences that represent communication flow (Josefowicz 2012) allow us to start representing communication interactions on the Internet in a visual way (Josefowicz, Gallon and Lorenzo 2017). In the near future, case studies on teacher training and professional development will be relevant for Information 4.0 when combining online connectivity and human collaboration with artificial intelligent agents in automatised systems.

Now that we are entering a reality where content is already provided through connectivity, and learning processes are guided by a variety of automated tutorials, the added value of human teachers needs to be re-examined. Thus, our central hypothesis is:

> In the era of Information 4.0, skills for communication and information management must be related to the highest level of PISA reading competence and global literacy: reflecting on content and form, drawing upon one's knowledge, opinions, or attitudes beyond the information provided, and accepting different perspectives and viewpoints.

Future studies will necessarily include a humanistic approach to technological problems, machine-human interaction, and communication analytics applied to the hyperconnected and hypermediated interactions of Information 4.0.

Results

Our initial studies have helped us design an operative roadmap for Information 4.0, designed to help students learn what nobody knows yet.

A. Identify the research scope for Information 4.0

To begin, we identify our specific research field (i.e. Information 4.0) and locate it in a new environment that is developing as the informational component of Industry 4.0, which has also been referred to as the fourth industrial revolution. While Industry 4.0 is already a consolidated concept (Brynjolfsson and Hitt 2000) that has received German government support (Kagermann et al. 2013), Information 4.0 is an emerging framework for exploring communication and learning processes at macro, meso and micro levels, in mediated, multimediated and hypermediated interactions, both human and machine generated.

We can say that the Information 4.0 ecosystem is driven by the internet of things (IoT), informed by continuous massive information input (Big Data), using complex automation. But it is not only that:

- Information 4.0 is a complex network of networks, powered by artificial intelligence (AI), in which objects make autonomous decisions that affect us directly in a variety of ways. Information is seen as molecular (no documents are targeted, just information molecules, one notion in response to one state vector), dynamic (continuously updated), offered rather than delivered, ubiquitous (online, searchable and findable), spontaneous (triggered by contexts) and profiled automatically (Gallon and McDonald 2016).
- Information 4.0 is a network of infinite instantaneous interactions, a continuous information exchange between agents. It enables emergent human-cyber-physical systems, and makes it possible to implement, leverage, sustain and understand these systems. It puts the technical communication at the centre of the Industry 4.0, IoT, Big Data, cognitive computing revolution (Gollner 2016).

This on-going research journey towards Information 4.0 will be an evolutionary process that needs to focus on the most innovative scenarios. Any digital innovation has social implications and creates its own territory. Our field of analysis is not defined just by identified platforms and environments in the digital territory, but by the relationships and the communication flow that emerges and develops between them: human-human, human-machine, and machine-machine exchanges are creating the specific focus that allows us to find not only visual and emergent reality, but also the hidden processes that generate it. Our main challenge is how

to research deep into spaces that are unknown, uncertain, and unseen, at the same time produce strong human (emotional) responses.

B. Treat the concerns of people about communication, interaction and exchange in Information 4.0. ecosystems

Our studies show that two of the main concerns of people already familiar with complex communication environments are loss of decision making and excess surveillance – in other words, loss of territory for action and loss of control. In a study conducted for Adobe Technical Communication (Gallon and Lorenzo 2015), an international group of participants (mainly technical information specialists from USA, Canada, UK, Spain, France, Denmark and Germany) provided a total of 28,152 identified interactions, including single visits to static SlideShares (27,428 accesses), active survey completion (366) or webinar registrations (358) among other communication actions (data as of 15 June 2017). These data help us to detect tendencies, doubts, and worries related to the use of technology at the edge of the unknown communication horizon.

Asked about the IoT, most participants in our research (65.52%) said it is potentially positive for individuals as a way of providing useful or vital services. Despite their favourable outlook, 62% of our survey population also said they were worried about dangers that might exist as hidden consequences of automation and technology *(Fig. 1)*:

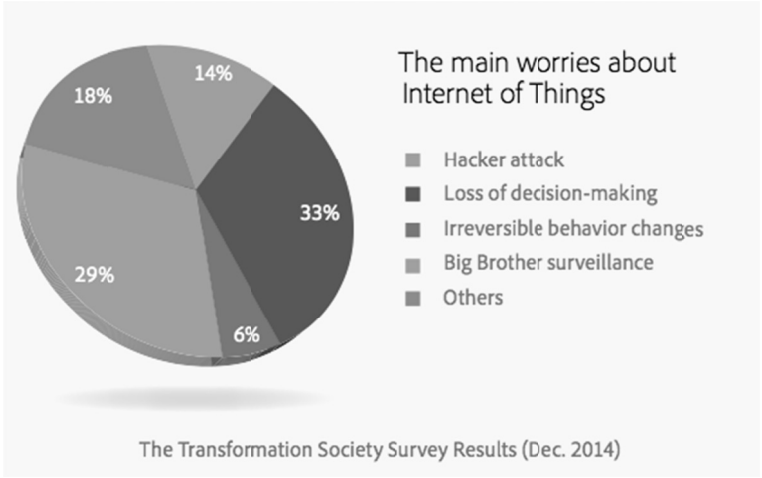

Figure 1: Survey participants' worries about the Internet of Things

Just as we monitor the hidden acquisition of reading skills through visible performance, our current research is looking at known, visible communication processes in virtual environments to try and understand the hidden issues that inform them:

- What kinds of data and analyses do we need in order to study both visible and hidden aspects of "Information 4.0?"
- How are we going to integrate the existing understanding of communication (from psychology and sociology, mainly focused on micro and meso levels of interaction) into new emerging research related to human and non-human networks (necessarily focussed on a wider concept of connectivity)?
- How can we develop a common framework for integrating and synthesising related pedagogical action?

The stakes are high and run across all aspects of society at a global level. As educators, we need to find our sources and our solutions in the merging of pedagogical theory, entrepreneurial thought leadership, and goals for sustainability set by international organisations such as UNESCO (UNESCO 2015) and OEDC (OECD 2016b).

C. Determine the essential competencies that students need to be able to learn in this context

Institutions and administrations are clearly demanding development of a humanistic learning approach for a hybrid world (World Economic Forum 2016). The more the Industry 4.0 revolution consolidates its principles of hyperconnectivity and hypermediation, the more students feel alienated from person-to-person socialisation and disaffected from school and other formal educational environments (Hannon 2012).

To compensate for these situations and undesirable consequences, education systems are including relational programmes in their curriculum. Projects for solving conflicts at school, building empathy, facilitating peer-to-peer tutoring, mediation, no-bullying campaigns, and emotional intelligence for community building are spreading everywhere. The need for relational skills seems to grow among new generations that are extremely connected in virtual spaces.

Another area where new techniques need to be developed is in maintaining students' attention. A study by Microsoft Canada indicates that the average attention span of people continues to drop. In 2000, the average human attention span was 12 seconds. In 2015, it had been reduced to just eight seconds – one second less than that of a goldfish (Microsoft Canada 2015)! The study also found that during the eight seconds, the level of attention can be quite high, and that attention shifts

from one activity to another, often across multiple screens, which means that people do not lose attention so much as change the focus of their attention every eight seconds. Educators need to adjust their techniques to account for this phenomenon if they want to reach children born into a hypermediated world.

In this scenario, we propose to correlate the 2000-2015 OECD PISA assessment levels *(Fig. 2)* with three levels of explicit, implicit and referential information, to create an initial 3-level approach to learning and communicating in Information 4.0 ecosystems *(Fig. 3)*.

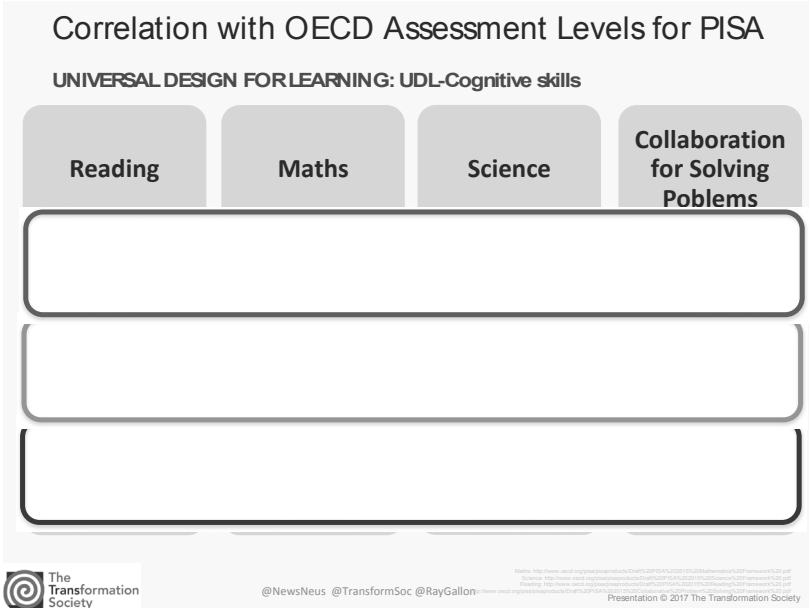

Figure 2: PISA assessment levels as defined by the OECD

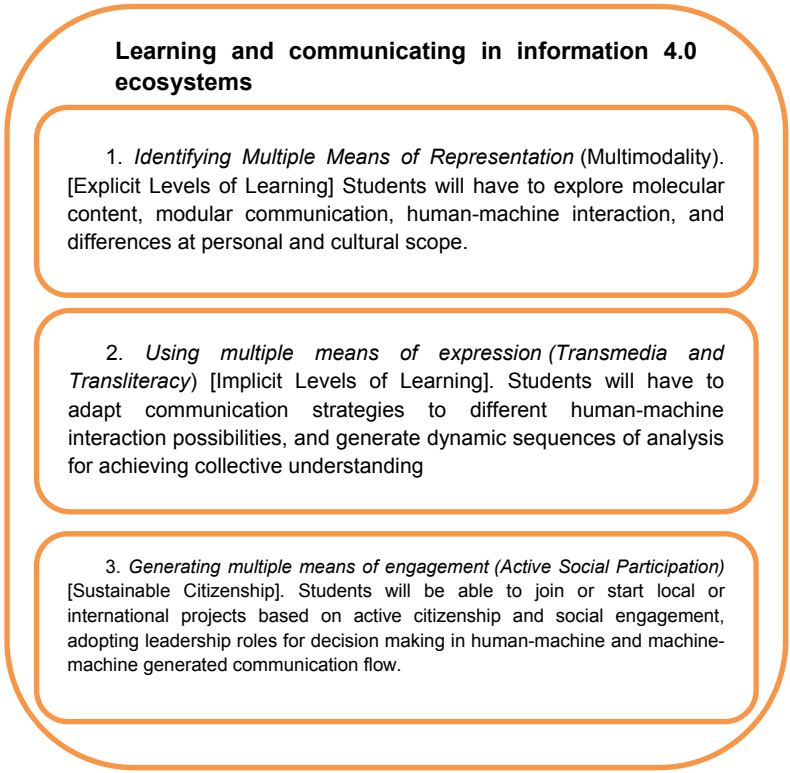

Figure 3: Three-level approach to learning and communicating in Information 4.0 ecosystems

Although this proposal is merely the first draft, it maintains the progression determined by Bloom's Revised Taxonomy (Anderson et al. 2001) for cognition and understanding. It also follows the OECD 2030 proposal for developing Global Competencies supporting values and ethical sustainable action, that can be summarised as follows (OECD, 2016b – *Fig. 4*):

Figure 4: schema correlated to OECD global competencies development

D. Develop the professional techniques, skills and attitudes we need to put in teachers' hands to help students learn in hyperconnected, hypermediated environments

At an individual level, ethical questions and social impact easily come to mind when thinking of innovative technology. In a robotics-based learning context, human teachers must help students find their strengths, raise students' awareness, and open lifelong learning perspectives for everyone. The teacher's role will grow when they encourage students to learn how to be, and how to be with others, in a hyper-connected world that is simultaneously more fragmented and more collective than ever.

Here is an example that draws on technologies that exist today. A grain field is equipped with solar-powered sensors. They check on soil conditions, temperature, humidity of the air, and the presence of pests. A visual recognition sensor registers the presence of a ravaging insect in large quantities. The sensor immediately sends a radio signal to a drone, equipped with the appropriate insecticide. The drone is also informed by a sensor about wind speed and direction, and calculates a trajectory and dosage that is efficient and minimises negative environmental impact. It sounds wonderful. But what if the designers of these robots forgot to

check if there were people in the fields who might be sprayed? How was the decision taken to begin the spraying process, using what criteria? What exchanges took place between sensor and drone? Was an external computer involved? Did it use AI to decide what to do?

In fact, in this scenario, we humans can see the input (presence of an insect pest) and the output (spraying). But the entire decision-making process is unreachable, unreadable, and hidden from human beings *(Fig. 5)*.

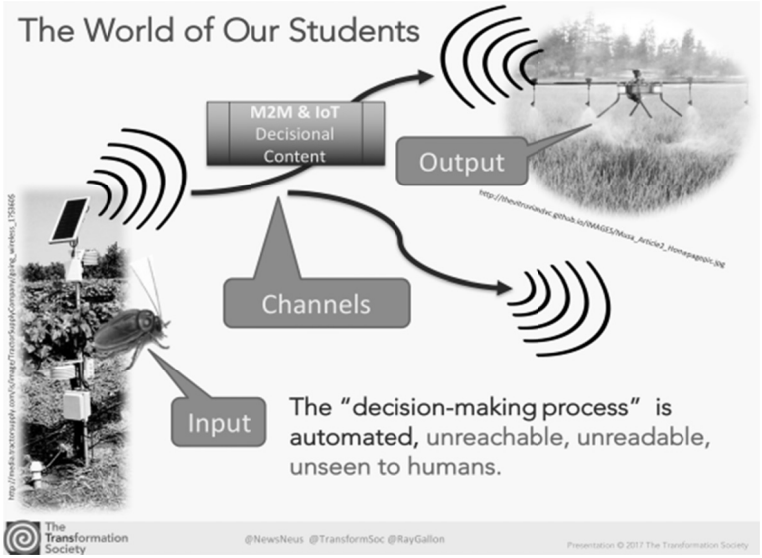

Figure 5: A hidden decision process using currently existing technologies

In such a situation, communication is much more than content message, communicative code, interacting agents, or relational context. It also includes a huge number of processes that are not only hidden, they are unknown and undetected by humans: machine language, big data flow, automatic analytics, artificial governance, and transmedia narrative are parts of this hybrid, hypermediated transaction. This is not just a theoretical construct; today's children already live in this technological context, and the rate of change is accelerating. Eventually, machines will not only be dispatching external robots to solve problems, but also making changes in our own bodies through medical implants, aesthetic prostheses, or neuronal communication devices.

Our studies *(Fig. 6)* show that people over 40 are more reluctant to accept implanted devices permanently connected to the Internet than their juniors are (82.93% worry about this vs. 40% under 40).

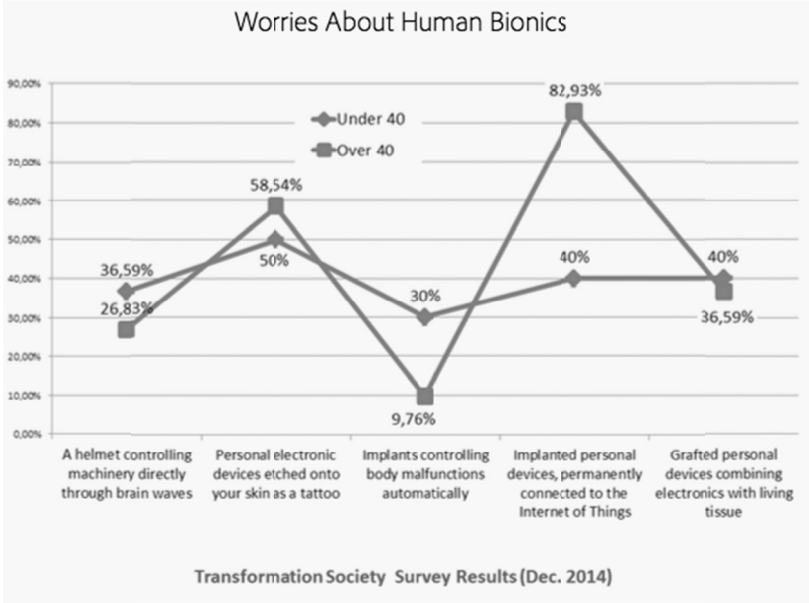

Figure 6: Generational differences with regard to human bionics

In a world where these phenomena are commonplace, and machines play an active role in expanding cultural spheres, what skills do children need, and how do we prepare teachers to help them gain mastery? How can universities, institutions, businesses and governments define a common framework for developing new curricula, empowering new methodologies, and encouraging humanistic attitudes?

Digital Technology is not only the tangible evidence of a deep interconnected flow of evolving content, but the essential structure that shapes singular events and community experiences. Both digital tools and digital content are deeply mutually embedded and shape each other. Enterprises are slowly coming around to integrating both as business assets, but the increasing abundance of products of digital innovation makes it difficult to dive deep into the globality of their consequences, their future implications, or the related values that should be encouraged to make them worthwhile.

In an attempt to build a common approach, the European Parliament has already passed a resolution proposing a humanistic code of ethical conduct for robots, including the possibility of a special status almost as a person for the most advanced (European Parliament 2017).

Conclusion

The critical point for communication in a robot-based educational ecosystem is hidden from us, unknown, and unreachable using normal human communication skills. Educational needs become unclear when communication processes escape the human environment and enter the hidden realm of machine-machine exchange. In the model of industrial development set by Industry 4.0, interconnected objects will make decisions without human intervention. Much of their exchanges will be simple data exchanges, of little interest to humans. But a significant number of communications will take place at a level of real informational interaction, and some of it will be informed by deep learning and other AI technologies. We clearly need to shift our ideas of linguistic analysis from the current focus at micro and meso levels, to a macro level vision where non-human communication vastly expands the field of investigation.

The educational paradigm shift needed to deal with Information 4.0 moves teaching and learning from linear interaction into multimodal and multi-cognitive processes. The main turning point has already been taken, as teachers' roles evolve and focus on changes from teaching to learning. Educators promote a student-centred approach at the same time that enterprises focus on a customer-centred journey. Notions about environmental responsibility and sustainability are entering into the discourse following Halliday's socio-semiotic approach (Halliday 1978, 2006). Institutions, governments, and businesses are all promoting environmental awareness. The convergence of a few significant social concepts across multiple segments of society is the result of a connective process that stems organically from social and economic construction, including major problems and challenges that have been encountered. In the same way, teaching techniques and proposals are evolving from mainstream *Cognitive Constructivism* towards a more *Social Constructivism* (Kukla 2000; Schmidt 2007), animated by connectivist principles (Siemens 2004).

It is in this context that we can see the basis for Information 4.0 studies, where several interactions take place: human recognition and communication; social networking and culture building; holistic connections of people and objects in the IoT, which lead to an Internet of Everything.

This exploration of Information 4.0 is an ongoing project, and open to new contributions from linguistics, psycholinguistics and sociolinguistics in micro, meso, and macro analyses. We open a call for colleagues to join our studies in the Primary and Pre-primary Research and Development Community of the Association for Teacher Education in Europe (ATEE: https://atee1.org/primary-and-pre-primary-education/), the Transformation Society (http://www.tranformationsociety.net), and the newly-formed Information 4.0 Consortium (http://information4zero.org). Studies should focus on identifying emerging communication models in the universe of transmedia, new teaching and learning techniques for virtual spaces in Smart Learning Environments, and new quantic models in the Nemetics field (Josefowicz, Gallon and Lorenzo 2017).

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CHAPTER TWO

DIGITAL LITERACIES FOR LANGUAGE LEARNING AND TEACHING: FROM A CONCEPTUAL FRAMEWORK TO THE DESIGN AND DEVELOPMENT OF AN ONLINE PORTAL

ODETTE GABAUDAN AND SUSANNA NOCCHI

Abstract

Advancing digital literacy among language learners and teachers is, to quote Hicks and Turner (2013), no longer a luxury. As technology is pervading our daily lives, there is still an acute requirement to equip students and language learners more specifically with the digital competencies that will enable them to flourish in a multilingual and multicultural digital environment. In parallel, language teachers need to reinvent their teaching to tie their use and understanding of digital tools to progressive pedagogies.

This paper will describe and evaluate an Irish nation-wide project that aims to enhance digital literacies for language learners and teachers, namely digilanguages.ie. Following an initial phase that consisted of identifying key language learning contexts that require digital competencies, a suitable conceptual framework (Dudeney, Hockly, and Pegrum 2013) was identified to underpin the design and development of an online portal. The framework allowed for the integration of digital literacies and the learning of a language in a variety of contexts. One of the key challenges addressed in this paper is the translation of the framework into the design and development of a coherent and integrated resource that will inspire both language learners and teachers so that language learning and teaching will be transformed and adapted to a modern and increasingly complex society. Ensuring sustainability for the resource is at the heart of both the technological infrastructure and the participating institutions' commitment. Therefore, an iterative consultation process with key stakeholders (through online surveys and face to face discussions) has informed each stage of the design and development of the resource. It aims to strike a balance between

allowing learners/teachers to interact with the material according to their preferences while also providing enough guidance for independent language learners/teachers who wish to navigate the often unpredictable multilingual and multicultural exchanges of our modern world (Kramsch and Whiteside 2008).

Key words: *digital literacies, language learning, OER, national framework*

Introduction

The theme of the 2017 ATEE Spring Conference "Innovation, technology and research in education" is at the heart of the work presented in this paper. The project is entitled "Enhancing digital literacies for language learning and teaching". It is the result of a collaboration among language departments of six Higher Education Institutes in Ireland. The genesis for the project, an open educational resource (OER), is rooted in a national effort to build digital literacy in Irish education (Teaching and Learning in Irish Higher Education: A Roadmap for enhancement in a digital world 2015-2017). The project also seeks to address the national language skills shortage highlighted in numerous Irish-based reports (e.g., National Skills Bulletin 2015; National Strategy for Higher Education to 2030, 2011) and the interest shown by the Irish government in targeting "a step-change in the learning of foreign languages in Ireland" (press release by the Irish Department of Education and Skills, April 2017). The OER consists of a portal that aims to transform 21st century language learning and teaching by integrating competencies of digital literacies into the language curricula of Higher Education Institutes in Ireland.

Aim of the Study

The focus of this study is to review the phases, opportunities and challenges that arose in designing and developing an online portal that aims to serve as a national framework for the enhancement of digital literacies, specifically for language learning and teaching in Ireland's higher education sector. In the context of both language learning and teaching, digital literacies go beyond the technical skills or competencies required, for instance, in the creation of a blog entry or in using a particular social medium. Following Dudeney, Hockly, and Pegrum, digital literacies are conceptualised as "the individual and social skills needed to effectively interpret, manage, share and create meaning in the growing range of digital communication channels" (2013, 2).

At the very core of digital literacies are the social practices that permeate the use of new digital technologies (Jones, 2014). Such social practices are inherently anchored in both language and culture. The

unpredictable multilingual and multicultural exchanges that characterise our modern world mean that it is essential to gain an awareness of "which speech style to speak with whom, about what, and for what effect" (Kramsch and Whiteside 2008). Such awareness and "symbolic power" (ibid.) is at the heart of digital literacies in language learning. As a result, the online portal includes a Digital Literacies strand that closely follows the framework rolled out by Dudeney, Hockly, and Pegrum (2013) and identifies four key focuses, as follows. (i) *Connections* are particularly relevant in the context of social networking and online communication technologies. (ii) *Remixing* literacies involve the creation of something new by remixing pictures, videos and other media. The (iii) *information* focus is concerned with not only finding information but knowing how to evaluate it. The (iv) *language* focus considers texting social practices, gaming, coding or judiciously navigating hypertext. By proposing a series of activities for each focus and its subcategories, the portal aims to help students and teachers to become more effective in their multilingual and multicultural digital activities.

Materials and Methods

This section explores the methods used to inform the development of the portal. The project started with a needs analysis in order to determine relevant target audiences and their respective requirements in relation to language learning and teaching in a 21st century world. Two different surveys were administered across six Higher Education Institutes in Ireland. The response rate for both surveys was very satisfactory given the size of the sector in a small country. The first survey targeted language students at an undergraduate level. A total of 355 participants responded to a range of questions designed to identify their main challenges in learning languages in a higher education context. In particular, they were probed on a list of items to identify what they found difficult about moving from second level education to higher education. They found the transition between the two levels particularly challenging with a high score given to issues related to lexis and grammar as well as to the standard of foreign language used by their lecturers as a majority of students would not have had previous experience of being taught by native speakers of the foreign language.

In relation to the usefulness of an online resource while abroad on a mobility programme, 93% of respondents either strongly agreed or agreed that they should have access to an online resource to help them. They identified that what they needed most were resources for grammar

practice, resources for vocabulary practice, and guidelines on cultural issues. Other aspects that respondents consider useful are self-assessment tools, guidelines on language learning strategies, and a space for discussions with other students.

Another set of key findings that emerged out of the student survey concerned digital literacies. Students were provided with a list of digital literacies skills and asked to identify whether each skill was included in their programme and whether they considered it should be included. The list of digital literacies comprised print, texting, hypertext, multimedia, gaming, mobile, tagging, searching for information, filtering, networking, digital identity, online intercultural issues and remix. Interestingly, respondents overwhelmingly felt digital literacies through the target language and culture should form part and parcel of their programme of studies and should be more prominent than what they currently are.

A second survey was disseminated among lecturers and student teachers. A total of 75 respondents took part. A key finding is the discrepancy between what respondents believe are important digital literacies (same literacies as listed above), their competence in these various literacies and their ability to integrate them into their teaching. Many avoid teaching digital literacies or feel they lack the skills to teach digital literacies through the target language and culture.

The findings of the surveys informed the design of a framework for the development of the portal. Three key target audiences were identified. The first group of users consists of students, in autonomous learning conditions and in a context of transition – either between second level schooling and higher education or between Irish higher education and foreign higher education. The second group of users includes lecturers and student teachers who are looking for classroom or independent activities for their students. The third group of users are lecturers or student teachers in search of continuous professional development. Feedback from project funders on the usefulness of proposing a range of activities for the skill development of language professionals led to an increased focus on that particular aspect of the portal. Each group of users has access to three different strands namely Digital Literacies activities, Language Skills and Practices activities and Transitions and Contexts (see digilanguages.ie). Each strand has a coordinating leader to ensure coherence and progress of its development. As mentioned previously, the Digital Literacies strand follows Dudeney, Hockly, and Pegrum's (2013) framework.

The result of this initial consultation process led to the design of an overarching framework which in turn informed the development of the portal that would host the activities for the three key user groups, for three

strands and for six languages including English as a foreign language, French, German, Italian, Spanish and Gaeilge. The latter was also important as it was the language used for the localisation of the portal for the Irish speaking community.

The activities are developed and curated by a range of key stakeholders, many of whom were identified through the organisation of an OER Fest, a national event organised to identify and inform language lecturers and student teachers who were interested in playing an active role in the development of activities for the portal. The event attracted 45 participants, most of whom have since been involved in designing and curating activities for their respective languages and for the three key target users.

Having developed and curated a range of activities for the portal, a selection of such activities was piloted and evaluated on criteria including relevance, content, ease of use and technical aspects, such as navigation or colour scheme. The pilot was carried out both with students (n=68) and lecturers/student teachers (n=27). The next section reports on the participants' feedback.

Results

One of the key challenges faced in the development of such an extensive OER is its structure and navigation. This is due to the complexity inherent in having three different user groups, three strands, six languages, one of which is also used for localisation purposes (Irish). The interface aimed to be simple so that students and teachers could follow their own pathways. The teacher interface is split between continuous professional development activities and activities that can be used with students in the classroom, while, at the same time, multiple access points (through user group, language or strand), searchable content, filter for languages or levels aim to make the portal user-friendly. However, further work in this area is required as feedback to date points to a very rich site but a poor navigation experience with too many clicks required to access particular activities and difficulties in locating information.

Introductory sections are in English (except for the localised version of the portal in Irish) while the activities themselves are language specific, thus making initial content easily accessible to all users including those whose language may not be represented.

The digital literacies strand, the most unfamiliar to many language professionals, provides a multimedia explanation for each type of digital

literacy as well as activities relevant to each of the six languages. Indeed, digital literacies practices vary for each language. The language specific variants are not always available for all languages. Irish for instance only has access to one country's search engine while French, English and Spanish have access to multiple countries' search engines due to the worldwide status of these languages. The three strands aim to integrate with each other as much as possible through meta-activities. For instance, when students prepare for their student mobility abroad, they need to identify suitable accommodation. The Transitions and Context strand includes a meta-activity called Student Accommodation. In turn, it taps into the Digital Literacy strand by referring to a Hypertext activity and to the Language Skills and Practices strand by suggesting activities for listening and viewing strategies in the context of searching for student accommodation. Therefore, meta-activities such as Student Accommodation encourage users to navigate through all aspects of the portal.

At the time of writing this paper, the range of resources available on the portal is equivalent to an extensive 500 learning hours across the entire portal. Many activities target learners with an intermediate level of language (B1 and B2 on the Common European Framework of Reference). More activities need to be added for novice and advanced learners of a language. More input from digital natives or the I-generation would enhance the relevancy of the portal. A mechanism to build a community of practice around the learning outcomes of the portal also needs further consideration.

Regarding the implementation phase at an institutional level, this has been very dependent on local organisational structures. In some institutions, for instance, the team members of the project have been able to implement significant module amendments during their programmatic review, whereas this has not yet happened in other institutions, as team members, for various organisational reasons, had a different level of agency in their own institution.

Conclusions

An essential outcome of the portal's framework is to effect change in language teaching practices across the national, and perhaps international, higher education context. The aim is to equip language graduates of the future with the necessary digital literacy competencies that will enable them to be active language members of foreign language communities as well as effective citizens, employees and consumers in a 21st century global world. For change to become truly effective, digital literacies will