

Visualising structure and agency in a MOOC using the Footprints of Emergence framework

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Abstract

Reviews of research into MOOCs have identified two areas needing further research; the individual learner experience and the role of the teacher/facilitator. In this paper we examine the teacher/facilitator's role as MOOC designer in achieving an appropriate balance between structure and agency in the design of a specific MOOC, and consider whether this balance was achieved by analysing the learners' experience of this MOOC. To do this we used a tool known as Footprints of Emergence, which enables designers, teachers, learners and researchers to visualise the course design and their learning experience in any course. Drawing Footprints of Emergence requires deep reflection on 25 factors which influence learning in complex learning environments, such as MOOCs.

The context for this research was the Competences for Global Collaboration MOOC (cope15) offered by FH Joanneum, in Graz, Austria, in Spring 2015. Through negotiation and taking advantage of a diversity of competences and experiences, the team designed a hybrid learning space with a multitude of resources and learning paths. They used an approach which combined Salmon's model for moderating small groups of learners with the principles of connectivism and the structuring of xMOOCs. In using this approach the teachers needed to adopt unfamiliar roles as open practitioners and relinquish control over their students. The visualisation offered by the design footprint of cope15 helped to frame their discussion and planning.

The MOOC design required learners to assume responsibility for their own learning, deal with uncertainty and be open to a holistic learning experience. At the end of the MOOC they were asked to draw a Footprint to reflect on their learning experience and provide a written reflection. 30 participants agreed to their Footprints and written reflections being analysed for this research. The Footprints show that a balance between structure and agency was achieved for these learners. They experienced neither too much prescription nor too much chaos in the MOOC design and learning processes. These preliminary findings suggest that attention to structure and agency using the Footprints of Emergence visualisation tool enables the design of a MOOC to meet learners' needs, and supports end of course reflection and evaluation.

Keywords

Footprints of Emergence, MOOC, Structure, Agency, Emergent Learning

The MOOC phenomenon is now well established and with it has come increasing research outputs. Many aspects of the MOOC experience have been investigated, particularly with respect to the meaning of 'massive' and 'open' in relation to teaching and learning. Two aspects of the MOOC experience which require further research are the role of the teacher/facilitator (Liyanagunawardena, Adams, & Williams, 2012; Mackness & Bell, 2015; Ross, Sinclair, Knox, Bayne, & Macleod, 2014) and the learner experience (Veletsianos, 2013; Milligan & Littlejohn, 2013; Saadatmand, 2014).

In this paper, the authors explore the relationship between the role of the teacher/facilitator as course designer and learners' experiences in the context of the Competences for Global Collaboration MOOC (cope15), through the use of a visualisation tool developed by Williams, Mackness, & Gumtau (2012) – Footprints of Emergence. This tool enables a view of the complex relationship between structure (the MOOC design and the teacher's role in this) and agency (with particular reference to learners' identity and presence in the online environment) in any given learning environment. Structure and agency are particularly appropriate lenses with which to explore learning in MOOCs. MOOCs present the learner with complex open learning environments where a key characteristic is autonomy and choice over the learning paths taken. One of the authors was the designer,

convener and teaching team leader of cope15, the other collaborated in the creation of the Footprints of Emergence visualisation tool.

Footprints of Emergence

Priestley, Robinson, & Biesta (2011) have recognised that learner reflection and evaluations can often be superficial, as they tend to focus on recall rather than inner dialogue. Williams, Mackness, & Gumtau (2012) in recognition of the need to 'dig deeper' into the learner experience, particularly learners' experiences of complex, uncertain learning environments such as MOOCs, developed a visualization drawing tool – Footprints of Emergence – to address this need. Drawing footprints (see Figures 1 and 2) requires learners to reflect much more deeply about their learner experience, considering a range of factors, each on a continuum from a prescribed to an emergent learning experience. The Footprints of Emergence visualisation tool was created to support designers, teachers, learners and researchers in eliciting deeply reflective, tacit knowledge and understanding about the balance between prescriptive and emergent learning in any given learning environment. The stimuli for the development of the Footprints of Emergence visualisation tool were:

- The developers' own experience of learning in massive open online courses which was, at times, chaotic.
- Their own interest in what might be the conditions for emergent learning to occur and what conditions might be experienced as chaotic and cause learners to drop out of a course/MOOC.
- What conditions might limit learning and how learners could be encouraged to reflect deeply, rather than superficially, on the complexity of their learning experience.

Drawing on their knowledge of a variety of learning theories (e.g. complexity theory - Cilliers, 2005; connectivism - Siemens, 2005; social learning theory - Wenger, 1998; theory of affordances - Gibson, 1977) and personal practice, Williams et al. (2012, p.53) created a framework of 25 factors grouped into four clusters:

1. Open/Structure cluster (the extent to which the overall structure of the learning 'scape is open or predetermined);
2. Interactive Environment cluster (the way openness and structure is realised in an actual event);
3. Agency cluster (the overall extent to which agency, initiative and identity are active elements of the learning process);
4. Presence/Writing cluster (the way in which people present and articulate themselves and their thoughts and feelings across a wide range of media, from the immediate presence of conversation and interaction to studied, formal modes of writing).

The authors believe these factors are influential in determining the nature of any open learning experience (Figure 1).

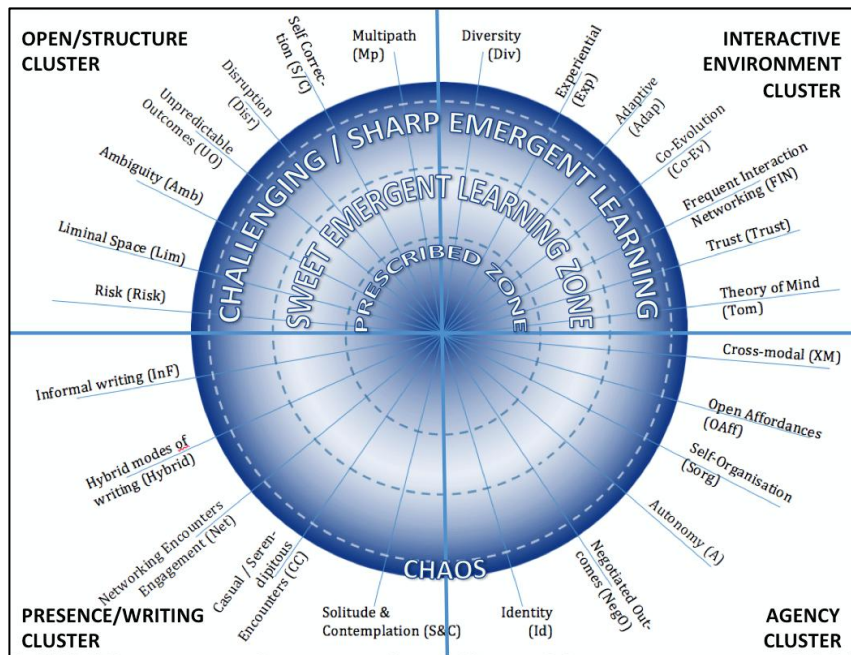


Figure 1: Footprints of Emergence Drawing Tool

Users of the footprints drawing tool reflect on their experience of each of the factors with the support of descriptive text (see Appendix 1 in Williams & Mackness, 2014) and place each factor on a continuum between prescribed and emergent learning, leading to the drawing of a 'Footprint of Emergence' (Figure 2).

This visualisation shows at a glance, the balance between prescription (the central blue zone of the footprint), sweet emergence (the white zone), challenging/sharp emergence (the outer blue zone) and chaos (dark blue zone at the circumference). It also visualises the relationship between structure and agency, with structure being visualised in the Open/Structure and Interactive Environment clusters, and agency being visualised in the Agency and Presence/Writing clusters. Biesta & Tedder (2006) have written that agency is central to educational thinking and practice and is connected to contextual and structural factors. They have also written that uncertainty makes agency necessary but difficult to achieve which is relevant to learning in MOOCs. A key characteristic of MOOCs is the autonomy and self-determination that is needed to learn in these diverse, open and interactive online environments. The footprints drawing tool helps users to reflect more deeply on the complexity of their learning experience, agency and structure in any given learning environment. In using this tool structure and agency are not treated as a dichotomy. Instead the drawing provides a different representation in which the learning process is portrayed as an integrated set of 25 factors in which structure and agency work interactively (Ashwin, 2008; Priestley et al. 2011).

The cope15 MOOC

In spring 2015 the University of Applied Sciences FH Joanneum in Graz, Austria, offered a [MOOC on competences for global collaboration](#) for the second time. The intention was to support collaborative and cooperative online and open learning processes of FH Joanneum students from different disciplines together with learners from all over the world. The content of the cope15 MOOC was multidisciplinary; the six weeks covered the fields of education and learning, communication, law and economy as follows: how to learn in this MOOC (week 1) and reflection on the learning processes (week 6), communication and negotiation (weeks 1 and 3), legal cultures (week 2), emerging markets and inter-organizational relationship & networks (weeks 4 and 5).

The open MOOC website with links, videos and assignments could be accessed without a login and was designed as a place for discussion and exchange via comments. The learners could participate in an open Facebook community or a closed Google+ community (both were moderated); they could also use Twitter and write posts in their own blogs. In the cope15 MOOC attention focused on the institution's website, where 4100

comments were posted. There were no obligatory assignments; learners could determine their own learning paths according to their own context. There were two conditions for receiving a badge: learners were required to be active and visible online in at least 4 of the 6 weeks and to independently send a summary of their online activities to the facilitators; those learners who did not do this were not awarded a badge.

460 learners from 32 countries were registered in the cope15 MOOC; 302 were active at least once. 126 learners were awarded a badge – many of them were business students, but 18 students were from social work, information design, communication design and construction; 6 lifelong learners were also awarded a badge. At FH Joanneum the MOOC was integrated into the curriculum in different courses across the institution and the badge was worth 1 ECTS (European Credit Transfer and Accumulation System), equivalent to 25 hours of study.

In the cope15 MOOC subject knowledge and learning how to learn were equally strong elements. Based on previous experiences with small MOOCs (Pauschenwein, Pernold, & Goldgruber, 2014) cope15 was designed as a 'hybrid' MOOC (Waite, Mackness, Roberts, & Lovegrove, 2013). Influences from cMOOCs were the principles of connectivism, autonomy, diversity, interactivity and openness (Downes, 2010), anticipating emergent learning (Williams, Karousou, & Mackness, 2011) and Salmon's approaches to virtual groups and e-moderation (Salmon, 2012; Salmon, 2013). Influences from the xMOOC model were providing '*structure, a narrative, and resources for the participant*' (Ross et al., 2014, p 62). For a detailed explanation of the differences between cMOOCs and xMOOCs see Bates, 2014. It was a challenge to structure the MOOC accordingly and to foster student agency and encourage user generated content.

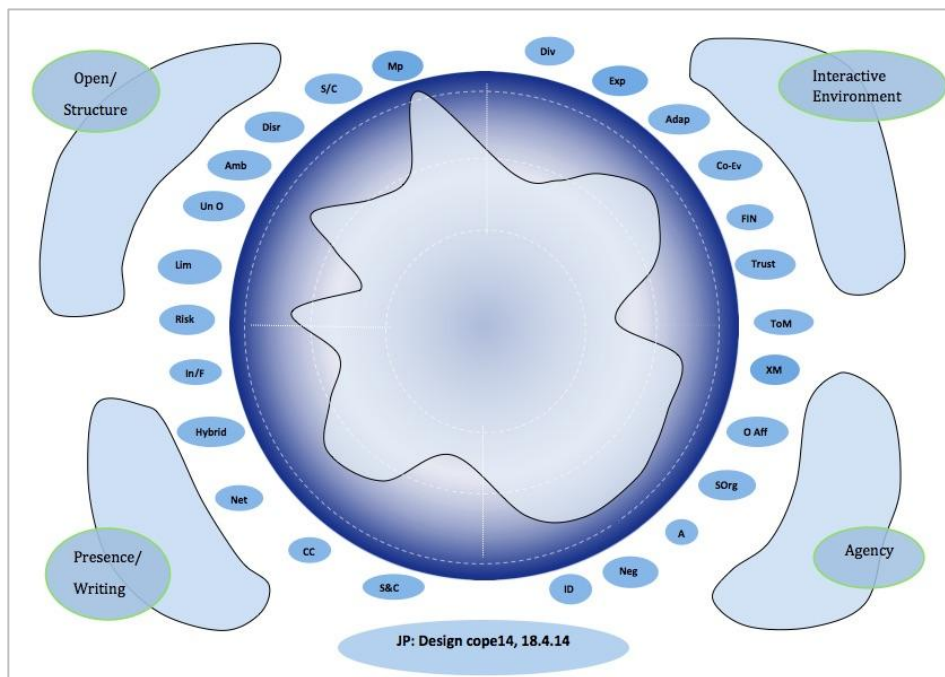


Figure 2: Footprint drawing of the design intentions for the cope15 MOOC

The design footprint for cope15 (which was the same as for the first cope14 MOOC) visualises the teachers' intentions to determine a structure that would allow for maximum agency whilst at the same time providing the support and moderation that learners needed. (Figure 2). These were:

- An open design in which the open structure cluster required learners to find their own way choosing from multiple paths
- A strong emphasis on networking
- Learners would have high autonomy in choosing how, when and where to learn

- Teachers would provide a welcoming/inviting environment encouraging learners to interact and connect with each other with their support. Despite this, teachers couldn't control the learning efforts of their students as it was possible for students to comment using a nickname.
- Learning outcomes were expected to be emergent and individual to each participant. *'Emergent learning is by definition open, complex, adaptive and self-organised, and therefore not predictable.'* (Williams et al. 2012).

The cope15 team, consisting of experienced teachers in the fields of pedagogy, economy, journalism and information design, adopted two distinctive but integrated roles as teachers in the MOOC. On the one hand the teachers took an xMOOC approach (Bates, 2014) and structured the learning environment by providing materials, videos, e-tivities, assignments and expert feedback on comments in the discussion forums and in the weekly Google+ hangout. This approach reflects aspects of Salmon's model for online learning (Salmon, 2012; Salmon, 2013). On the other hand they supported learner agency by acting as conveners and facilitators, moderating and monitoring, but not controlling, learners' activities through the stages of access and motivation, online socialization, information exchange, knowledge construction and development (Salmon, 2012; Salmon, 2013). In the first week they welcomed everybody with a personal comment, during the MOOC they responded to learners' activities, curated the webpages of 'learners' links and materials' and posted comments to strengthen participants' confidence. Behind the scenes they used large [A3-tables to document their monitoring activities](#). An interesting by-product of this monitoring was that by observing learners' proceeding through the MOOC weeks and interacting with the learners they got to know many of the learners more closely than in a conventional course, in the sense of recognising them, establishing a relationship with them and 'caring' about them.

Data Collection using the Footprints of Emergence Tool

In the final week of cope15 participants were set two assignments. They were asked to reflect on their learning experience in the MOOC in writing and by drawing a Footprint. These assignments were voluntary and not required for assessment purposes. Nevertheless 47 of the 302 active participants completed a Footprint, posting them to the cope15 website and 30 of these participants agreed to their Footprints and their written reflections being used for this research (see [cope 15 participant footprints](#)). These 30 cope15 participants were a heterogeneous group. 12 were male, 14 female and in 4 cases the name or email address didn't specify gender. 25 were students from FH Joanneum, one student came from another Austrian university and 4 were lifelong learners. 20 were undergraduates and 4 were Masters students. 21 students came from 4 different business study degrees, 4 from information design, one from social work. 27 of the 30 were awarded a badge.

Drawing the Footprints does not require precise placing of a factor point on the continuum between the prescribed and emergent zones. Rather participants are asked to draw the Footprints intuitively accessing deeply reflective thinking without agonising over exact positioning of points. It is recognised that Footprints are a visualisation of reflection at a given point in time (a snapshot) and like learning itself can change from moment to moment. However, for analysis it is useful to score the Footprint points. This was done retrospectively by the authors scoring each factor on the continuum from the prescriptive zone to chaos between 0 to 10 for the prescriptive zone, 11-20 for the sweet emergent zone, 21-28 for the sharp emergent zone and 29 to 30+ for the chaos zone. Each author did this independently for each Footprint. The authors' scores were then compared, any differences (which were minimal) were discussed and then the agreed scores were entered into a spreadsheet for analysis. The scores were aggregated to provide an overall impression across the group as a whole, which could be compared with the design Footprint drawn by one of the authors in her role as MOOC convener. In addition the 30 participants' written reflections (2500 words of data) were analysed and coded using the Footprint factors. Again the authors completed this coding independently before sharing, discussing and finalising the resultant allocation of codes.

Emergent Findings

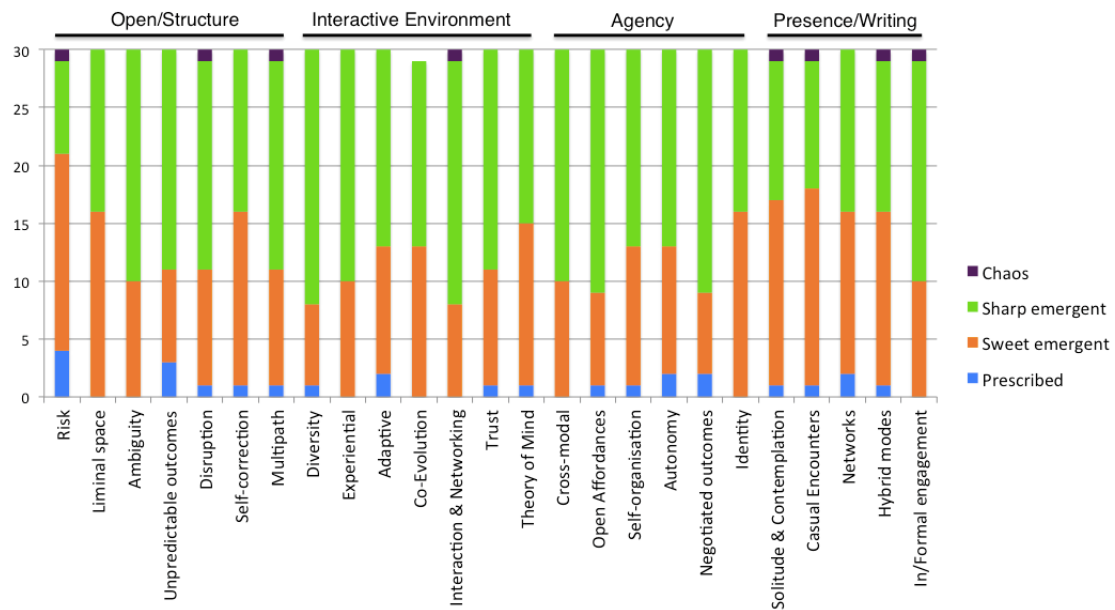


Figure 3. Number of participant scores in each zone for each factor

Comparison of the Footprints revealed that for the 30 participants who agreed to their Footprint being used for research purposes, overall the course was experienced as neither prescribed nor chaotic and more challenging than sweetly emergent (Figure 3). Only one participant found every factor challenging, but 17 participants positioned more than half of the 25 factors in the challenging zone. Of the 30 participants, one third placed some (up to a maximum of 4 factors) in the prescribed zone and 4 participants placed factors in the zone of chaos (up to a maximum of 3 factors).

A closer examination of the Footprints revealed that two thirds of these 30 participants found the following factors challenging: Ambiguity (open to several simultaneous meanings); Diversity (open ended range of resources and people); Interaction and Networking (open, diverse networked learning incorporated in the process and outcomes); Open Affordances (creative, innovative engagement); Negotiated Outcomes (mutually determined success factors); In/formal Engagement (a range of writing, interacting and assessment artifacts and practices). This finding confirms that learners' experiences of structure and agency in cope15 were closely aligned to the design intentions.

The coding analysis of students' written reflections revealed that more than half the participants' comments could be related to the following factors: Diversity, Co-Evolution (mutual adaptation and growth), Interaction and Networking, Self-Organisation (self-motivation inherent in course design), Identity (creating and developing own roles, affordances and capabilities) and Hybrid Modes (diversity and choice of media and modes) (Figure 4). Overall 27 comments could be placed in the Open/Structures cluster, 73 in the Interactive Environment cluster, 60 in the Agency cluster and 42 in the Presence/Writing cluster.

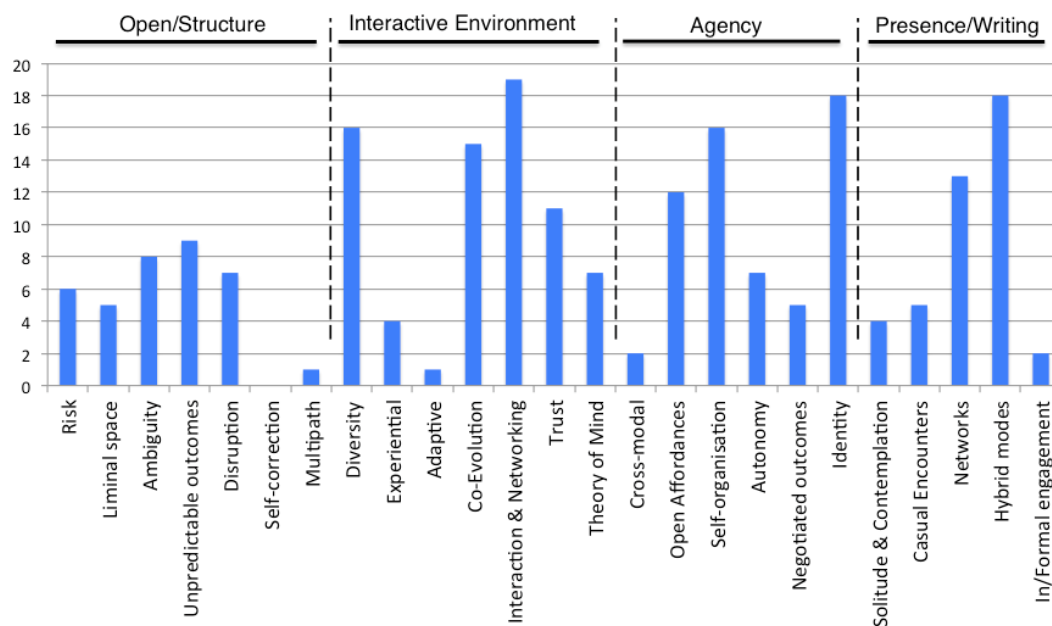


Figure 4: Number of coded responses for each factor

The coding analysis also revealed that half of these students (15) commented that this was their first MOOC and/or experience of online learning. These coding analysis findings suggest that students, even without the use of a visualization tool such as the Footprints of Emergence, will intuitively and implicitly include reference to factors relating to structure and agency in their course reflections.

Structure, agency and teaching in a MOOC

The [cope15 Footprint drawings](#) provide a rich picture of the complexity of learning in a MOOC. Despite being individual and unique to each learner, comparison of the aggregated participants' Footprints scores with the MOOC convener's design Footprint suggests that the course design intentions were met for these learners. Factors in all the four clusters were influential in this MOOC. Structure and agency were well balanced and integrated into the learning design (there was neither too much prescription, nor too much chaos), there were no unbalanced Footprints with many factors in the very prescribed or chaos zones, and many learners were active. Ross et al. (2014, p.64) have discussed '*enjoyment, retention, quality of the outputs and conversations*' as possible but problematic categories for measuring success in a MOOC. In cope15, 42% of the 320 active learners and 27% of the 460 enrolled participants completed the course and were awarded a badge. In this research we have focused our analysis on 30 participants; 21 of these wrote positive comments about the MOOC in their reflections, including 6 who explicitly stated that they would attend the cope16 MOOC next year or another MOOC, despite this being the first experience of a MOOC and/or online learning for 15 of these 30 participants. This suggests that the structure and design of cope15 supported individual agency for the 47 participants who submitted a Footprint drawing.

Understanding the teacher's role in the MOOC was a challenge for the interdisciplinary cope15 team. From her prior work with the Footprints of Emergence, the cope15 teaching team leader knew that agency is essential for emergent learning, and that a lack of balance between structure and agency can lead to negative consequences such as disaster, calamity, chaos, fiasco or mob rule, as reported by Baggaley (2013, p.369). Agency can be constrained by structure (Kahn, Qualter, & Young, 2012) but can also constrain structure. The cope15 teaching team leader used the 25 factors of the Footprints of Emergence as a design tool for the MOOC because, like Osberg & Biesta (2008, p.324), she knew that '*it is the plurality of the 'space of emergence' that educates not the teacher*'. Drawing a Footprint of the design of the learning space helped her to evaluate the balance between structure and agency in the cope15 MOOC before the start of the course (Figure 2). The Footprint clearly

showed where structure and agency would be challenging, but as a whole visualised the intentions of an open, diverse and self-directed learning experience.

Teachers in cope15 were asked to change their 'habitus' (Papacharissi & Easton, 2013) by moving into an 'open' learning environment. The cope15 team invested time in negotiating and planning how to embed the MOOC into individual disciplines and curricula and discussed the meaning of open and emergent learning. This required the team to consider the balance between structure and agency, constraint and freedom in the MOOC and ultimately, for some, the need to let go of control. The team also recognised that personalised learning, intimacy, individualism and a personal touch are necessary for active learning (Fitzgerald, Anderson, & Thompson, 2015), and made efforts to provide this for the 320 active learners. Laurillard (2014) questions whether personalised guidance is scalable for MOOCs, but the cope15 MOOC teaching team did not attempt to provide guidance, which they believed would constrain emergent learning; instead they focused on motivation and developing relationships with the MOOC participants. The cope15 MOOC demonstrated that two moderators, using and extending Salmon's approach (2012, 2013) could keep an overview of 320 learners. They were 'present' (Garrison, Anderson, & Archer, 1999), listened to student voices (Veletsianos, 2013) and were diligent in providing feedback. Cope15 was designed as an open course, but did not downplay the role of the tutor nor '*reduce the concept of education to untutored learning*' (Osberg & Biesta, 2008, p.316).

The authors acknowledge that their discussion of the relationship between structure and agency in the cope15 MOOC is based on just 30 (10%) self-selected participants, who volunteered their Footprints for this research. These cannot be regarded as representative of the whole learner group. In addition, because 25 of these participants were FH Joanneum students, we acknowledge that the institutional course structures, culture and assessment could have influenced the drawing of the Footprints and the participants' written reflections. Positive bias was possible and we cannot claim any definitive outcomes from this research. What we can say is that the Footprints can give an overview of the learner experience at a more nuanced level than traditional end of course evaluation surveys. In drawing Footprints learners elicit tacit knowledge and understanding and reflect more deeply on their learning than they might in a traditional end of course evaluation. They come to see and better understand the contextual factors which influence their learning, factors which perhaps they hadn't previously explicitly considered and which can be difficult to identify in uncertain, unpredictable online environments such as MOOCs.

The authors believe that the Footprints of Emergence tool is useful in supporting MOOC designers and teacher/facilitators in achieving an appropriate balance of structure and agency factors in the design of any learning environment, but particularly where the design and delivery of an open course is intended to lead to emergent learning and for post course discussions, reflection and evaluation. We also believe that drawing Footprints can help learners to see, more clearly, the relationship between structure and agency and the significance of this for their learning. Future research with 60 undergraduate physiotherapy students of FH Joanneum aims to explore this further. In this longitudinal study students will be required to use the Footprints of Emergence visualization tool to reflect on their learning in hospital/clinical placements (2-5 placements per year) during the course of their degree. This will result in 10 footprints from each student. Students and teachers will be interviewed about the process of using the Footprints for reflection and evaluation purposes with a view to broadening our understanding of the relationship between structure and agency in complex learning environments.

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