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ABSTRACT

While the practice of using educational technologies in Higher Education is increasingly common among educators, there is a paucity of research on innovative uses of emerging technologies to transform teaching and learning. This paper draws on data collected as part of a larger study aimed at investigating emerging technologies and their use in South African Higher Education Institutions (HEIs) to improve teaching and learning. The research employed a mixed method research design, using both qualitative and quantitative data collection methods—quantitative data from a survey of 262 respondents from 22 public HEIs in South Africa and qualitative data gathered from 16 experts/practitioners on their self-reflective definition of the term “emerging technologies.” The paper concludes that levels of institutional development, access to resources, discipline, group belonging and individual motivation of respondents influenced the way they defined emerging technologies including what constituted an innovative use of technology, foregrounding the contextuality of emerging technologies.

Keywords

Educational technology, emerging technologies, contextuality, Higher Education, South Africa, constructivism, social media, Web 2.0.

INTRODUCTION

The use of educational technologies is on the rise among students and educators in Higher Education (L. Johnson, Smith, Willis, Levine, & Haywood, 2011). Some of these technologies, which are termed “emerging technologies,” have specific characteristics, such as openness, real-life connection and focus on collaboration, and come with the promise of radically transforming teaching and learning in education (L. Johnson, 2012). However, Higher Education Institutions (HEIs) are struggling with understanding the potential of these emerging technologies, which often leads to institutional decisions that hinder their adoption (Bates & Sangra, 2011; Bozalek, Ng’ambi, & Gachago, 2013; Melville et al., 2009).

Although there are numerous accounts of how individual emerging technologies have changed the teaching and learning practice of individual lecturers (Heiberger & Junco, 2011; K. A. Johnson, 2011; Junco, Heiberger, & Loken, 2011; Rambe & Ng’ambi, 2011; Wang, Woo, Quek, Yang, & Liu, 2011), and interest in these tools for teaching and learning seems to be rising internationally and nationally (Bosch, 2009; Bozalek et al., 2013; Ivala & Gachago, 2012), there is a paucity of research on their impact on teaching and learning practices within HEIs.

One of the main challenges when investigating emerging technologies is the fact that the term, emerging technologies, is in many cases not well defined and often misunderstood (Siemens & Tittenberger, 2009; Veletsianos, 2010). This paper arises from a large inter-institutional research project on the use of emerging technologies in South Africa’s HEIs¹. This project examines how emerging technologies can be used for transforming teaching and learning interactions and paradigms in a highly diverse Higher Education context, including resource-scarce and resource-rich institutions. In the course of this project, the 18 researchers, from different universities and disciplines, have repeatedly revisited their own understanding of the term “emerging technologies.” This paper is a response to those debates, interrogating the team members’ individual understandings of the term “emerging technologies” and some of the findings of a national survey carried out as part of this project, with the aim of developing our own understanding and thus contributing to the debate on what defines emerging technologies.

BACKGROUND

This paper is part of a larger project, initiated in 2011 with an aim to investigate whether and how qualitative outcomes in education could be realized through the use of emerging technologies to transform teaching and learning interactions and paradigms in the South African higher education sector. The idea of qualitative outcomes is guided by Henschke’s (2010) principles for stimulating learning, namely:

- 1 An environment in which learners are empowered, are safe to express themselves, to ask and respond to peers’ questions without feeling oppressed, domesticated or silenced;
- 2 An environment that encourages intellectual freedom to “think-aloud,” “try-out” new things and reflect on lessons learned;
- 3 An environment in which the psychological distance between knowledgeable others (peers and experts) is reduced; and

¹ See project website on <http://emergingicts.blogspot.com/>

- 4 An environment in which learners are equal partners in knowledge production (participatory parity).

This on-going project is conducted in three stages. Stage one surveyed the use of emerging technologies amongst South African higher educators, the second stage was dedicated to writing up in-depth case studies on how emerging technologies impacted on teaching and learning practices of these educators and the last stage's focus is on developing a model for the use of emerging technologies in HEIs for transformative teaching and learning. This paper reports on data collected in the first two stages of the project.

As the project progressed, tensions arose between conceptualizations of emerging technology in the literature, those of the survey respondents and those of the members of the research team. Since literature has shown that emerging technologies are not well defined or fully understood, we decided to investigate individual project team members' own understanding of this term. Most of the members of the research team are themselves practitioners engaged with using emerging technologies in their various institutions and all members of the team are actively researching the use of emerging technologies in HEIs. Eight different South African universities were represented on the project and one International Non-governmental Organization (NGO), the Open Courseware Consortium, covering a range of historical positions and levels of resourcing. We felt that by triangulating the emerging understandings of this team and some of the findings of the national survey on the use of emerging technologies in Higher Education, we would provide valuable insights into the meaning of this concept in the specific South African context, with its historical intra-institutional disparities.

EMERGING TECHNOLOGIES IN HIGHER EDUCATION

Although there is a growing international interest in emerging technologies and their usefulness for teaching and learning in higher education, there is still a great deal of uncertainty and confusion about the actual meaning of the concept "emerging technologies" (Siemens & Tittenberger, 2009; Veletsianos, 2010). Often emerging technologies are discussed in academic fora such as conferences in ways that are taken for granted, without any in-depth discussion about common understandings of the concept. Globally, literature attempting to establish a common understanding of emerging technologies in the broader higher education context, rather than disciplinary-specific context is also sparse (Veletsianos, 2010).

Three notable attempts to define emerging technologies in the context of Higher Education have been that of the New Media Consortium (NMC) with the release of their annual Horizon Reports², Siemens and Tittenberger's book on emerging technologies (2009) and Veletsianos' edited collection on emerging technologies in Distance Education (2010).

The NMC regards emerging technologies as those that are "likely to have a large impact on teaching, learning, or creative expression within higher education" within a time span of one to five years (L. Johnson et al., 2011). By publishing regional reports, they acknowledge a certain context-bound nature of these technologies (Johnson & Adams, 2011). Siemens and Tittenberger seem to equate emerging technologies with social software (2009, p. 42) and they mention blogs, Skype, Wikis, Second Life, Facebook and Google Reader as emerging technologies. They subscribe to the view that technologies are not neutral but embody philosophies and ideologies in themselves, reflecting particular worldviews.

² For more information see <http://www.nmc.org/horizon-project>

They see these technologies as having multiple affordances by which they mean the potential created by specific features of technologies, such as the potential of social software to provide emergent learning paths through interaction with peers.

On the other hand, Veletsianos (2010) takes a different view, focusing less on specific affordances of technologies, and defining emerging technologies in education more broadly, as “tools, concepts, innovations, and advancements utilized in diverse educational settings to serve varied education-related purposes” (2010, p.3). He defines emerging technologies as having five main characteristics (pp.13-17). Most importantly, he sees emerging technologies as context-specific and not necessarily new technologies. For example, online gaming and Twitter have been around for some time but may still be considered emerging in HEIs depending on how and where they are appropriated (characteristic 1). Emerging technologies are evolving or, in other words, in a “dynamic state of change where technologies and practices are in a continuous state of refinement and development” (characteristic 2, p. 13). Emerging technologies also go through established hype cycles of “euphoria, adoption, activity and use, maturity, impact, enthusiasm, and even infatuation” (characteristic 3, p.15). Emerging technologies are not yet fully understood and not yet fully researched (characteristic 4), which might account for the fact, that they are often being used in “old and familiar ways” (p. 16), without taking full advantage of their potential.

Veletsianos’ fifth characteristic is that although emerging technologies have the potential to disrupt current teaching and learning practices, this potential is mostly unfulfilled or has yet to be realized. As an example for such potentially transformative learning, he argues that the openness that some of the emerging technologies afford, such as Web 2.0 tools, provide opportunities for transformation by taking learning outside of the classroom context, regular teaching hours, and educators’ immediate control. This can allow students to become real members in a community of practice, facilitating learning that is not teacher-centered and classroom-bound but learning that is “ongoing, lifelong, and independent of educational institutions and age” (p. 2).

METHODOLOGIES

This paper draws on data collected as part of a larger study that employed a mixed method research design, using both qualitative and quantitative data collection methods (Creswell, 2003). In March 2012 (halfway through the project), qualitative data was gathered from 16 of the 18 team members in the research project in order to better understand the project team’s own evolving definition of emerging technologies. These team members were asked to write about their own understanding of the characteristics of emerging technologies. The 16 respondents form a diverse group on many levels, such as gender (5 male, 11 female), ethnicity, home language (7 English, 4 Afrikaans, 1 IsiXhosa, 4 other), the position they hold at their respective HEIs (6 lecturers, 8 academic developers, 2 researchers) and their level of experience with emerging technologies (3 beginners, 6 intermediates, 7 experts).

These written reflections were coded into emergent themes, using constant comparative analysis (Lincoln & Guba, 1985). This coding was done by three members of the research team to ensure repeated, systematic searching of the data (Hammersley, 1981) and to review interpretations, in the light of new data gathered. New codes were generated, until no new insights were being gleaned (Riley, 1990). A process was followed of refining the codes, associating similar and related codes. The final set of codes and examples of how they arose from each reflection was summarized in a spreadsheet.

Perhaps because of the team's familiarity with Veletsianos' five characteristics of emerging technologies (2010, pp.13-17), these characteristics were evident in the emerging themes, although the approach followed was inductive, and we had not set out to code according to these characteristics. Some more nuanced understandings of Veletsianos' characteristics were reflected in additional code categorizations and there were categories that added new dimensions to the notion of emerging technologies.

To promote validity, members of the wider research team discussed the emerging themes, the congruency of the emerging findings with the raw data, and tentative interpretations. Audit trails, detailing the methods, procedures and decision points in carrying out this study were recorded.

Furthermore, selected data from a survey questionnaire, which was sent out during August and September 2011 to establish the use of emerging technologies by practitioners in public HEIs in South Africa, was used to triangulate the findings. Overall, a total of 262 participants, from all the 22 public Universities in South Africa, responded to the survey. While the findings of this survey are reported in detail elsewhere (Bozalek et al., 2013; Ng'ambi, Gachago, Ivala, Bozalek, & Watters, 2012), some of the findings were included in this paper to support the written reflections.

Ethical clearance was obtained from the Research Ethics Committee of the institution where the principal investigator of this project is based.

FINDINGS

Findings of the study supported Veletsianos' five characteristics of emerging technologies, and two additional characteristics emerged from the data. Data are reported against the seven characteristics (first five drawn from Veletsianos):

- Characteristic 1: Emerging technologies may or may not be new technologies.
- Characteristics 2 and 3: Emerging technologies can be described as evolving organisms that exist in a state of 'coming to being' and experience hype cycles.
- Characteristic 4: Emerging technologies satisfy the "not yet" criteria of no yet being fully understood and not yet being fully researched.
- Characteristic 5: Emerging technologies are potentially disruptive, but their potential is mostly unfulfilled.
- Characteristic 6: Emerging technologies are used by specific people.
- Characteristic 7: Emerging technologies provide personalized learning opportunities.

Characteristic 1: Emerging technologies may or may not be new technologies.

One of the survey questions asked South African Higher Education practitioners about their use of emerging technologies for teaching and learning. A list of 33 technologies was populated based on findings from an international literature review, in particular the yearly Horizon Reports (L. Johnson & Adams, 2011), and the research team's experience. The result is shown in Table 1.

Emerging technologies	On a regular basis		At least once in the past year		Never		Don't know what you mean by this	
Research databases	123	61.5%	26	13.0%	48	24.0%	3	1.5%
Social media	97	48.0%	39	19.5%	61	30.5%	3	1.5%
Social networking	89	44.5%	38	19.0%	71	35.5%	2	1.0%
Instant messaging	76	38.0%	35	17.5%	89	44.5%	0	0.0%
E-books	75	37.5%	57	28.5%	66	33.0%	2	1.0%
Web-based documents	73	36.5%	51	25.5%	71	35.5%	5	2.5%
Blogging	69	34.5%	45	22.5%	78	39.0%	8	4.0%
Bibliographic management	67	33.0%	51	25.5%	69	34.5%	13	6.5%
Internet phone	65	32.5%	40	20.0%	94	47.0%	1	0.5%
Open Educational Resources	62	31.0%	58	29.0%	77	38.5%	3	1.5%
Wikis	55	27.5%	53	26.5%	87	43.5%	5	2.5%
Podcasting / Vodcasting	46	23.0%	54	27.0%	98	49.0%	2	1.0%
RSS Feeds	46	23.0%	28	14.0%	101	50.5%	25	12.5%
Multimedia; Digital stories	40	20.0%	53	26.5%	104	52.0%	3	1.5%
Concept and Mindmapping	38	19.0%	49	24.5%	101	50.5%	12	6.0%
Microblogging	37	18.5%	34	17.0%	126	63.0%	3	1.5%
Screencasting	29	14.5%	30	15.0%	122	61.0%	19	9.5%
Lecture capturing	28	14.0%	34	17.0%	120	60.0%	18	9.0%
Modeling / Simulation tools	28	14.0%	34	17.0%	130	65.0%	8	4.0%
Reusable learning objects	26	13.0%	23	11.5%	106	53.0%	45	22.5%
Webconferencing	24	12.0%	38	19.0%	131	65.5%	7	3.5%
Personal response systems	22	11.0%	18	9.0%	148	74.0%	12	6.0%
Tablet computers	22	11.0%	25	12.5%	151	75.5%	2	1.0%
Social bookmarking	21	10.5%	17	8.5%	142	71.0%	20	10.0%
Context aware environments	15	7.5%	16	8.0%	139	69.5%	30	15.0%
Electronic portfolios	15	7.5%	26	13.0%	139	69.5%	20	10.0%
Adaptive / Assistive technologies	12	6.0%	20	10.0%	123	61.5%	45	22.5%
Online games	12	6.0%	18	9.0%	163	81.5%	7	3.5%
Learning analytics	11	5.5%	23	11.5%	119	59.5%	47	23.5%
Argumentation Visualization	8	4.0%	8	4.0%	131	65.5%	53	26.5%
Augmented Reality	7	3.5%	9	4.5%	132	66.0%	52	26.0%
Virtual worlds	6	3.0%	15	7.5%	162	81.0%	17	8.5%
Remote instrumentation	5	2.5%	12	6.0%	170	85.0%	13	6.5%

Table 1: Use of emerging technologies by Higher Education practitioners (200 responses)

Findings on the above question showed that some of the technologies that featured prominently in the Horizon Reports, such as social networking, e-Books and collaborative learning environments, were also extensively used for teaching and learning by the South African Higher Education educators, whereas technologies such as open content or tablet computing have yet to gain followers in the South African context. Bandwidth intensive technologies, such as game based learning, augmented reality or virtual worlds, which are predicted to enter mainstream education in the developed world in less than three years, were used minimally in South African HEIs (see Table 1).

Although a number of respondents mentioned blogging, podcasting/vodcasting or social media as examples of most innovative technologies used in the past five years, it was interesting and perhaps unexpected, that the institutional learning management systems (LMS) or content management systems (CMS) were top on the list as most innovative tool used by educators in South African HEIs³. This finding supports Veletianos' (2010) first characteristic of emerging technologies: that emerging technologies are highly context-specific.

The first characteristic of Veletianos' definition, namely that emerging technologies are emerging within a context, was also most aligned with the team's shared understanding on emerging technologies (11 respondents). Respondent 9 (R9) said, for example: "The type of technology would NOT need to have been developed currently/recently but would have been used for the first time in a context" or R5: "So what is emerging in Paris may be some years off emerging in Parys⁴." Only two respondents defined emerging technologies as "cutting edge technologies" (R1 and R2).

Context was defined in various ways: with some respondents referring to context in terms of national or regional difference, as demonstrated by R7:

"However, due to very different contexts in developing countries (as compared to Europe, Asia, Australasia and the USA for example) as well as the differentiation in the contexts of the various South African Higher Education Institutions, a definition of emerging technologies for the purposes of this project should include a sense of local context in which emerging technologies could include technologies that might have been available globally for some time, but for reasons such as lack of infrastructure, was not available at a particular site."

Four participants defined context on an even more granular level, such as by discipline, or for a small group of lecturers. Respondent 11 went as far as defining context on an individual level: '[emerging technologies] make life simpler for one person, wouldn't necessarily make it simple for another'.

Participants' also broadened the term emerging technologies to emerging practices, defining emerging technologies as: 'innovative, new, emerging different practices' (R1) with technologies or 'technologies that are adopted in a particular social practice' (R8) (in total five responses).

Characteristic 2 and 3: Emerging technologies can be described as evolving organisms that exist in a state of "coming to being" and experience hype cycles.

Seven members of the research team recognized Veletianos' second and third characteristics, that emerging technologies are evolving and undergo hype cycles by defining emerging technologies as, for example, being "*on the rise, upcoming and gaining in momentum*" (R10). Participants agreed that emerging technologies are not in the mainstream, but are used by early adopters, who are willing to take risks, as the following quote shows: "*It would also need to be regarded as risqué [risky] by the mainstream academic - the early adopter ide*" (R6). Eight participants indicated that emerging technologies undergo hype cycles or cycles of adoption; however, not all respondents agreed that emerging technologies have to go through the same development cycle in all contexts, as R5 argues: "*Sometimes it never will make it as far as Parys, maybe because Parys hasn't heard of it, or doesn't see the need for it, or by that time it has been superseded by something else.*"

³ The full data set can be found at <http://www.emergingict.blogspot.com/p/survey-data.html>

⁴ Parys is a town situated on the banks of the Vaal River in the Free State province of South Africa.

Characteristic 4: Emerging technologies satisfy the criteria of not yet being fully understood and not yet being fully researched.

Only five participants defined emerging technologies in terms of Veletsianos' fourth characteristic, that emerging technologies are not yet fully understood or researched yet, as the following quotes show: *"their value is still untested and impact unexplored"* (R8) or *"people are still trying to implement and understand the affordance of that technology"* (R15). It could be that this aspect of emerging technologies is taken for granted by the research team, since the focus of the research project was to explore emerging technologies in South African Higher Education. One participant who did remark on this aspect argued that this could be the case because these technologies reside predominantly in students' realms outside the formal learning context and are hence difficult to access: *"I believe that emerging technologies are happening in spaces that are not always accessible to formal education and educators...I believe that a lot is happening without us knowing or realizing"* (R11).

Characteristic 5: Emerging technologies are potentially disruptive, but their potential is mostly unfulfilled.

Ten respondents referred to the transformative nature of emerging technologies. They wrote that emerging technologies promote qualitative learning outcomes such as collaborative knowledge sharing, authentic learning, student-centeredness and student empowerment. However, only three participants were more cautious and talked about emerging technologies having a potential for transformation that might not always be fulfilled, as shown in the following quote:

"Emerging technologies have the potential to be transformatory and lead to qualitative educational outcomes but this is not necessary the case – for example, Second Life [a virtual world] can be used to expose students to drill and practice type of learning that happens in any event in face-to-face traditional practice" (R10).

Affordances of emerging technologies identified in participants' responses include the promotion of flexibility, accessibility, creativity and their simplicity and ease of use.

Characteristic 6: Emerging technologies are used by specific people.

The first additional characteristic that was reflected in both the survey and the personal reflections of the research team refers to a sense of the kind of people who use emerging technologies. One of the questions in the survey prompted respondents to explore their motivation for using emerging technologies (see Table 2). An analysis of the data revealed that the main motivator to engage with emerging technologies is a lecturer's personal interest and passion about technology (28%), followed by availability of the technology at the institution (23%).

Seven of the research team's reflections included some kind of description of who was using emerging technologies, describing these as, for example, *"early adopters"* or *"risk takers."* While this positioning reflects the existence of hype cycles, we felt that a sense of who emerging technology practitioners are contributes usefully to their characterization. Certainly the elaboration below gives a clear criteria for distinguishing users of emerging technologies from users of more established technologies: *"Only a small proportion of lecturers in Higher Education are that innovative or interested in using technology that they have the time, energy or inclination to investigate cutting edge technology"* (R1).

Option (select all that apply)	Frequency	Cumulative percentage
Personal interest: I am passionate about technology	100	28%
It is available at my institution	81	23%
Institutional workshop / demonstration	36	10%
My institution requires this of me	29	8%
My colleagues had positive results using this technology	29	8%
My students demanded this	17	5%
I experienced it as a student in my studies	13	4%
Other: To improve learning	12	3%
I saw this at a conference	11	3%
I read about it in a paper	11	3%
Incentive (funding, policy)	6	2%
Other (various)	6	2%
Total	351	100%

Table 2: Motivation to Use Emerging Technologies

Characteristic 7: Personalized learning opportunities.

A second additional characteristic was the sense among four participants that emerging technologies are empowering, that they create or activate a lecturer's and student's personal agency, the capacity to act. The ability to act on the world is reflected in the view of R5, who argued that *"the way that people use technology helps to shape it."*

Emerging technologies seem to facilitate more independent, autonomous and creative learning opportunities, which can take place outside an institution's control. A few respondents raised this point, and argued that by allowing students to initiate the use of these technologies, the ownership of the learning process is shared among students and lecturers. This is evident in the sense of ownership suggested by R11 who emphasized that emerging technologies *"do not reside in the institutional domain, but are owned by lecturers and students alike."*

The flexibility and range of emerging technologies that lecturers and students engage with allows for, as R3 mentioned, *"a variation in opportunity to learn, accommodating the different learning needs and capabilities of individuals"* and allows students to set up a more personalized learning environment. This shared sense of ownership may lead to more enthusiasm and engagement from both lecturers and students, as R11 explained: *"People need a lot of enthusiasm and time to keep up...but emerging technologies are fun, so this time is spent effortlessly."*

DISCUSSION AND CONCLUSION

This paper set out to interrogate emerging understandings of the term "emerging technologies," which has been characterized as not well defined and often misunderstood (Veletsianos, 2010). In particular, we sought to make a contribution by elaborating these emerging understandings in the context of South African Higher Education. The investigation took place as part of a larger inter-institutional research project on the use of emerging technologies in South African HEIs, and interrogated the research team's own understanding of the term "emerging technologies" as well as responses to a national survey on the use of emerging technologies in South African Higher Education.

Our collective understanding of the concept evolved over time as we engaged in discussions and brainstorming sessions with one another throughout the project. Engaging with the literature and with the research findings prompted us to examine our emerging understandings as a team. We found that

Veletsianos' (2010) definition of emerging technologies was flexible enough to be appropriate in our highly complex and diverse higher education context, as it allowed us to acknowledge the institutional and individual differences that impact on a lecturer's and a student's engagement with these technologies and that highly innovative pedagogical use of technologies, which might appear old-fashioned in other more developed contexts, may be defined as emerging in our own contexts.

Although heavily influenced by Veletsianos' definition, we found more nuanced layers in our own emerging understandings. The importance of context was reflected in our responses and was unpacked to include region, level of institutional development, access to resources, discipline, group belonging and even the individual level. This finding was confirmed in the responses to the survey that was sent out to Higher Education practitioners. Although a number of respondents mentioned blogging, podcasting/vodcasting or social media as examples of most innovative technologies used in the past five years, the institutional learning management systems (LMS) or content management systems (CMS) were top on the list as most innovative tool used by educators in South African Higher Education institutions. This finding confirms Veletsianos (2010) argument that emerging technologies are highly context-specific. Our own focus on viewing emerging technologies as pedagogical practices, supported Veletsianos' (2010) broadened definition of emerging technologies, which he sees not just as simple technologies, but also ideas or concepts: "emerging technologies are both the tools and the ideas that are emerging and emergent" (pp. 19-20).

Only few members of the research team foregrounded the fact that emerging technologies were not well understood or researched. This perception could be fuelled by the fact that these technologies are often used by students and thus in spaces that are not easily accessible for lecturers or researchers, echoing what the Committee of Inquiry into the Changing Learner Experience (CLEX) report calls "invisible learning spaces" (Committee of Inquiry into the Changing Learner Experience (CLEX), 2009) and might also be linked to members' diverse levels of experience with researching emerging technologies.

In addition, two further characteristics of emerging technologies emerged. The first was that emerging technologies are the domain of a few individuals who have the impulse to innovate, and that they may be intrinsically motivated, e.g. by the enjoyment to be had when engaging with these technologies. In similar fashion respondents to the national survey listed as main motivator to use emerging technologies their own passion for technology, closely followed by availability of a technology at the institution. This is an important finding for institutions planning their engagement with these early adopters of technology (Bates & Sangra, 2011). The second was that emerging technologies appear, at least to some of the team, to characteristically activate the individual agency of lecturers and students, allowing a more flexible, autonomous, creative and personalized use of these technologies and may lead to an increased sense of ownership and lecturer and student engagement (Archer, 1995).

Our findings foreground the potential of emerging technologies to transform teaching and learning practices as a result of "the negotiated and symbiotic relationship between pedagogy and technology" (Veletsianos 2010, p. 16). It also raises interesting questions around the interplay of a lecturer's sense of agency when choosing to engage with these technologies and the affordances they offer. Do lecturers engaging with emerging technologies show more affinity with constructivist, student-centered teaching and learning approaches, or do emerging technologies facilitate these approaches? More research is needed that focuses on the way in which students in South African Universities regard emerging technologies, and how they experience their own current practices using technology to improve qualitative learning outcomes.

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