Konstantinos Chorianopoulos

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I am doing research and teaching in the broad area of Informatics with an emphasis on the domains of user interfaces, video, video-games, gamification, crowdsourcing, software, learning, health.

AREAS OF INTEREST

- User interfaces, television, mobile, wearables, robots

- Crowdsourcing, video, cartography

- Gamification, video-games, learning, exergames

- Software studies, computing education

Previous Experience

2008—now	**IONIAN UNIVERSITY** *Assistant Professor (Software Technologies)* Corfu, Greece
2009—now	**HELLENIC OPEN UNIVERSITY** *Adjunct Professor* Athens, Greece
2011–2016	**NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY** *Visiting Professor* Trondheim, Norway
2006—2008	**BAUHAUS UNIVERSITY OF WEIMAR** *Marie Curie Fellow* Weimar, Germany
2004–2005	**IMPERIAL COLLEGE LONDON** *Research Associate* London, England

Education

2004   **PhD Interaction Design**
         Athens University of Economics and Business, Athens, Greece

2001   **MSc Marketing and Communication**
         Athens University of Economics and Business, Athens, Greece

1999   **Meng Electronic and Computer Engineering**
         Technical University of Crete, Chania, Greece

Languages

Greek (Native)
English (Proficient)
Spanish (Advanced)
French (Basic)

SHORT BIOGRAPHICAL NOTE

Konstantinos Chorianopoulos is a maker, scholar, and mentor. He holds a Diploma in Engineering (Electronics and Computer Engineering) an MSc in Social Science (Marketing and Communication), and a Ph.D. in Design (Interaction Design). He has also been a post-doctoral Marie Curie Fellow for five years. During his studies and research, he has been affiliated with engineering, business, and applied arts university departments and he has collaborated with more than fifty researchers from academia and industry (Imperial College London UK, Microsoft Research USA, Yahoo Labs USA, University of Sao Paulo Brazil, Norwegian University of Science and Technology Norway, Bauhaus University of Weimar Germany). He has participated in seven European Commission-funded (ESPRIT, IST, FP6, FP7, H2020) research projects in the field of human-computer interaction for information, communication, learning, and entertainment applications in TV, mobile, and ubiquitous computing. He is the main author of more than fifty peer-reviewed research articles and he has been lecturing internationally (universities, conferences, tutorials, seminars, invited lectures) on several aspects (design, engineering, science, art) of informatics. He has served on the steering committee of the European Interactive TV organization and on the editorial boards of the following journals: Computers in Entertainment (ACM), Entertainment Computing (Elsevier), Journal of Virtual Reality and Broadcasting.

SOFTWARE

Please find bellow software that has been developed in the context of projects and theses. All software is open-source, free to download and modify according to the respective licence.

- Mapito: A suite of server and mobile tools for open geographical mapping.
- FluTrack (Mining and visualization of geocoded short messages, eg twitter, sms that have keywords related to viral human infections): Flutrack Online Service.

- SocialSkip (Cloud-based custom YouTube video player with questionnaire functionality, useful for video lectures and for video analytics, e.g., skipped/paused video regions): SocialSkip Online Service
- ChordiAction: Multi-user and Multi-touch library for large multi-touch screens with many users who work independently
- AppMapNode (Map-based node management with social features for large metropolitan wireless community networks)
- Virtual TV Channels (TV channels are produced dynamically from local-network storage)
- Personalized Interactive Maps (User interface for vector based maps and routes based on personal preferences)

Editorial work

I have been serving on the editorial board (reviews, special issues, review delegation) of the following journals: Computers in Entertainment (ACM), Entertainment Computing (Elsevier), Journal of Virtual Reality and Broadcasting

Program committees

6th Iberoamerican Conference on Applications and Usability of Interactive TV (2017), ACM TVX 2014, European Interactive TV (EuroITV) conference (2005-2013), The 21st ACM International Conference on Multimedia (ACM Multimedia 2013), Workshop on Multi-User Services for Social TV (MUSST2013), CVRB 2013 - 1st International Conference on Virtual Reality and Broadcasting, International Conference on MultiMedia Modeling (MMM 2012, 2014-2015), Edited Book on "TV Content Analysis", International Conference on Designing Interactive User Experiences for TV and Video (UXTV08), IET Intelligent Environments 2007, ACM SIGCHI 2006 Workshop on "sociable and mobile ITV", ACM SIGCHI 2007 workshop on "Shared Encounters: Content Sharing as Social Glue in Everyday Places", ACM SIGCHI 2007 Workshop on "Supporting non-professional users in the new media landscape"

Reviewer

Journals
PLOS ONE, Computers and Education (Elsevier), The International Review of Research in Open and Distance Learning, Journal of Computer Assisted Learning (Wiley), Human Technology: An Interdisciplinary Journal on Humans in ICT Environments, Journal of Experimental Child Psychology (Elsevier), Entertainment Computing (Elsevier), Multimedia Systems Journal (ACM/Springer), Information Sciences Journal (Elsevier), Personal and Ubiquitous Computing (Springer), Transactions on Multimedia (IEEE), Transactions on Multimedia Computing, Communications and Applications (ACM TOMCCAP), Multimedia Tools and Applications (Springer), International Journal of Human-Computer Interaction (Taylor and Francis), Behaviour and Information Technology (Taylor and Francis), Telematics and Informatics (Elsevier), Computers in Entertainment (ACM), Journal of Virtual Reality and Broadcasting, International Journal of E-Services and Mobile Applications (IGI).
Conferences

ECIS (2014), ICEC (2014), ACM SIGCHI Work in Progress (2003-2006, 2008, 2011, 2014), ACM SIGCHI Papers and Notes (2007-2014), MMM (2012-2013), MUM 2013, UbiComp 2012, 7th IEEE International Workshop on Networking Issues in Multimedia Entertainment (NIME'11), 7th International Conference on Pervasive Computing (Pervasive 2009), ACM SIGCHI UIST Demos (2008), ACM SIGCHI UIST Papers (2007), IET Intelligent Environments (2007-2008), ACM SIGCHI Student Papers (2003-2006), , ACM SAC 2004 - Special Track on Ubiquitous Computing, Cross Media Service Delivery Conference 2003

Review requests

Since 2005 (and up to January 2015), I have consistently provided reviews for more than three hundreds research papers, and for more than two dozens academic venues (journals, conferences, workshops). Lately, the number of requests has been growing exponentially, so I might not be able to respond to all requests in due time. Still, I am looking forward to thoughtful and targeted review requests that seriously consider past and present research interests, as indicated in Research and Publications. Please note that my current rate of accepting to review is less than 30% and it strongly depends on my professional connection with the respective associate editor. In other words, please do not take personally a possible rejection, the reason is that we have not yet spent enough time working together for me to invest back in this relationship.

Funded projects

I have been employed and/or acquired external funding in context of the following projects.

- TraMOOC (Translation for Massive Open Online Courses) EC H2020 (2015-2018)
- ArTe: Art and Technology, Norwegian University of Science and Technology, (2011-2012)
- VIDEOPAL: Asynchronous Video Messaging over a distance: Microsoft Research Grant (2010-2011)
- CULT (Cultural Understanding through Learning and Technology) – EC FP7 (2009-2011)
- MEDIACITY – EC FP6 (2006-2008)
- TIRAMISU (The Innovative Rights and Access Management Inter-platform Solution) — EC FP6 (2004-2005)
- CONTESSA (Content Transformation Engine Supporting Universal Access) — EC FP5 (2001-2003)
- iMEDIA (Intelligent Mediation Environment for Digital Interactive Advertising) — EC FP5 (2000-2001)
- CAMPIELLO (Interacting in collaborative environments to promote and sustain the meeting between inhabitants and tourists) — EC FP4 (1997-1999)

Awards and distinctions

- Keynote speaker at WebMedia 2012 conference, Sao Paulo, Brazil, 2012.
- Visiting Scientist at Norwegian University of Science and Technology (NTNU), Trondheim, Norway (2011-2013).

- [Keynote speaker at World Usability Day](), Slovenia, 2011.
- Principal Investigator of a Microsoft Research fund for a field study on an asynchronous video link between primary education schools in the USA and Greece, Ionian University, Greece (2010-2011).
- [Marie Curie (European Reintegration Grant) fellowship by the European Commission for research in computer mediated communication in learning environments](), Ionian University, Greece (2009-2011).
- Vice-chair of the [IFIP special interest group on Interactive TV](), which is part of the [IFIP TC14 on entertainment computing]() (2008-now).
- [Marie Curie (Transfer of Knowledge) fellowship by the European Commission for research in interaction design and architecture](), Bauhaus University of Weimar, Germany (2006-2008).
- Program co-chair of the [5th European Interactive TV (EuroITV 2007) conference](), CWI, Amsterdam, the Netherlands, 2007.
- Program co-chair of the 4th European Interactive TV (EuroITV 2006) conference, Athens, Greece, 2006.
- Keynote speaker at the 3rd European Interactive TV (EuroITV 2005) conference, Aalborg, Denmark, 2005.
- National Science Foundation (NSF) scholarship for the participation in the [Doctoral Consortium of the ACM CHI 2003 Conference on Human Factors in Computing Systems](), Fort Lauderdale, Florida, USA, 2003

RESEARCH STATEMENT

I have been doing research in the broad area of Human-Computer Interaction methods (human-centered software design and evaluation of its effects on humans), with a particular focus on the application domains of entertainment (since 2001) and learning (since 2008).

Every few years, depending on resources and contemporary developments, I am expanding skills and knowledge into a new application domain. Recently, I have become interested in well-being (since 2013) and culture (since 2018). Here, I am organizing research according to broad topics of public interest in order to make them more accessible to the general public.

Entertainment, learning, well being, and culture

Since 2010, I have been exploring topics that influence e-learning and the quality of life, such as:

- serious video games: Children (and adults) have become highly engaged by computer video games. Is it possible to [design engaging video games that facilitate learning in Science Technology Engineering and Math (STEM) topics]? What is the effect of serious video games on student performance and attitudes?

- learning outside of the classroom: [What is the effect of mobile learning during a museum visit?]

- video-based learning: There are many ways to record a lecture on video, but [which video lecture format is the most effective and preferred by the students]?

- teaching computer programming: Computer programming has been treated in the classroom as a math or science topic, but the result has been fewer students being interested in learning, or at least understanding computer programming. [How can we engage students in computer programming?]

- healthy habits: Computers have been diffused into everyday activities such as [casual sports], eating, sleeping, etc.

- maker communities: [The projects, the structure, and the process of maker communities] provide an alternative to the mainstream and formal approaches to design, production, and learning.

The research framework bellow is organized according to two strands with respect to physical context (private and public space) and the type of activity (entertainment and learning).

Public space, collaboration, telecommunication, and community awareness

Since 2006, I have been examining human activity outside the home and toward the public space, with a particular focus on informal educational settings and computer mediated communication. For this purpose, I am employing both established and novel interaction and communication technologies. Moreover, I am working closely with schools and teachers, in order to leverage their ability to adopt and adapt technologies in ways that are suitable for their skills and needs. Recently, I have been working on the following projects:

- mediacity: a scholarly investigation on the interdisciplinary area that is defined by architecture, urban studies, and media interaction.

- cult: a cooperation platform between schools that reside in rural areas of Europe.

- videopal: a field study on an asynchronous video link between USA and Greece.

- collaborative multi-user screens: tools and techniques for designing highly collaborative multi-touch surfaces that are more than the sum of the parts (User Experience Quality in Multi-Touch Tasks, Multi-user Chorded Toolkit for Multi-touch Screens)

- virtual communities: online 3D virtual worlds (Second Life), social networks (Facebook)

Private space, family life, and multimedia production tools

Since 2000, I have been working on a broad set of research issues that consider an interdisciplinary area defined by human-computer interaction, multimedia design, and media communication. Most designers with an information technology (IT) background think about interactive television in personal computer terms. Although the academic background is in computer engineering, empirical research on the broadcast and the media industry –Hellenic Broadcasting, RAI research, Canal+, Danish Broadcasting– has taught me several lessons, in complement to the IT mentality. In particular, I have done research on:

- multimedia authoring tools that are suitable for the workflow of TV producers, as well as for user participation (see papers: User Interface Programing for Interactive TV, The Evolution of TV Systems, Content, and Users Toward Interactivity)

- user interface software and design that facilitates viewer interactivity with the rich TV visual language (see papers: user interface design principles for interactive TV, Animated character likeability revisited: The case of interactive TV)

- user evaluation methodology that concerns the uses and gratifications of TV by the audience (see papers: User Interface Evaluation of Interactive TV: A Media Studies Perspective and Learn and Play with Interactive TV)

- digital media management strategy that augments the established business model with alternative distribution and consumption channels, such as the Internet, mobile devices, etc (see papers: Coping with TiVo: Opportunities of the Networked Digital Video Recorder and Cross-media digital rights management for online music stores, Taking Social TV Beyond Chatting: How The TV Viewer Adds Value To The Network).

- social video retrieval:

Courses

Undergraduate

Human-Computer Interaction (3rd semester, 6 ECTS, 80 students): The HCI course provides an introduction to the breadth of human-centered computing. In addition to desktop user interfaces, the course introduces mobiles, CSCW, ubiquitous computing, entertainment, etc. The course is also complemented with student assignments that focus on empirical user analysis and user-centered design of computer applications, as well as software prototyping with Processing.

Computer Supported Cooperative Work (4th semester, 4 ECTS, 20 students): The CSCW course provides an overview of theories as diverse as software, sociology, anthropology, and organizational behavior. This course is an (optional) follow-up to Human-Computer Interaction and students are working in groups in order to design, develop and evaluate groupware.

Multimedia (5th semester, 5 ECTS, 40 students): The Multimedia course is based on a practical personal project, which is performed in the Processing programming environment. Moreover, the course lectures provide a firm ground on both theory and contemporary practice in multimedia technology, design, management, and art.

Software Technology (6th semester, 6 ECTS, 50 students): Software engineering has been usually focused on the modeling and design aspects of large software projects. In addition to the established approach, the Software Technology course takes a pragmatic approach to the numerous and rather diverse daily activities of software construction. For this purpose, the theory and the mandatory project include case studies and practical exercise on tools and techniques that support the software development and maintenance process. I am mostly concerned with the user-aspect of software (UIST), while my colleagues support the system aspect.

Previous teaching program included: Computer and Internet Art, Cultural Informatics, ICT and Tourism, Multimedia Design, Audiovisual Techniques, Communication Theory, Computer Programming.

Postgraduate

Interaction Design (1st semester, 5 ECTS, 10 students): The Interaction Design course provides a lecture-based introduction to the breadth of human-centered computing. In addition to desktop user interfaces, the course introduces mobiles, CSCW, ubiquitous computing, entertainment, etc. The course is complemented with a reading folder and critical presentations by the students.

Computer Supported Cooperative Work (2nd semester, 5 ECTS, 10 students): This course is complementary (optional) follow-up to Interaction Design and is based on a reading folder that includes the state-of-the-art in CSCW. Moreover, students are working in groups of two in order to produce original research in CSCW and present it in a final workshop (schoolit10 workshop, schoolit11 workshop).

Ubiquitous computing (Distance education, 6 ECTS, 15 students): The ubiquitous computing course has two dimensions: 1) A series of five lectures provides a solid background to the human factors aspect of computer technologies beyond the desktop and the server room, and 2) A hands-on series of projects, which employ either off-the-shelf technologies (camera, leds, sensors), or re-purposed consumer devices (mobile phone, mouse, keyboard), or the arduino system.

Mentoring

In addition to teaching (broadcasting of knowledge), I have been mentoring students toward an MSc, PhD thesis. So far, more than half of the thesis students under my supervision are publishing their final thesis as a research article in an international peer-reviewed venue (conference, journal).

I enjoy working with people who are passionate about interactive technologies and want to address important personal, social, and environmental challenges.

If you are interested in pursuing a PhD with me as advisor please contact me to discuss projects. If you are an ambitious and motivated BSc, MSc student and you are working in English, then feel free to drop me a line, we might be able to work together.

Completed PhD

- Varvara Garneli (2017)

Ongoing PhD

- Alexandros Merkouris (2014-)
- Elias Stouraitis (2015-)
- Diogenis Alexandrakis (2016-)
- Manousos Kamilakis (2017-)
- Konstantinos Patiniotis (2018-)

MSc, BSc Thesis students

The following students have been successfully supported toward a completed thesis project. Most of the students have also prepared at least one research article.

- Koutsourelakis, C. (2006): Mobile phone icons
- Mikalef, K. (2010): Mobile learning in the museum
- Stamatoukou, G. (2010): Math video game in Scratch
- Gkonela, C. (2011): Data collection from user interaction within web video
- Leftheriotis, I. (2011): Multi-touch and multi-user programming and evaluation
- Ilioudi, C. (2012): Video lecture styles
- Garneli, B. (2013): learning by playing and learning by making
- Talvis, K. (2013): Flu detection through social media status updates
- Takoulidou, I. (2014): Data collection from crowdsourcing platforms
- Merkouris, A. (2014): Learning programming through wearables and robotics
- Pardalis, K. (2015): Open geographic information tools
- Kapenekakis, I. (2015): Dynamic geographic map layers for pedestrians
- Simianakis, S. (2016): Human-centered video editing for action cameras
- Sagiadinos, S. (2017): Video tutor analytics
- Patiniotis, K. (2017): Serious video games
- Chorianopoulou, B. (2017): Science education through robots and tablets
- Papapolyzos, A. (2017): Peer-reviewing for collaborative cartography
- Skenteridis, K. (2018): Augmented board games
- Dimitriadis, Z. (2018): Interactive book

External examiner

- Emil A. Mork (2013): MSc Thesis (NTNU, Norway)
- Alcina Prata (2014): PhD Thesis (University of Lisbon, Portugal)
- Arnfinn Gjørvad (2014): MSc Thesis (NTNU, Norway)
- Stian Weie, (2015): MSc Thesis (NTNU, Norway)
- Kristoffer Hagen (2015): MSc Thesis (NTNU, Norway)
- Meng Zhu (2015): PhD Thesis (NTNU, Norway)
- Jordi Puig (2015): PhD Thesis (NTNU, Norway)
- Martin Almvik (2016): MSc Thesis (NTNU, Norway)
- Mikael Rino Solstad (2016): MSc Thesis (NTNU, Norway)
- Maria Aune Remøy (2016): MSc Thesis (NTNU, Norway)
- Ingeborg Ødegård Oftedal (2016): MSc Thesis (NTNU, Norway)
- Altanopoulou, P. (2017): PhD Thesis (University of Patras, Greece)

Talks

- Interaction Design. Guest lecture. User Interface Design for Interactive TV. Department of Computer Science. University College London. February 2005.
- Beyond Usability. Opening keynote speech. 3rd European Interactive TV conference (EuroITV 2005), April 2005, University of Aalborg, Denmark, 2005
- Supporting the Social Uses of Interactive TV. Guest lecture. Social computing course. University of the Arts (UDK), Berlin. July 2006.

- Double screen interaction design. Guest lecture in the course 'Multi-device interaction design in the museum,' Department of media design, Bauhaus University of Weimar, November 2006.
- Interaction Design for Ambient Systems. Guest lecture. Social computing course. University of the Arts (UDK), Berlin. December 2006.
- Interaction Design for Ambient Systems. Guest lecture. Architectural Media Communication course. Department of Architecture. University of Cyprus, Nicosia, Cyprus, December 2006.
- Media Design in Everyday Places. MSc Media Architecture, Bauhaus University of Weimar, January 2007.
- From Mass Media to Interactive Multimedia. Guest lecture. Department of Audiovisual Arts, Corfu, Greece, April, 2007.
- What is interactive TV? Keynote speaker, Mediacity, Abo Academy, Vasa, Finland, May 2007
- Physical computing with the Processing programming environment, Physical computing workshop, Department of media design, Bauhaus University of Weimar, June 2007.
- Broadband multimedia applications in everyday life of an Archipelago. Lecture. Broadband Symposium. University of the Aegean. Syros. June 2007.
- Connecting Everyday Life in Sporadic Communities. Guest lecture. Technical University of Berlin (TU-Berlin), Berlin, Germany, September 2007.
- Exploring the impact of urban conflict on the 'image of the city' with an interactive video installation, Locunet, symposium, University of Athens, May 2008.
- Modelling and development of interactive and networked artworks with open-source software and hardware, e-MobilArt (CULTURE 2007) seminar, University of Athens, Greece, June 2008.
- HCI teaching and Research at Ionian University, World sability Day 2010, University of Athens, Greece, November 2010
- Understanding the Hybrid City with Dynamic Digital Maps, Hybrid City Symposium, University of Athens, Greece, March 2011
- Ubiquitous games in the museum, Trondheim museum, Trondheim, Norway, August 2011
- Pragmatic understanding within web video, NTNU, Trondheim, Norway, Sept 2011
- User-centered design and development methods for interactive video, Mini course, University of Aveiro, Portugal, July 2012
- Graphical interfaces for Navigating Web video, Chalmers University of Technology, Gothenburg, Sweden, August 2012
- Crowdsourcing user interactions with the Video Player, Keynote talk at WebMedia 2012, Sao Paolo, Brazil, October 2012
- Interaction design for ubiquitous learning and entertainment through video technologies, Mini-course, Sao Paulo University, Sao Carlos, Brazil, October 2012
- Ubiquitous computing and interaction, Guest lecture, Aarhus University, Aarhus, Denmark, November 2012.
- Flutrack.org: Open system and open data for epidemiology, Health Informatics Day, University of Athens, December 2013
- Socialskip.org, Web Technologies Course Guest Lecture, Norwegian University of Science and Technology, September 2014

- Social Media Analytics, Behavioral Informatics Course Guest Lecture, Athens University of Economics and Business, October 2014
- Flutrack.org: Open system and open data for epidemiology, Guest Lecture, Madeira Interactive Technologies Institute (MiTI), Portugal, December 2014
- Programming Interactivity and Innovation. Book presentation at ACM SIGCHI Greek Chapter, December 2015
- Introduction to Programming interactivity. Lecture and Demo, Athens University of Economics and Business, April 2016

TUTORIALS

- K Chorianopoulos, L Jaccheri, AS Nossum. Creative and Open Software Engineering Practices and Tools in Community Projects, Engineering Interactive Computing Systems (EICS 2012), Denmark.
- P. Cesar and K. Chorianopoulos. ESCape – Directions for Next Wave of Interactive Television Research, European Interactive TV Conference 2010 (EuroITV 2010), Tampere, Finland.
- P. Cesar and K. Chorianopoulos, Interactive Television and the Web International World Wide Web Conference 2009 (WWW 2009), 2009, Madrid, Spain.
- P. Cesar and K. Chorianopoulos, Introduction to User Experience Design for Interactive TV International Conference on Designing Interactive User Experiences for TV and Video (uxTV 2008), Mountain View (CA), USA.
- K. Chorianopoulos and P. Cesar, User Experience Design for Interactive TV International Conference on Digital Interactive Media in Entertainment and Arts (DIMEA 2008), Athens, Greece.
- K. Chorianopoulos and P. Cesar, Human-computer interaction methods in digital TV applications European Interactive TV Conference 2008 (EuroITV 2008), Salzburg, Austria.
- P. Cesar and K. Chorianopoulos, Interactive Television and the Web International World Wide Web Conference 2008 (WWW 2008), Beijing, China.
- K. Chorianopoulos and P. Cesar, Introduction to Interactive Digital Television. European Interactive TV Conference 2007 (EuroITV 2007), Amsterdam, The Netherlands.
- P. Cesar and K. Chorianopoulos, Interactive Digital Television and Multimedia Systems Multimedia Conference 2006 (ACM MM 2006), Santa Barbara (CA), USA.
- K. Chorianopoulos, Beyond TV. 4th European Interactive TV conference (EuroITV 2006), Athens University of Economics and Business, Athens, Greece

TEACHING STATEMENT

Teaching consists of at least the following components: Syllabus, lab and practical work, lecture, group work, home-work, exams, and last, but not least, mentoring.

Syllabus and readings

Usually, the first thing to be considered in the design of a course is the text-book. Fortunately (or unfortunately) the area of informatics has been changing fast for as long as I have been a student and researcher (15+ years). By the time any decent text book is

published some part of it is outdated, or at least not as important as some other parts of it. In the case of translations, the problem is even greater. National publishers are (naturally) picky about the books they translate, so by the time the local (e.g., Greek) version hits the shelves, a significant part of it has expired. Of course, there are some ideas (e.g. algorithms) or some practices (e.g., the text editor) that stay the same despite the number of changes, but those are usually lost in the details of long (out-dated) text-books. The above issues are just the tip of the iceberg. I have noticed that the teaching system (syllabus-teachers-notes-students) usually becomes trapped in a text-book and the respective syllabus: there is an inertia to the changes that happen to both practice and research. The suggested remedy: 1) pick a couple of great English text-books that are updated often by the authors, 2) ignore (the nice) slides offered by the authors and prepare a short comprehensive set of slides that is easy to update and change often, 3) set-up a collaborative wiki that students update with relevant content. In summary, text-books are really great (for your library shelves).

The lecture

Lecturing has been for many years one of the main components of teaching at any level of education, but the growth of online lectures has been shifting the value of teaching from the local lecture to added value activities. Please do not get me wrong, I love teaching and talks, as well as getting feedback and evaluation by the audience. On the other hand, I have found numerous online talks (on the same topics I teach) to be so much better than my own performance. Could this be a threat to our local lecturing activities? To the extend that a live lecture is just the same performance over and over again, then any live lecture might be replaced by instructional media such as video by a top lecturer who provides rehearsed acting, which has also the benefit of being able to pause, replay, and skip. Will the live lecture become obsolete as soon as there is a broad and deep video library of quality lectures available online? I think, yes, and yes, but I consider this to be an opportunity for shifting our attention towards the other components of teaching and in particular mentoring, which is personalized to each student. At the same time, the lecturer is empowered to create and develop lectures on topics of expertise, which might not have been relevant at a local level. Overall, the demise of the local lecture is a great opportunity for improving the effectiveness of teaching, as well as for the personal development of each lecturer/researcher.

Group work, mentoring, and live journal

In addition to highly topical lectures that are delivered by an expert on the topic, the local and campus activities should focus on adding unique value to the learning experience. There are many creative approaches to additing value to learning experiences that are not threatened by instructional media, such as personal mentoring, group-work, and synchronous tele-teaching. In particular, personal mentoring in the context of group-work enables individuals to relate with the effort required to transform themselves from the current situation to a new level. Even shy students who might not ask for personal advice are inderectly benefited by the questions of more extrovert students. Moreover, personal mentoring and group-work might be further enhanced by an occasional synchronous tele-teaching session. In this way, the local activities are transformed into a flexible learning format that reflects the group dynamics, which are not possible to

mimic with instructional media. Moreover, local and distant group-work is a pilar in many kinds of contemporary work activies, so the students are indirectly also getting exposure to the modern work place. Finally, in contrast to performing according to schedule, I am recording the above activities in a journal, which is shared with students. This journal has been useful for further reflection, and it is also beneficial for those who missed the class.

Teacher and instructional media

Every time there is a new technology or medium that records and transmits knowledge there is an hypothesis that it is going to replace teaching. The first one to accurately invalidate the hypothesis was Socrates, who was against books as a replacement of teachers because one cannot discuss with a book and discussion (interactivity) between face-to-face humans is where learning takes place. The exact same hypothesis has been raised again several times during the introduction and diffusion of instructional media such as printing, distance learning through post, online syllabus, e-books, forums, video lectures, etc. After thousands of years of facing the same hypothesis again and again we should have known better. In short, instructional media cannot replace (and cannot be compared) to teaching as long as they are not really personalized to and interactive with each learner. Of course, modern instructional media, such as video with text-based forums or video-games provide increased interactivity between teacher and learner. In addition, we can have teachers and learners interact through video conference in real-time. So, it seems that we are getting there, slowly but steadily adding interactivity between humans during online learning. Then, the question is: Are we going to be able to totally replace human contact with mediated one during online learning? Yes, as much as we have been able to replace it for other human relationships, such as love and friendship. ;-)

Home work and instructional media

Since you can find quality and quantity of instructional media in open courseware platforms (syllabus, notes, slides, videos, text-books), home-work should be geared towards those resources. This idea has been named the flipped classroom, because it keeps the same structure (teaching plus assignments), but flips the place: teaching happens at home and assignments happen at school. In the beginning a student should be mentored towards the right instructional media according to preferences and level. In this way, we can imagine the teacher as a doctor, who has a very personal contact with each student and provides a prescription of instructional media according to needs, history, and objectives. In the end, the ultimate goal of the home-work schedule should be the empowerment of the student to retrieve those resources by personal means. Indeed, learning to learn seems to be the holly grail for any learning activity. Although all learning objectives are about a particular subject matter, there is always this higher-level objective, regardless of subject matter. At the highest level of learning to learn one is expected to be able to keep an intrinsically motivated dialog between oneself and the instructional medium, and this is the rare occasion when teaching theories and teaching styles like this page become useless.

The lab and practical work

As soon as the majority of instructional media (text-books, slides, video lectures, video-games, simulations) is employed in home-work, then what is left for the classroom? It has been said that the contemporary classroom (teacher at the top and students in rows) stands for the hierarchical structure and the needs of industrial and post-industrial economic activities. Since we have been going through an economic transformation with much of motor and cognitive work being replaced by robots and computers, then the real question is what is the nature of contemporary and future office work (if we assume that such a thing is going to exist)? My current understanding is that the classroom should become mostly a collaboration space with activities that require group-work. Local live lectures should remain part of the mix, but should be turn-based between the instructor and the participating students, who are going to present and get critique of their homework. Moreover, the idea of lab and practical work should grow to include out of classroom activities, as much as possible: for example, students visiting museums and doing activities there, higher education students doing video conference with remote groups of students, working on few projects during a long time under the mentoring of multiple instructor and outside stakeholders.

The exam

Last, but not least, the exam is considered to be the holy grail for the students, because of the significant implications (fail, pass, honours, etc). During the 90's, as a student, I have never liked exams, and the transition to research and teaching offered an initial (but short lived) relief. As a teacher I have discovered that the stress of giving exams has only given its place to the stress of grading exams with a single definite mark, which carries the aforementioned important implications. How could the exam change to encourage constructive use of week-long preparation and 2-3h intense writing? For the time being, in small-scale (10-20 students) research-based courses, I have successfully introduced peer-reviewing and grading. In particular, each student has to evaluate the term paper-presentation-process for each one of the rest of the students and provide a grade. If the grade is within a narrow range of my grade for that term-paper then that student gets high mark, otherwise looses some points. The benefit of this approach is twofold: 1) the students are forced to engage with the peers' work as much as their own work, and 2) they become more responsible about their own work, because they understand better the criteria for grading it.

Pedagogy

There are probably as many pedagogic approaches as there are religions and existential philosophies. Then, it becomes apparent that the selection of any particular pedagogy cannot be totally objective and it depends on several factors and on their inter-dependencies. For example, applied arts schools (e.g., industrial design, architecture) are based on the studio approach, which is a collaborative lab mixed with mentoring and critiques. Nevertheless, first year students will also get a lot of lecturing, but lecturing will diminish as the students progress towards the final years in favor of studio work. Another interesting pedagogic approach is the one of music schools, which have one-to-one instruction, which is based mostly on performing on a musical instrument. The approaches followed by applied visual and audio schools has been test by time, as

it remains the same over thousands of years. Notably, computer science is very similar to applied arts: There is an instrument (computer) with many manifestations (mobile, embedded, desktop, server, etc) and the instrument can be applied to solve problems in many other domains. Then, a pedagogic approach to teaching computing might have a lot to learn by the studio and one-to-one approach followed by applied arts schools.

Mentoring style

Mentoring versus lecturing
Although I do enjoy giving (or attending) a good lecture, mentoring (closely followed by lab work) is the most effective way of teaching and learning. Actually, I think that, if it was possible, mentoring should become the only way of teaching others. Unfortunately, teaching is usually associated with fixed lectures, which transfer knowledge from research findings to students in a rather inflexible way, as if knowledge is fixed and most unfortunately as if all students attending the lecture have the same level or the same preferences. As a matter of fact, mentoring is attacking both problems (knowledge growth and variability of student knowledge) and is also the most rewarding activity for the researcher/mentor, because one can immediately get feedback on student improvement; now compare that to lecture-based teaching, which is only evaluated at the end of the semester with an almost binary pass/fail exam. Of course, mentoring is also very challenging and it is not practical for larger groups of students. In my view, the rewards for me and my students far exceed the challenges. In practice, the main reward during mentoring has been the construction of software and publication of articles all of which have strengthened the self-confidence of students and fueled their follow-up steps in industry or research. Nevertheless, I can see some value in lecturing in the format of a shared experience that bonds together a big group of people, just like TV or cinema does. For example, students gather in an auditorium to attend a professionally recorded lecture on video and then they have a discussion with a panel of experts. Or, students watch a video lecture at home and then they meet at the lab, in order to work in groups.

Some notable challenges in the preparation of a thesis (or moving from school to industry)
I have been supervising a few dozens theses at all levels (BSc, MSc, PhD) and at different countries and universities. Although the requirements seem different, I have identified some challenges that are common in the process of preparing a thesis that makes some sense in the face of the modern world: *1) Open-ended, 2) Confusing, and 3) Demotivating.* Overcoming these challenges is not easy and in many cases does not happen at all or happens partially. *Open-ended:* The majority of the students arrive at the start of the thesis with an experience of more than fifteen years of course-work that has been offered to them mostly as well-defined problems and solutions. When I tell them that the syllabus for the thesis will be the thesis report itself when submitted at the end of the process, most of the students experience a cultural shock at the level of the "chicken and egg problem". *Confusing:* Depending on the personality (extrovert-introvert) of the student and the amount of readings (e.g., books, articles, software) after approximately one or more months the student will report that the topic is confusing and unclear. That's an excellent signal that the student has done a significant amount of breadth exploration on a topic and it is time to narrow down into a more focused topic. *Demotivating:* Narrowing down the topic into something concrete is usually a wish that the student soon regrets, because after a few more months of work on a narrowly defined topic the stu-

dent becomes bored and demotivated. That's again an excellent signal that the student has been doing a significant amount of in-depth work and it is time to wrap-up things into the thesis report. Sometimes, I think that the main value of doing a thesis is about facing these challenges for the first time in a controlled environment like a university. Recognizing and acknowledging these challenges provides some hope that they might become manageable by the end of the thesis or at least that the student will be prepared for the real world and the contemporary industry, which is very much like that: *1) Open ended, 2) Confusing, 3) Demotivating*. In this analysis, I am assuming that the supervisor does not give the student a very narrow concrete topic in advance, which is a very common approach by many supervisors. In this case, the student avoids the Open-ended and Confusing challenges and arrives immediately at the third challenge, with the added problem of not experiencing first-hand those very common challenges. Although there are some benefits to this approach (e.g., efficiency), there are some drawbacks too, because this kind of education does not stand for the contemporary world, but is a relic of the industrial age, which needed people to do mostly well-defined tasks.