MULTIMODAL TEACHING AND LEARNING WITH THE USE OF TECHNOLOGY: MEANINGS, PRACTICES AND DISCOURSES

Vasiliki Papageorgiou and Petros Lameras
Coventry University, Priori Street, Coventry, United Kingdom, CV1 5FB

ABSTRACT

The aim of this paper is to report on teachers' experiences of, and approaches to, multimodality in teaching and learning. A small-scale online survey with closed and semi-structured questions has been deployed to school and university teachers (n=68) for eliciting their experiences in multimodal teaching and learning. Thematic analysis has been adopted as the overarching methodology for reporting patterns in the data from the survey. The results from the analysis showed that experiences of multimodality are discerned as: (1) imparting information, (2) enacting collaborative learning and (3) preparing students for exploring concepts. The process of meaning making is exemplified through a developmental progression from more teacher-directed modes through oral, written and visual representations to more student-centered through gestural representations as means of connecting and combining different modes triggered via visual communication, collaboration and exploration.

KEYWORDS

Multimodality, Technology-Enhanced Learning, Collaborative Learning

1. INTRODUCTION

There is an increasing body of evidence, which suggests that multimodality in learning is an active, student-centred approach in which students select the resources mostly relevant to them (Mayer, 2001). This means that students are responsible for organising learning content such as words and images into coherent verbal and visual models comprising their mental schemata and conceptual structures (ibid.). The essence of multimodality therefore is to provide different types of resources to the student for stimulating learning in meaningful ways within and across disciplines. To this end, multimodality is described as an interdisciplinary approach drawn with an emphasis on communication and representation (Jewitt, 2013). This is directly relevant to teachers in terms of using current theories of learning to engage students with student-centred pedagogies and resources of learning (Hassett & Curwood, 2009). Multimodality in today's classrooms refers to 'multiple' modes of representation, with combined elements of print, visual images and design (Jewitt, 2008). Multiple modes of representation include capabilities of combinations of oral and written language, visual, gestural, tactile and spatial representations (Cope & Kalantzis, 2009). This transitional shift from print-based education to multimodal education indicates the need to rethink how teaching and learning is conceived, approached and practiced.

A substantial body of research has reported on interventions, case studies, conceptual frameworks and design of teaching and learning activities using multimodal technologies and not on the actual multimodal teaching practices mediated by technologies currently used by teachers (Bell et al., 2010; Cope & Kalantzis, 2009). In this paper, it is argued that multimodality is based on the process of creating meaning through connecting and combining teaching strategies, approaches to teaching and learning with technologies that afford exploration, investigation and participatory learning. Against this background, meanings, practices and discourses were investigated in conceptualising and practicing multimodality in teaching and learning with the use of associated teaching approaches, technologies and resources. The research questions addressed in this study were the following:

1. What multimodality means for teaching and learning with the use of technology?
2. How multimodality is approached and practiced with the use of technology for enhancing teaching and learning?

The paper starts by contemplating on ways of understanding multimodality and elucidates on multimodality and digital technologies for teaching and learning. It then describes pedagogical approaches such as collaborative learning in tandem with more activity-led teaching advocating context-specific and personal construction of meaning. It continues with the methodology and research design adopted for the data collection and analysis. The results of the survey analysis are presented in the next section along with a discussion on connecting findings with research questions and implications for teaching practice and research. Finally, conclusions and future research are discussed based on the evidence from the survey.

2. WAYS OF UNDERSTANDING MULTIMODALITY

The way multimodality is perceived and enacted is in tandem with how technologies are deployed and used for designing and delivering learning content (Miller & McVee, 2013). Thus, it is less the technology itself and more about the individual and collaborative practices applied with technology including the mechanisms that teachers incorporate to create meaning to students. In essence, multimodality emphasises situated action, considering the social context as the key factor for meaning making, with special focus on how people use the resources available based on their cultural practices, personal beliefs and institutional contexts; rather than emphasising the attributes, behaviours and the system of the available resources (Kress, 2001). This introduces new possibilities for investigating, analysing and understanding the different ways which people use multimodality for creating, sustaining and transferring meaning to inter-related ecosystems and social contexts.

3. MULTIMODALITY, PEDAGOGICAL APPROACHES AND DIGITAL TECHNOLOGIES FOR TEACHING AND LEARNING

The advent of digital technologies for supporting teaching and learning has supplemented or amplified conventional non-digital activities (Beetham & Sharpe, 2013). Digitisation of administrative and routine tasks such as storing, transferring and retrieving information supplements traditional teaching and learning in the sense that the digital modalities used do not resemble or offer something novel to the way current teaching and learning processes and strategies are practiced. Indeed, learning technologies should help students to increase their capacities for innovation, leadership, multi-and inter-disciplinary collaboration, emotional intelligence, critical skills and collective problem solving in a participatory digital learning environment (Greenhow, et al., 2009). Multimedia resources and tools in these environments may include for example, interactive videos and images, recorded lecture presentations, online quizzes, discussion forums (synchronous and asynchronous), visual representations of student data to depict progress and on what the student is doing to learn (Sharples, et al., 2016). Currently many teachers tend to use digital technologies to support teacher-directed approaches with the aim of improving the quality of lecture presentations by using Interactive Whiteboards; PowerPoint for lecture notes and asynchronous discussion forums for the recreation of face-to-face tutorial discussions (Beetham & Sharpe, 2013). The affordances of the aforementioned technologies in these cases are mainly exploited to explain and visualise content knowledge or for engaging students in activities that require to visually absorb and manipulate information more actively than before. Mayer (2001) argues that student's learning becomes more meaningful when an array of interactive tools and resources are deployed rather using text alone. Moreover, the visual representation of content is vital for communicating subject matter and improving students' understanding (ibid.).

There is increasing research on collaborative multimedia learning in different subject domains (Bell, et al., 2010). Studies have shown that collaboration can enhance the quality of the learning process, hence the importance of achieving specific learning outcomes combining multimedia content with collaborative learning may lead to engaging, interactive and powerful multimedia learning environments (Dillenbourg, 1999). Students working collaboratively in groups have the opportunity to share their thoughts and prior

knowledge. Collaborative dialogue supports learning by clarifying thinking and consolidating ideas (Hmelo-Silver, 2002). The "classroom learning communities" approach seeks to operationalize the benefits of learning through participation in communities of practice (Lave & Wenger, 1991). Multimodal collaborative learning promotes the idea of creating a learning community with a shared purpose of making sense of scientific ideas and practices (Harris & Rooks, 2010). Teachers, although still reluctant in using technology in pedagogically driven ways, have slowly started to integrate new educational teaching and learning practices (Miller & McVee, 2013) including but not limited to serious games, blogging, collaborative editing and online media manipulation. In this study, multimodality for teaching and learning is examined in terms of experiences on using different modalities (oral and written language, visual, gestural and tactile representations), technologies and teaching strategies (e.g. transmitting information, collaborative learning, informal learning) capturing more holistically the way multimodality is perceived and enacted by teachers.

4. METHODOLOGY AND RESEARCH DESIGN

A thematic analysis approach was adopted as the overarching methodology for this study. Thematic analysis is a method for identifying, analysing and reporting themes or patterns within data. Thematic analysis was selected because it offers a dynamic and flexible method to analysing qualitative data and it is ideal for thematic synthesis of primary research (Braun & Clarke, 2006; Boyatzis, 1998). Deciding to use thematic analysis was interlinked with our attempt in coding the different primary data on meanings, practices and discourses for multimodal teaching and learning. The data collection process started by designing an online survey for eliciting teachers' beliefs, intentions and actions in using multimodality for teaching and learning. The VARK[1] for 'Teachers and Trainers' questionnaire on multimodality has been adapted to encompass questions aligned towards identifying variation in ways of deploying teaching strategies, digital technology and modes of multimodal meaning as comprehended by teachers in three European countries. In particular, 30 teachers from Germany, 20 from Finland and 18 from Denmark (n=68) participated in this small-scale study. Purposive sampling aimed at selecting teachers from different disciplines for the facilitation of generalisability and validity.

The online survey has been translated in German, Finnish and Danish for ease of use for the participants of each country. The survey included 28 closed and semi-structured questions as to enable participants to instantly select the option mostly relevant to them (i.e. closed question) as well as to prompt for a more recursive process where participants had to go back and forth their descriptive answer for fine-tuning, refining and reflecting (i.e. semi-structured question). An informed consent form and information sheet were included in the survey for completion prior to main body of questions for seeking participants' agreement to take part in the study; and be ensured that all information provided would be treated in confidence.

The processes of analysis were adopted from a thematic analysis perspective for discovering the themes embodied in the evolving meanings of the data. In line to this, the following processes were carried out: (1) familiarization with the data, (2) generation of initial codes, (3) searching for themes, (4) review of themes, (5) definition of themes and (6) synthesis of themes. Repeating this process for all data-sets the data were categorised while considering connections and interconnections between codes and themes. Then, eight codings were generated (e.g. experiencing multimodality as imparting information) which were mainly emerged and resembled within the different sections of the survey.

5. RESULTS

This section reports on the results of the online survey for eliciting teachers' beliefs, intentions and actions in using multimodality for teaching and learning. The themes emerged from data analysis are presented below.

[1] http://vark-learn.com/the-vark-questionnaire/teaching-questionnaire/

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5.1 Experiencing Multimodality as Imparting Information

The majority of the participants from Germany (53.3%) and Finland (50%) define multimodality as "a complex of modes including talk, visual communication, action, gesture, posture and movement", which shows a clear understanding of what is multimodality and in line with contemporary definitions revised in the literature (see Figure 1.). A considerable proportion of the teachers perceived that multimodality describes communication practices using modes to develop and deliver content, hence transferring information and content was the focus for multimodal teaching. Most of the teachers used technology for transferring information in static and linear way using voice and gestures via lectures and imparting knowledge via assignments and tests although there was a tendency to explain multimodality as a more interactive, constructive and interactive mode of teaching.

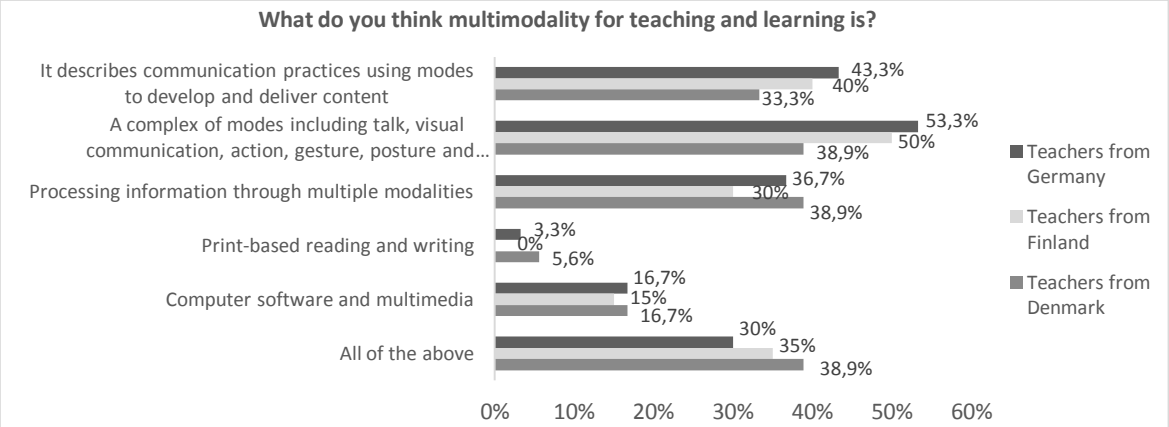

Figure 1. Teachers' definition of multimodality for teaching and learning

5.2 Experiencing Multimodality as Enacting Collaborative Learning

Teachers from Finland and Denmark (95% and 100% respectively) indicated that they use technology for collaborative learning practices. This may shows that the use of collaborative practices mediated by multimodal technologies is prevalent, as teachers increasingly seem to be confident in integrating collaborative activities that necessitate participatory tools and multiple modes. Participants were also asked to specify the modalities they use to enhance collaborative practices. Collectively the data show that the use of collaborative projects mediated by multimodal technologies was the most prominent choice between the others for the teachers from the three surveyed countries. Formative assessment seemed to be an important part of collaborative teaching strategies since the focus is to help the student understand comprehensively not only how to improve individually but also how the overall performance of the team could be enhanced to communally produce meaningful ideas. Interestingly, mostly the teachers from Finland and several teachers from Denmark appeared to use a variety of digital modalities (e.g. synchronous/asynchronous tools, social networking) to enhance collaboration and create a more dialogic and supportive learning culture. This result illustrates the importance of feedback and the ways that feedback is visualised to students for enhancing engagement (see Figure 2.).

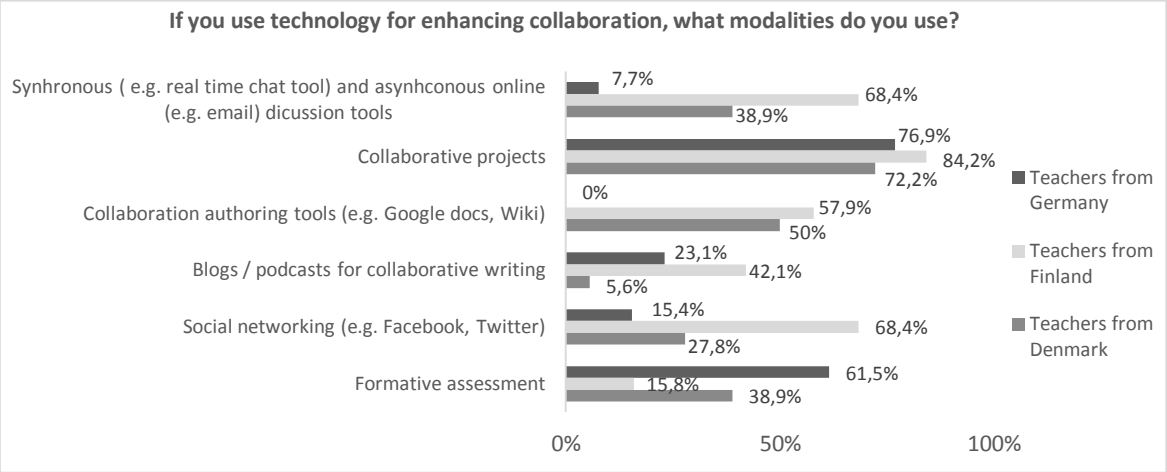

Figure 2. Modalities used by teachers for collaborative learning

5.3 Experiencing Multimodality as Preparing Students for Exploring Concepts

Participants were asked to make explicit their understanding concerning the strategies they would prefer to use in different teaching and learning situations. The teachers were enquired "How would you ideally prepare the first session of your course for your students?" Participants from Germany (46.7%) tend to introduce their session by an oral statement that stresses what students need to learn, absorb and memorise alluding to a behaviouristic approach to teaching. This result illustrates teachers' preference in more traditional-based practices via the use of the predominant oral communication modes. It also shows that less emphasis is given to the students' ideas and interests but mainly on teacher's organisation of content-based sessions and activities. Creating activities for students to collaboratively brainstorm on what they want to learn in this course via Google docs was the most popular option of the educators from Finland and Denmark (See Figure 3.). This approach highlights the teachers' learning design decisions informed by the students' personal interests, prior knowledge and interaction with peers; exemplifying a visual communication multimodality approach. Participants from Germany (30%), Finland (15%) and Denmark (38.9%) would ideally use a PowerPoint presentation showing examples and applications of how aspects of the course are beneficial for the society. Teachers attempted to use visual communication tools for explaining and clarifying concepts guided and directed by them and in line with the subject matter. This possibly reveals that teachers had difficulties in creating novel and complex multimodal artefacts for introducing concepts and ideas beyond the curriculum for initiating discussions that would help students to connect prior knowledge with novel concepts.

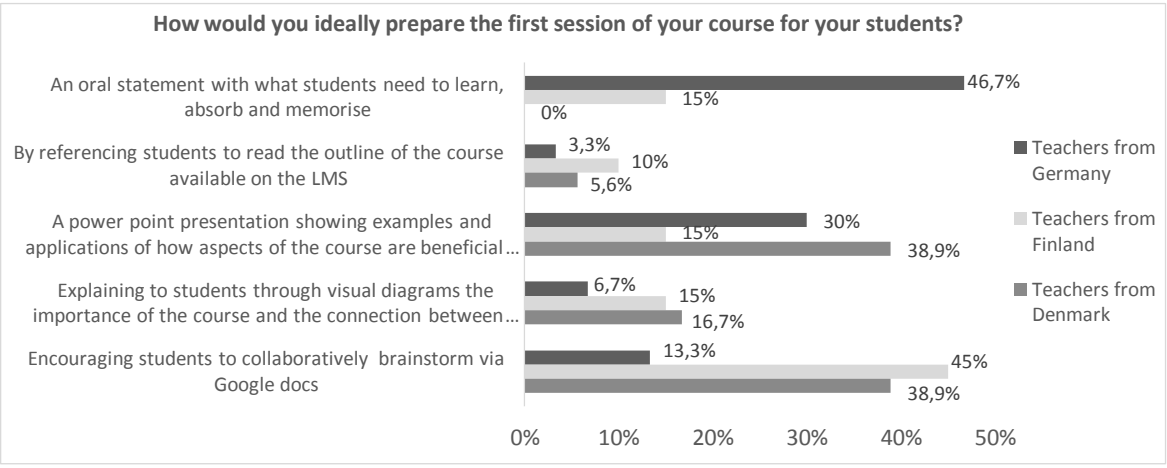

Figure 3. The pedagogical choices by the teachers for introducing their first session of a course

Responding to the question: "You have organised a field trip for your students to explore a topic in question. How would you prepare students?" Participants (see Figure 4.) perceived the usefulness of supporting students to design their own field trip preparation guidelines. Teacher's role is to provide the context for students to prepare and suggest resources and tools (mobile devices with gestural interfaces) to be used by students to plan their scientific investigations. The provision of different web links / web-quests for the preparation of the trip was also an option chosen by many teachers from Finland and Denmark, illustrating the vital role of multimodal technologies to empower students to enquire and conduct experiments in informal learning situations. However, oral means of communication still remain one of the central modes of content delivery as many teachers stated that they would orally suggest ways of preparing (as opposed to instructing students to follow a specific direction imparted by the teacher) that needs to be made by students in the classroom – because technology seemed to be obsolete when face-to-face teaching is the primary teaching mode. It was clear that the use of technology for multimodal teaching is experienced as a supplementary tool for face-to-face teaching for cementing a blended learning setting.

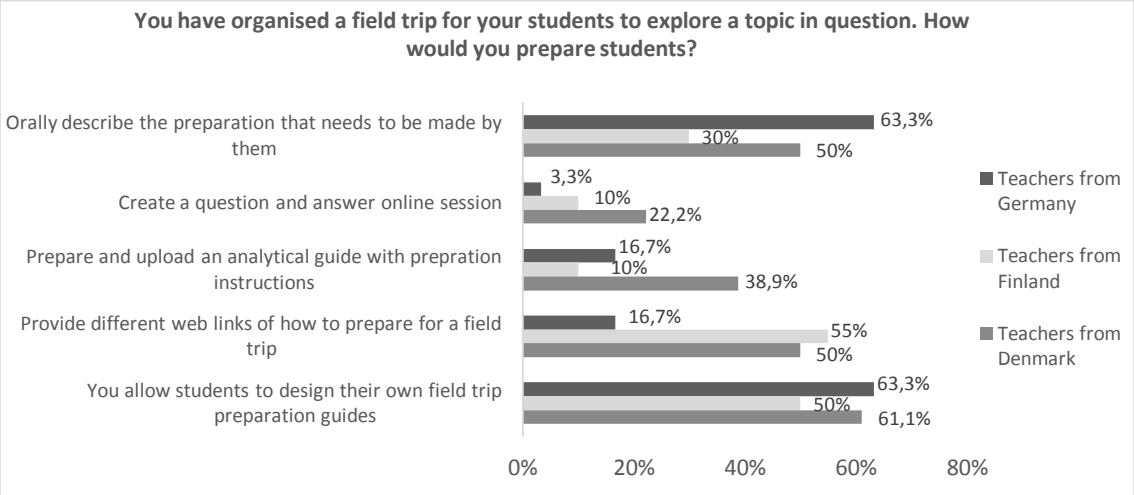

Figure 4. Strategies used by teachers for the exploration of a specific topic during a field trip

6. IMPLICATIONS FOR PRACTICE AND RESEARCH

Connecting the 3 emerging categories of experiencing multimodality as: imparting information, enacting collaborative learning and preparing students for exploring concepts to the two overarching research questions led to interesting experiences and practices for understanding how multimodality is approached with the use of technology. This section aims to provide a reflection on implications for multimodal practice and research in tandem to the research questions.

6.1 What Multimodality Means for Teaching and Learning with the use of Technology?

It is evident from the findings that multimodality is conceived as a cluster of modes increasingly being used as a communication mechanism for delivering information and content. This is in conjunction to using oral, written and visual representations for meaning making. The choice of modes, being used by participants include oral language (lecture), written language and visual communications (diagrams, PowerPoint). This creates an inventory of the meanings when technology is used in relation to storing content in a repository for rote learning. Essentially, building on the notion of using oral, written and visual descriptions, teachers' primary awareness is on constructing a system for imparting their knowledge and experiences through linear ways of representation. A demand of learning the foundations of the module based on subject matter or

offering to students' information pre-selected, reviewed and evaluated by the teacher is the distinct aspect of meaning through the combination of oral/written and visual modes of meaning.

There were instances where multimodality via using technology was experienced as engaging students in activities for individual and collaborative construction of meaning and for preparing students to explore via field trips. An array of more 'developed' modes were evidenced such gestural for constructing meaning making processes that required students to take control of their learning by preparing to carry out investigations in field trips through smart devices. This demonstrated a more 'complete' understanding of multimodality in a more developmental sense, starting from a fragmented perception, that of using oral/written and visual descriptions for accessing and transferring information to a more cohesive- that of using gestural (via mobile devices for carrying out explorations during field trips) coupled with written/oral, audio and visual.

6.2 How Multimodality is Approached and Practiced with the use of Technology for Enhancing Teaching and Learning?

The findings revealed that there is a connection between 'espoused theories' and 'theories in use'. For example, participants that perceived multimodality as a linear contingent process emanated via oral/written language, the use of technologies that supported this view was more prevalent. Information transfer through lectures, presentations, learning repositories and written hand-outs were widely used. This was in tandem to influences derived from personal beliefs about teaching and learning, the role of the teacher in the classroom as well from institutional policies that might have pushed teaching to a certain pedagogical direction. It is however inconclusive to suggest that teachers' perceptions on 'fragmented' ways of using multimodal tools for teaching and learning are influenced only from their conceptions of teaching and learning.

More systematic research is needed for understanding, the connections between multimodal conceptions of learning and teaching with the way technology is used. Participants who felt that multimodality is enacted via more gestural, processes for meaning making, the use of technology was experienced as a process of engaging students in activities that could not be realised with conventional technology (PowerPoints). For example, teachers who experienced multimodality as an active process, the technologies deployed were more participatory, interactive and adaptive to student's interests and meaning making processes. Activities that involved collaborative projects and preparing for carrying out investigations through field trips encompassed a blending learning approach for synchronous and asynchronous communications, and the use of mobile devices for investigations, explorations and inquiry.

7. CONCLUSION

This paper investigated experiences of multimodality and their association to teaching and learning with the use of technology. Thematic analysis has been used to analyse the findings based on a survey with 68 teachers for eliciting experiences of multimodal teaching. The results showed a relation between multimodal meaning making descriptions, teaching approaches and technologies used for teaching and learning.

Limitations of this research were on the basis of discerning more detailed accounts of connections and influences that determined a specific way of conceiving the phenomenon in question. Sample restrictions were also a factor that prevented from getting more nuanced descriptions, particularly for identifying relations between ways of understanding multimodality, teaching strategies and technologies being used. More-over, due to the small-scale nature of this study, the findings are not generalizable to other contexts but rather may be used to provide insights on how teachers experience multimodal teaching and learning in specific contexts grounded to this study. Finally, it is acknowledged that multimodality is not a new concept for teaching and learning, however, this study might help to better understand how multimodality could work by using pedagogically driven approaches to teaching and learning mediated by technology that would help practitioners to design and support teaching and learning activities for enhancing students' learning experiences. Future research should closely investigate relations between multimodal meaning making and associated use of technology for discerning theories, practices and discourses. This will help the technology-enhanced learning research community to investigate and interpret multimodality in specific digital environments hence gauging larger-scale qualitative studies as means to surmount its impressionistic endeavour.

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