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Designing a Social Exploration MOOC: Visual Literacies— Exploring Educational Practices and Technologies

Julie-Ann Sime, Lancaster University
Chryssa Themelis, Lancaster University
Yiannis Arapoglou, Wide Services
Asteria Marantou, Wide Services
Katerina Theodoridou, CARDET

Abstract

Social exploration is the key to spreading ideas through networks (Pentland, 2014). When people talk with others outside their immediate group, they can bring fresh ideas into the group—leading to improved outcomes. So, to improve educational practice, we should increase communication in our professional communities and encourage communication amongst professional educators in different disciplines, and across sectors of education and national boundaries. To improve social exploration opportunities for educators, we developed a massive open online course (MOOC) so they could explore technology-enhanced learning practices and technologies, and the topic of visual literacies. We investigated how a MOOC could be designed to support social exploration, and we examined the contribution of gamification and a live-streamed seminar. The pedagogical design of the MOOC was based on networked learning theory. This approach emphasises openness and democratic relationships between teachers and learners, and supports diversity and inclusivity of participants (Dohn, 2014). Social network analysis of 14 discussion fora was combined with qualitative data analysis of 11 questionnaires on the learner experience. Results revealed two distinct patterns of interaction in discussion fora as participants conversed about the learning material and shared ideas about teaching practice. The role of the tutor in promoting social exploration and creating teacher presence was found to be important in discussion fora and in a live webinar. This investigation illustrates how networked learning theory and tutor activity contribute to the creation of a social exploration MOOC for professional development and identifies avenues for further research on the design of learning communities.

Keywords: MOOC; social physics; online learning; networked learning; technology-enhanced learning; gamification

Introduction

The COVID-19 pandemic has had a dramatic effect on our educational systems, as educators have had to adjust rapidly to move their teaching online. As a consequence, many have increasingly engaged in professional development courses, and have turned to their professional networks for support and ideas (Hodges et al., 2020). Pentland's (2014) theory of social exploration explains how ideas are shared in a network and how new ideas are brought into organisations by connecting with others outside the group.

This paper is a reflective account of an innovative teaching practice. It examines the pedagogical design of a social exploration MOOC based on networked learning theory (Dohn, 2014;

Goodyear et al., 2004). The MOOC has a dual focus: delivering new content on visual literacies in online education, and promoting the exchange of practice in a professional-development community. MOOCs offer great potential value to professional development, and this investigation adds to the limited understanding of their use in this context (Milligan & Littlejohn, 2014).

This study uses a design-based research methodology to combine theory-driven design and empirical educational research to understand how theory works in practice (Anderson & Shattuck, 2012). Because the outcomes are both practical and theoretical, it contributes to research and to the scholarship of teaching and learning (Boyer, 1990; Fanghanel et al., 2016; Hutchings & Shulman, 1999) by:

- grounding research in discipline-specific and pedagogic knowledge and research, via engagement with the literature
- analysing practice through critical reflection on teaching and learning
- disseminating the outcomes to the professional community to promote further development.

This study is a systematic inquiry into the learning of professional educators, and advances the practice of teaching in MOOCs. As technologies continue to change, educators need to continually update their professional knowledge and competence in learning technologies and pedagogies to enrich their courses.

The novelty of the pedagogical design lies in its:

- technology-enhanced learning perspective on visual literacy (how technologies and pedagogies can improve visual communication)
- authentic and leading-edge content obtained from a study of how experienced educators use visual technologies in practice (Sime & Themelis, 2018, 2020)
- networked learning theory design that is democratic, diverse, and inclusive (de Laat & Ryberg, 2018; Goodyear et al., 2004)
- support for social exploration (Pentland, 2008, 2014) that emphasises the importance of allowing educators to talk with each other to gain fresh ideas for their teaching.

We investigated how an online learning community could be designed to promote social exploration, and we included gamification and a live-streamed seminar. The MOOC, entitled "Visual literacies: Exploring educational practices and technologies", aimed to improve the educators' competence with digital technologies to enhance visual communication in teaching practice and their understanding of visual literacy in online education (MOOC, 2018). The MOOC was designed in English by European researchers and was delivered over 5 weeks in April–May 2018. It offered free professional development to educators from formal and informal education, and from vocational training.

We support the European policy initiative on Opening Up Education in Higher Education through supporting the development, sharing, and re-use of open educational resources (OERs) through four actions: acquisition of digital skills, support for OERs, connecting classrooms and deploying content, and mobilising stakeholders to change the role of digital technologies at education institutions (European Commission, 2013). As a result, we set out to create resources that could be re-used and modified by educators and to make the course as open as possible.

This research contributes to the practice of professional development through MOOCs (Milligan & Littlejohn, 2014), and to the debate on how to design learning communities by fostering

learning interactions and experiences (Alexander & Fink, 2018; Heredia et al., 2019; Khoo & Cowie, 2011).

Research design

A design-based research (DBR) methodology with mixed methods was used to gather data on the participants' activity in the MOOC, and on their perceptions of learning (Anderson & Shattuck, 2012). Design-based research combines theory-driven design of learning environments with empirical investigation of an educational intervention to create an impact on both theory and practice. Qualitative data was gathered from 11 questionnaires—including one on prior knowledge and experience—and 10 shorter questionnaires on participants' learning experience. Quantitative data was gathered from participants' learning activities and a more detailed examination of the community through interactions in discussion fora. The data analysis included descriptive statistics about the participants' prior experience and their learning activities, including social network analysis of interactions in 14 discussion fora (Jan et al., 2019). Analysis of questionnaire data included descriptive statistics and thematic analysis of open questions.

The MOOC was promoted on social media and mailing lists (through professional teacher and learning technology associations) as a professional development course for educators who were interested in visual literacies and educational technologies. As a result, 308 participants registered from over 45 countries (62% women and 38% men).

A 5-week MOOC was developed to explore educational practices and technologies relating to visual literacies. The e-learning design had a variety of content presentations and activities (infographics, video, animation, wiki, 1-minute questions, discussion fora, weekly quizzes, a game, a live webinar). Discussion fora for sharing teaching experiences and discussing new ideas were supported by two tutors and a guest speaker who provided a live webinar in the final week. The MOOC included weekly questionnaires about the learning experience and a short (1-minute) question that was designed to be answered quickly. The MOOC was implemented in Moodle. The MOOC's content, pedagogical design, and technical design are discussed below.

MOOC design: Content

To ensure the content of the MOOC was up to date, of high quality, and relevant to international teaching practice, a research study was conducted to find out about current teaching practice and learning technologies. There is insufficient room to present these findings here. For further information, see Sime and Themelis (2018, 2020).

Briefly, learning materials were derived by combining a literature review with data from semi-structured interviews with 21 educators who were experienced in using visual communication technologies and pedagogies. The data was analysed with informed grounded theory to identify common themes, resources, and theories (Thornberg, 2012). This approach enabled us to map the field of research and practice at the intersection of visual literacies, technology-enhanced learning, and online education. Because the educators came from 10 countries, and from diverse disciplines and educational settings, we had an international, multi-disciplinary perspective.

Thus, the learning materials were state of the art in terms of teaching and research into visual teaching and technologies. They included newer technologies such as augmented reality, and theories about online identity and presence in virtual worlds. This established a rich and varied basis for enhancing professional educators' knowledge and understanding.

During the MOOC's delivery we asked participants about the quality of the content and its relevance to their professional practice. Using participation data and data from the 11 questionnaires, we examined their prior experience and their perceptions of the MOOC. A

review of the literature on MOOCs identified three typical criteria for measuring success: drop-out rate, completion rate, and retention rate (Rieber, 2017; Zawacki-Richter et al., 2018).

MOOC design: Pedagogy

While keeping in mind the theory of social exploration, whereby good ideas are captured during communication in professional networks (Pentland 2014), our challenge was to create a pedagogical design that allowed social exploration and promoted peer-to-peer communication, while also introducing content about educational theory, practices, and technologies.

The pedagogy of MOOCs can be described in three categories: xMOOCs, cMOOCs, and hybrid MOOCs that integrate both styles (Zawacki-Richter et al., 2018; Zhu et al., 2019). However, there are a number of other pedagogical approaches and numerous variations, such as bMOOC (blended MOOC) and smOOc (small open online courses) (Storme et al., 2016).

xMOOCs adopt an instructivist pedagogy with tightly constrained, predetermined pathways and learning objectives (Zawacki-Richter et al., 2018). Most MOOCs adopt this expository approach with video lectures and passive student learning (Crook & Schofield, 2017). However, this design assumes that students all start at the same level and need to progress through each topic in a course. This approach does not accommodate the learning needs of a diverse, and unknown, group of professionals who have varied needs associated with their educational settings, the requirements of their teaching practice, and their unique knowledge and experience. A MOOC for professional development needs to respect the existing experience and knowledge of participants and allow them to choose their own learning objectives and topics that are relevant to their practice and interests. In other words, it needs to take a more student-led approach.

Downes (2008) introduced the term cMOOC to describe MOOCs that involved groups of people learning together in a community in which all teachers and learners are equal. These MOOCs are built on the learning theory of connectivism, in which learning occurs in networks of people who interact via technology (Siemens, 2005). This approach emphasises the importance of distributed learning resources connected in a network that decentralises learning. Learning is seen as "the ability to construct and traverse those networks" (Downes 2008, p. 2). Learners are expected to develop connections with experts and resources, and to draw on these when necessary. However, connectivism assumes that learners are sufficiently motivated to be self-directed, and many learners find that "interactions with technologies and resources in isolation are not sufficient" for learning (de Laat & Ryberg, 2018, p3). A hybrid approach could combine an online learning community with a taught course that is open so learners can choose their own learning objectives.

We applied the principles of networked learning theory because it emphasises the development of an online learning community (Goodyear et al., 2004) in which educators can share resources and reflect on their teaching practice while learning about the innovative content on visual literacy (de Laat & Ryberg, 2018).

Networked learning was initially defined as:

> learning in which information and communications technology (ICT) is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources. (Goodyear et al., p. 1)

This definition was later amended by Dohn (2014), who added "between the diverse context in which the learners participate" (p. 30). This addition is especially important in a MOOC, where participants may be very diverse.

The networked learning principles of democracy, diversity, and inclusion (E-quality Network, 2002), mean that all participants are treated as equal (tutors are also considered to be learners), diversity is encouraged and seen as a source of knowledge (thereby supporting cross-disciplinary communication), and inclusion means there is support for differences between learners and how they use resources. These principles align with Pentland's (2014) theory of social physics and the value of diversity for stimulating new ideas.

MOOC design: Technology

The MOOC platform had to facilitate the pedagogical and technical design requirements, that is, it had to handle large numbers of participants, live webinars, videos and text content, and support community development through asynchronous discussion. We also wanted to support the European policy of Opening Up Education and make the learning materials available as OERs for educators to re-use (European Commission, 2013).

Moodle was chosen over other major MOOC platforms (such as FutureLearn or Coursera), which have strict rules prohibiting the re-use of content. To support the open-education movement, we needed to use an open-source software (such as Moodle), which is distributed freely under the GNU General Public License. However, one disadvantage of creating the MOOC on an independently hosted Moodle platform was that there would be less publicity. To compensate for this, the MOOC was listed on MOOC aggregator sites such as the MOOC list (MOOC List, 2020). Moodle is a popular learning management system that can be configured to meet the needs of teachers and their learners. More than 500 plugins can be added to modify the platform and introduce features such as gamification, games, and live webinars.

Gamification is one of the most effective ways to engage and motivate learners (Zainuddin et al., 2020). Game mechanics, which are common gaming tactics used to motivate students, stimulate their desire to "win" by completing challenges. Aparicio et al. (2018) suggest that "a gamified learning environment is a decisive factor in the success of MOOCs" (p. 12). Some of the most popular mechanics for gamification, challenges, badges, and achievements were also used (Liyanagunawardena et al., 2017; Moodle Progress, 2018). The aim was to motivate learners to do more and progress faster by collecting badges for challenges such as completing the weekly activities (e.g., reading, watching videos, taking a quiz; participating in discussion fora or wiki). There were six badges, one for completing each topic in the MOOC, and course completion badges and certificates that were achieved by meeting criteria such as participation in discussion fora, reading, and viewing videos.

Quiz games were also used so participants could track and assess their own progress. Multiple-choice questions in weekly quizzes and in a quiz game, Millionaire, were marked automatically, so participants could test their own knowledge as often as they wanted.

The theory of tele-proximity suggests that using synchronous visual communication technologies (such as live webinars), can have a strong positive effect on feelings of teacher presence (Sime & Themelis, 2020). Tele-proximity is defined as an online embodiment that explains how tutors and students feel connected in synchronous networked communication. In other words, seeing the tutor—so the viewer can understand facial expressions, gestures and body language—is important for communication. Pentland (2008), who carried out research on communication in organisations, calls these "honest signals" because they are difficult to fake and can even contradict speech. As a result, these honest signals play an important role in communication. In Week 5, a virtual seminar with a guest tutor was live-streamed with Google Hangouts on Air with YouTube Live so a recording was available on YouTube (Visual/video Project, 2018). The webinar, which was included to investigate its role in developing community and a sense of teacher presence, was accompanied by an asynchronous discussion led by the guest tutor.

Results and discussion

Three hundred and eight participants expressed an interest in participating in the MOOC, and there were 185 active participants in Week 1. Although this isn't a massive number, the course was designed as an open online course that could accommodate large numbers. Typical measures of MOOC success—such as drop-out, completion, and retention rates—are discussed (Rieber, 2017), along with the learners' perceptions of their experience and social network analysis of their communication patterns (Jan et al., 2019).

Drop-out, completion, and retention rates

According to Rieber (2017), the average drop-out rate (i.e., difference between those who register and those who access the course) is 78%. In this MOOC, the drop from 308 (registered) to 185 (starting the course) was 40%. This was substantially better than expected.

Completion rates reported in the literature are typically very low: 3–4% (Rieber, 2017). In this MOOC only 1.6% gained a certificate. This was lower than expected, but participants were informed about completion certificate criteria only 3 days before the end of the course and this may have affected the outcome. The course was not designed with the expectation that all of the participants would complete all of the activities. Alario-Hoyos et al. (2017) question whether drop-out and completion rates are appropriate measures of success for MOOCs, in which learners' motivations are very diverse (Barak et al., 2016).

Retention rates during the course were better than expected with a 23% drop from Week 1 to 2 and 10% from Week 2 to Week 3, compared with reported rates in the literature of 40% and 25% respectively (Greene et al., 2015). Over the 5 weeks, we had 185, 142, 123, 105, and 66 participants actively engaging in the course, and 144 people viewed the webinar in Week 5. This represented a steady decline in active participants to 36% in Week 5. However, participation in one element—the virtual seminar—raised participation levels to 78% retention. Because some participants chose to participate only in parts of the course that interested them, these figures are not really meaningful in the context of professional development. For example, one participant said that he joined the course to engage in the Week 3 topic.

Unlike linear courses, the aim of the MOOC is not to teach the whole content but to develop professionals' existing knowledge. Participants choose their own learning objectives. Using retention rates assumes that learners start at the beginning of the course and then stop progressing—this is clearly not the case for the participant who started with Week 3. Alexander and Fink (2018) also created a MOOC based on networked learning theory and called for greater inclusivity of learners who might have varied learning objectives and numerous ways of engaging with learning resources. Their strategies might not all be visible in the MOOC (e.g., using the resources for face-to-face discussion groups or choosing interesting topics).

The learners' experience

Questionnaire data showed that the participants were professionals who wanted to expand and exchange existing knowledge and practice. At the start of the course, 68 participants (37%) completed a questionnaire on their e-learning experience. This revealed that 97% participants felt they had medium-to-high competence with ICT, 100% were comfortable with taking an e-learning course, and 90% had undertaken e-learning courses—mainly for professional development and certification. Of the participants, 98.53% were comfortable with taking a MOOC, and 71% had previously participated in a MOOC. Regarding visual literacy (the topic of the MOOC) 85.29% rated their knowledge as average or above, and 78% said that they used visual literacies in their profession. Overall, participants were experienced online learners who

were undertaking the course for professional development and were familiar with the topic of visual literacies.

The learning content was viewed very positively, although the lack of practical activities was noted. From an analysis of 10 shorter questionnaires, the content was perceived as being: useful to them as professionals (88.9–100% each week); beneficial to professional development (77.7–100%); and beneficial to personal development (88.2–100%). Open questions enabled participants to suggest changes and to indicate highlights. The Week 1 content was seen as providing an interesting and novel perspective on visual literacies. The Week 3 content on virtual and augmented reality introduced new horizons of "high interest", contained "various examples" from different disciplines, and was perceived positively. Week 4 was also valued for introducing new perspectives and ideas for teaching. On the other hand, several participants asked for more practical activities for using new technologies and this request was echoed in discussion fora posts.

There was insufficient evidence of the role of gamification in learning. Although the literature on gamification emphasises motivational benefits (e.g., Aparicio et al., 2018), we did not gather sufficient evidence to suggest that the quizzes, six badges, and completion certificate played a role in participants' motivation or performance. Further research is needed to investigate the effect of games and gamification on participants.

Finally, the webinar, which was live-streamed to YouTube, was successful in enhancing participation and making people feel part of a community (Visual/video Project, 2018). The Week 5 webinar with a guest tutor was viewed very positively. It generated comments such as "fantastic" and "very good" and showed that the "community was active". The webinar attracted 144 viewers (other Week 5 activities had 66 participants). This increase suggests that a learning community, which is required for social exploration, had been created. We explore this aspect next.

Communication patterns in the community

When talking about social exploration, Pentland (2014) says that symmetrical communication patterns allow good ideas to spread through networks. This means that tutors shouldn't dominate discussions—the interactions between participants and tutors should be balanced.

We used social network analysis to examine the interaction between participants and tutors in the discussion fora (Jan et al., 2019). Fourteen visual representations of interaction were created in 14 discussions. They showed a wide range of participation patterns.

Figure 1 Two representations of interactions in Week 1 and Week 5 discussion fora (tutors are blue dots and learners are orange dots)
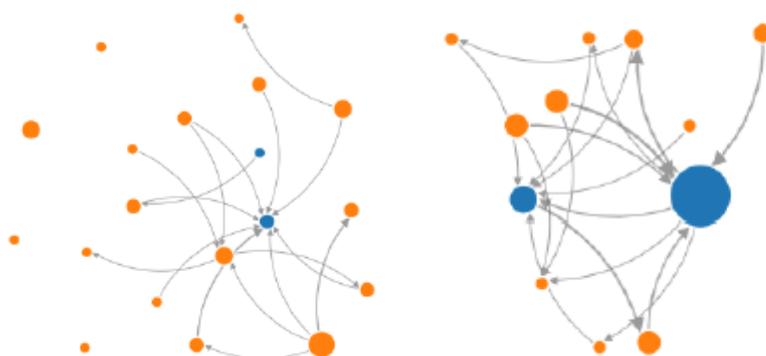
Figure 1 illustrates two patterns of interaction between participants during discussions. The blue dots represent tutors, and the orange dots are MOOC participants. The size of the dot represents the number of a participant's posts on the discussion forum, and the lines denote the interactions. The graph on the right shows a tutor-dominated discussion with the webinar guest tutor in Week 5. The graph on the left shows a more balanced pattern from a Week 1 discussion, which was an exchange of practice experiences between participants with the tutors acting as both facilitators and learners.

When we examined the 14 graphs, we could see that the discussions that focused on exchange of practice were more balanced than discussions of content, which were more likely to be dominated by tutors. Being aware of this difference and being able to visualise the interactions could be useful when designing future MOOCs. It provides a means of assessing the interaction patterns and whether or not the intended objective (i.e., to promote discussion amongst participants or to encourage discussions with the tutors) has been achieved.

Conclusions

In keeping with the design-based research methodology, we had two aims: to develop teaching practice, and to advance research. The first aim was met by designing a MOOC that allowed educators to explore educational theories, practices, and technologies related to visual literacy. We examined the learners' perceptions of the content and their experience of learning in the MOOC by analysing questionnaire data. The second aim was achieved by researching the design of the learning community by analysing questionnaire data on the learner experience and social network analysis of learner interactions in discussion fora. We looked particularly at how discussion fora, gamification, and live webinars contributed to the creation of a social exploration MOOC.

The first aim was to support the practice of educators by creating a professional development MOOC. The learning materials provided an overview of current practice and included case studies, guidelines, and recommendations for using visual communication methods and techniques. The content of the MOOC was obtained by interviewing educators who were experienced in teaching with visual communication technologies (for further details, see Sime & Themelis, 2018, 2020). Feedback from participants showed that the perceived benefit to professional and personal development was very high, and the variety of resources was identified as a highlight of the course. Educators appreciated being able to explore new technologies in visual communications and exchange experiences with educators from other disciplines, other countries, and other educational settings. Nevertheless, some participants suggested adding further opportunities for practical experience with technologies.

Although the MOOC was not massive, it attracted a large group of experienced educators who were keen to develop their practice and were willing to share their experience and knowledge with others. Moodle enabled us to share the learning materials with participants so they could re-use and modify them to suit their local context and their own learners. By delivering the MOOC and sharing the contents with educators, we supported the open education movement and the practice of educators.

The second aim was to research the design of a learning community. We used networked learning theory's principles of democracy, diversity, and inclusivity (E-quality Network, 2002) to design the MOOC. It was democratic because the relationship between tutors and participants was flexible. Social network analysis of discussion fora showed that learners could adopt the role of tutor, and vice versa. It was diverse because the content was multi-disciplinary—it contained examples of teaching visually in language learning, medicine, dance and art; in higher education, vocational training, and schools. It was inclusive because it had an open pedagogy (rather than a

tightly constrained linear structure) that allowed participants to set their own learning objectives (e.g., learning one topic only). So although it's not possible to design a learning community, networked learning theory is appropriate for creating suitable conditions for the development of a community and social exploration in a MOOC (Alexander & Fink, 2018).

MOOC participants exchanged their experience of teaching practice in discussion fora, thereby engaging in social exploration (Pentland, 2014). Discussions about teaching practice generated more interactions between participants and were less dominated by the tutor. Social network analysis of interactions in the discussion fora identified two patterns of interaction but was insufficient on its own to interpret these patterns and understand the difference between discussions of theory and practice (Jan et al., 2019). Social network analysis could be a useful tool for refining future MOOC design to ensure that social exploration occurs.

The roles of gamification and a live-streamed seminar in creating a learning community were explored. There was insufficient evidence of the role of gamification or games. However, the live-streamed seminar greatly increased participation and participants felt that the live event brought the community together. The sense of presence created by the live event appears to be particularly important for learners. This is in keeping with the theory of tele-proximity which suggests that being able to interact synchronously with the tutor is important for communication and feelings of teacher presence (Sime & Themelis, 2020). This suggests that MOOCs should include live events.

We investigated how to design a social-exploration MOOC based on networked learning principles and created a learning community by promoting discussions, encouraging sharing of practice and having an open, democratic, diverse, and inclusive MOOC. Understanding the role of the tutors in discussion fora and in live events was found to be important for creating the learning community. This design created conditions that were suitable for educators to share practices across institutional, disciplinary, and national boundaries—thereby achieving the dual purpose of supporting the professional development of educators and design-based research (Anderson & Shattuck, 2012).

Future directions

This study contributes to the debate about using MOOCs in professional development (Milligan & Littlejohn, 2014) and to research how to design MOOCs that support learning communities (Alexander & Fink, 2018). The outcomes of this investigation could be used to enhance MOOC learning design, and to improve teaching practice and professional development. There are several areas for further research.

The content of the MOOC could be improved by introducing more emphasis on practical aspects including opportunities for participants to gain first-hand experience with technologies, such as virtual reality and avatars, or the use of mobile augmented reality applications. It would be interesting to see if these experiences increased the perceived value of the MOOC to participants.

The practice of teaching in MOOCs could be improved by adding learning analytics plug-ins to add predictions about student engagement with learning materials. There is a Moodle plug-in based on the community of inquiry model that measures "cognitive depth" (based on cognitive presence) and "social breadth" (based on social presence) (Garrison et al., 2000). However, using behaviour to predict learning is problematic, because viewing a document is not the same as understanding it. Nonetheless, investigating the value of predicting social breadth in a learning community could be interesting.

Research on the design of MOOCs could continue to investigate the role of gamification and live webinars in the learning experience. More research is required to tease out which (if any) mechanisms of gamification are beneficial. The use of live events also merits further investigation (e.g., by increasing the number of guest-speaker webinars to see their effect on the learning community). We could also respond to Alexander & Fink's (2018) call for more research into inclusivity in MOOC design and investigate how to accommodate the many differences between learners, and the variety of ways they engage in learning practices.

Finally, we could improve our own practice by working with design experts to make the MOOC more visual—by adding more visual images and infographics. Sousanis (2015) argues for the value of visual thinking in teaching and scholarly discourse when it can help us to understand multiple perspectives and break free from fixed viewpoints.

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Biographical notes

Julie-Ann Sime
j.sime@lancaster.ac.uk

Julie-Ann is a lecturer in educational research at Lancaster University, UK, where she teaches and supervises research students undertaking an online doctoral programme in technology-enhanced learning. Her research areas are online learning, mobile learning, networked learning, visual literacies, digital wellbeing, and inclusion.

Chryssa Themelis
c.themelis1@lancaster.ac.uk

Chryssa is a researcher in technology-enhanced learning at Lancaster University, UK. She has 10 years' experience of researching the use of technologies in education, including the use of visual/video literacies, mobile learning, and augmented reality.

Yiannis Arapoglou
yiannis@wideservices.gr

Yiannis is the CEO of WIDE Services, Greece. His company offers integrated solutions in e-learning as a Moodle Premium Certified Partner.

Asteria Marantou
asteria.marantou@gmail.com

Asteria is an eLearning Officer at CEPOL. She contributes to the implementation and administration of e-learning services and new products. She is a certified project manager (PMP) with extensive experience in digital and in-class training. Her interests include new technology, gamification, video games and learning, e-learning, and customer experience.

Katerina Theodoridou
theodoridou.katerina@gmail.com

Katerina is the Director of R&D and Project Management at the Center for Social Innovation, Cyprus, where she coordinates the organisation's European-funded projects and coaches the project managers that undertake the research and development phases of the projects.