Exploring lecturer perceptions of digital curriculum mapping in South African higher education institutions[1]

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ABSTRACT

Digital curriculum mapping (DCM) serves as an essential technology-enhanced tool and process for curriculum development, facilitating lecturer-student engagement in online learning. DCM can simplify curriculum alignment and enhance lecturers' pedagogical skills and technological proficiency by addressing longstanding training and cognitive gaps, as well as the need for dynamic implementation practices. However, little research is available on the current state of digital curriculum mapping at South African higher education institutions (SAHEIs), including both public and private institutions, indicating a significant gap in research. The problem was exacerbated during academic forums on curriculum development when it became evident that some institutions lacked sufficient knowledge and experience in digital curriculum mapping, thereby hindering collective digital sharing efforts. The research aim was to explore how lecturers across diverse educational institutions in South Africa perceive and apply curriculum alignment and digital mapping. A qualitative methodological approach was adopted using in-depth interviews with 13 purposefully selected lecturers from four institutions. Thematic analysis was employed to interpret the narratives, guided by Siemens's connectivity theory, Fullan's change theory, and Mishra and Koehler's TPACK framework. The findings revealed lecturers' perceptions of DCM varied considerably, depending on the institution's approach and the lecturers' diverse levels of curriculum mapping. Variations were attributed to a general lack of policy and understanding, inadequate lecturer training, inability to engage with DCM at a collective level, a need for systematic and collaborative assistance in implementation, and limited inclusivity in the planning and implementation of DCM across SAHEIs. The conclusion is that adequate knowledge and training, and an inclusive curriculum mapping are crucial for developing an inclusive SAHEI DCM network system. This study contributes to the body of knowledge by providing information on the current SAHEI situation as well as outlining some strategies for addressing DCM issues, providing directions for future research.

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INTRODUCTION

The South African Department of Higher Education (DHET) views the professionalism of lecturing and lecturers' curriculum development, knowledge and skills as essential for enhancing teaching and learning. Curriculum development, thereby, plays a pivotal role in promoting transformative outcomes, approaches, and activities in higher education (DHET, 2018). However, global experts, including Bruggeman et al. (2021), view blended learning as a challenging process, influenced by factors such as design thinking, innovation skills, media usage, information technology literacy, and real-life experiences in core academic disciplines that can hinder implementation. Although curriculum responsiveness enhances programme excellence across the world (Tømte et al., 2019), the varied compositions of lecturers across different types of institutions in South African educational institutions negatively impact the overall quality of education (CHE, 2021; Tewari & Ilesanmi, 2020). Diversity spans backgrounds, academic training, curriculum expertise, and disciplinary knowledge across private and public tertiary institutions. The concept 'public universities' also includes those institutions with satellite campuses located in more rural geographical regions, contributing further to the diversity of academic staff. In their study on curriculum disparities, Amin and Mahabeer (2021) suggest immediate short-term strategies, among others, reducing irrelevant curricula and upskilling teachers.

This study focuses on the inclusive and central role lecturers can play at all stages of professional curriculum development and training, and how knowledgeable, self-empowered educators can act as intermediaries between curriculum and students. However, little scholarly research could be found, while discourse on curriculum alignment practices has indicated that some SAHEIs lecturers do not have the content knowledge, pedagogical knowledge and technological knowledge to contribute to dialogue on digital curriculum alignment. The motivation for this study was that lecturers at all levels and stages of curriculum development at South African higher education institutions, including those falling behind in training and knowledge, must be able to enhance their knowledge and expertise around digital curriculum mapping (DCM).

LITERATURE REVIEW

Foundational texts on online education were consulted. These included Laurillard's (2002) Conventional Framework, which positions learning as a reflective, iterative dialogue facilitated by digital tools to enhance interaction between the lecturer and the student. Furthermore, the Community of Inquiry model of Garrison, Anderson and Archer (2002) emphasises the importance of integrating cognitive, social, and teaching presence to ensure engagement and meaningful online learning. These two frameworks provided a comprehensive theoretical grounding for the design and evaluation of effective digital learning environments. According to Hebbecker et al. (2022), mapped classroom evidence enables lecturers to make data-driven decisions about existing curricula and design, thereby aligning instruction to students' needs

and achievement. However, in recent years, South African literature has focused on the decolonisation of the curriculum with less attention being paid to lecturers who deliver the curriculum, which, according to Vandeyar (2020), could cause the curriculum to fail.

Various influential curriculum theorists each brought a unique lens to curriculum development, deeming curriculum as both a product and a dynamic educational experience. For example, Tyler (1949) emphasises structure and systematic development supported by precise objectives. Taba and Spalding (1962) emphasise the importance of teachers playing a central role in curriculum design, beginning with specific teaching-learning units and gradually developing these into a comprehensive curriculum. For Stenhouse (1975), curriculum is not only a plan but a process of inquiry, autonomy, and reflective development. Posner (1992) highlights the importance of critical analysis and offers a systematic method for evaluating and understanding curricula, particularly for educators and education policymakers.

Traditional curriculum mapping consisted of paper-based, static documents, limited to in-person meetings between lecturers, and showed little engagement with students. The method proved to be inconsistent, as manual tracking was the primary method (Joyner, 2016). A definition of digital curriculum mapping (DCM) can be expanded to: A logical process and interplay of technology, pedagogy, and content knowledge to systematically document, align, and analyse what is taught across courses, grade levels, or programs. It helps educators create learning objectives and ensures that instructional strategies and assessments are coherent, consistent, inclusive, and aligned with established standards (Balzer, 2016; Botha, 2016; Garrison et al., 2010; Joyner, 2016; Mishra & Koehler, 2007; Tømte et al., 2019).

Fullan's theory of educational change

During the research, participants' perceptions of curriculum development and alignment were explored within the context of Fullan's (2015) theory of educational change. This theory contains three distinct stages of change, namely initiation, implementation, and continuation or institutionalisation (Joyce & Fullan, 1984). Fullan's stages of change can be used to explain the slow institutional uptake of DCM, especially in contexts with weak organisational readiness or fragmented policy implementation. The indication is that, although the three stages are consistent across educational environments, they vary in impact on HEI change, consequently influencing lecturers' opinions about DCM application. Fullan's change theory supported the design of the interview schedule for the collection of data.

Connectivism theory

Siemens (2005) developed connectivism as a learning theory for use in critical thinking when creating digital instructional environments, transcending typical behaviours and boundaries of cognitivism and constructivism (Duke et al., 2013; Yu, 2021). Learning occurs when connections are formed between individuals, resources, and communities or nodes of data and information within a network (Utecht & Keller, 2019). Information nodes can be accessed, or new knowledge can be constructed when links are made between these nodes, including the flow of knowledge between human and non-human nodes. Connectivism is particularly relevant

to DCM as it enables cross-disciplinary collaboration through digital platforms, yet challenges arise when lecturers lack digital fluency.

Organisations and individuals can thus be viewed as learning organisms, whose knowledge can be stored and shared digitally. Connectivism encompasses aspects of constructivism, indicating that collaborative and informative discussions facilitate the creation of new knowledge. When knowledge is stored digitally, the connections between data elements become more robust and reliable (Tømte et al., 2019). Therefore, individuals play a vital role in contributing to the knowledge cycle (Duke et al., 2013).

Mishra and Koehler's TPACK framework

Along the same vein, Mishra and Koehler (2007) present their Technological Pedagogical Content Knowledge (TPACK) framework as a theory and multidimensional lens to help educators understand the complex interplay between content knowledge (what is being taught), pedagogical knowledge (how it is taught), and technological expertise (the tools used to prepare it). According to Mishra and Koehler, when this framework is incorporated into DMS curriculum development, instructional design becomes content-accurate, pedagogically sound, and technology-responsive. Moreover, teachers can develop learning experiences that are content-rich, instructionally inclusive, and technologically adaptive to address the diverse needs of 21st-century learners, lecturers, and institutions.

Digital curriculum mapping in South African HEIs

The South African quality assurance framework (CHE, 2021) emphasises the need for the enhancement and efficacy of internal quality assurance systems in HEIs. However, policy and practice regarding the use of curriculum technology are still institution-specific (Moloi & Salawu, 2020). This includes systemic barriers and power dynamics, as well as the processes, approaches, and technologies adapted by each institution according to its own environment, needs, knowledge, and financial and technological resources (Moloi, 2016).

Literature further indicates that South African HEIs apply different curriculum mapping systems, some of which are still paper based (DHET, 2018). A national standardised DCM is therefore pivotal in helping the SAHEI system incorporate digital curriculum development for instructional design, warranting a content-accurate, pedagogically sound, and technology-responsive curriculum. DCM simplifies transformation by connecting stakeholders in curriculum development and aligning curricula at multiple levels. As global and national efforts strive to improve higher education and standardise qualification outcomes, DCM becomes crucial in international (Duke et al., 2013; Kilag et al., 2023), as well as South African higher education institutions, where curriculum decolonisation and the role of culture shaping curriculum still prevail (Moremoholo, 2023).

In their study, Khuzwayo and Booi (2021) argue that the role of curriculum should be to prepare students to use state-of-the-art technical skills aligned with South African Qualifications Authority (SAQA) standards, enabling them to join the workforce and respond to contextual challenges. As implementers of curriculum, academics must realise how crucial the alignment of subject matter is within the context of technological, pedagogical, and content knowledge (Mishra & Koehler, 2007). Although the DHET (2018) emphasises the importance of academic development to enhance lecturers' teaching and learning skills,

universities do not all maintain compatible standards. For instance, in a study exploring the perceptions of curriculum developers in KwaZulu Natal, Govender (2018) found that teachers had not received adequate support during the implementation of curriculum changes.

Given the lack of South African standardisation in lecturer curriculum practices, Isabirye and Moloi (2016) emphasise the importance of developing a coherent and purposefully structured set of learning experiences that lead to recognised qualifications. A lack of teaching and learning skills leads to discrepancies in didactic methods not supporting higher education learning (Maphosa et al., 2014). Consequently, engagement in curriculum development processes does not enable teaching and learning-related knowledge and skills that educators can share with others. The resolve is that DCM can help standardise programmes that align with the curriculum and institutions' missions and goals. Correspondingly, technology has significantly impacted every aspect of teaching during and after the COVID-19 pandemic. Digital curriculum mapping, therefore, serves as a technology-enhanced approach to curriculum development, allowing lecturers to participate (Okoye et al., 2021). If DCM can be visualised and realised, it can simplify curriculum alignment through collaboration and technological proficiency (Balzer, 2016).

Several South African higher education institutions (HEIs) employ DCM as both a tool and a process to assist lecturers in curriculum development. However, research by Bester (2022) found that many institutions lack focus and expertise, and that perceptions regarding the use of technology for curriculum alignment are misplaced. The conclusion is that although digital curriculum mapping provides a platform for peer learning, collaboration, and professional development strategies, many institutional members still require professional technological, pedagogical, and content knowledge for curriculum development (Binga & Ngibe, 2021).

RESEARCH PROBLEM

In the event of teaching curriculum alignment and digital mapping, little research could be found on the current state of DCM at South African higher education institutions (SAHEIs), particularly those with disadvantaged satellite campuses in regional areas, indicating a significant gap in research. Furthermore, during academic forums on curriculum development, it became evident that several educators lacked knowledge and experience in digital curriculum mapping, hampering the collective sharing of digital curriculum development knowledge. Researchers, such as Jadhav and Hlabane (2020), have contributed to enhancing discipline-specific developments in South Africa, but their findings could not be generalised to knowledge on curriculum development and alignment across private and public institutions of higher education. Despite emphasis on inclusive curriculum development, no research could be found exploring the challenges and benefits experienced by lecturers across diverse institutional contexts. Specifically, there was a lack of attention to how variations in lecturers' educational backgrounds, professional training, years of experience, and institution type influence their engagement with and perspectives on curriculum planning.

The research problem was formulated as there is a lack of attention to how variations in lecturers' educational backgrounds, professional training, years of experience, and institution type influence their engagement with and perspectives on curriculum planning. The research

aimed at investigating how lecturers across private and public higher education institutions in South Africa perceive and apply curriculum alignment and digital mapping, and how knowledge, training and the process can be enhanced.

The objectives were to:

- explore lecturers' perceptions of curriculum and the development process in higher education institutions by collecting data from participants with diverse professional experiences over a broad range of institutional settings
- evaluate lecturers' knowledge and experience of DCM for curriculum alignment in their institutions
- suggest possible DCM processes or strategies from the empirical research findings to align curriculum development in South African higher education institutions.

RESEARCH METHODOLOGY

Watson et al.'s (2020) typology, which includes purpose, product, and process, guided the research questions posed to the participants about the application of DCM for curriculum alignment, reasons for implementation (purpose), the methods used (process or strategy) and the challenges faced in the implementation of DCM at their institutions.

The study employed a qualitative case study design as the best method to collect narrative perceptions from 13 participative lecturers from four purposefully selected higher education institutions. A balanced approach was used in selecting two institutions classified as private higher education institutions and two institutions classified as public higher education institutions as case studies. The sampling strategy comprised criteria, including diversity regarding institutional type: private and public universities, of which one public university included historically disadvantaged satellite campuses in more rural areas. Disciplinary scope comprised humanities, education, applied sciences and creative industries. Furthermore, participants had to be involved in curriculum development and willing to participate in personal face-to-face interviews. Invitations were forwarded to the 13 lecturers who were interested and willing to participate in the research. Informed consent was signed and received before the research began. Such an approach seemed particularly useful as the researcher wanted to identify patterns, variations, and themes across the different settings while collecting data through in-depth interviews.

The semi-structured interview schedule contained open-ended questions which were used to collect the relevant data (Welman, Kruger & Mitchell, 2006; Fouche, Strydom & Roestenburg, 2021 and to ensure that the same open-ended questions were posed to all 13 participants (Coe et al., 2017). Throughout the research, the ethical principles and procedures required by Unisa's research ethics policy were considered. Detailed data were collected, and answers were followed up over a period of six months. Participants were assured of their anonymity, that their answers would only be used for research, and that a copy of the study would be available if needed. Audiovisual materials supported the personal in-depth interviews, while interviews were also recorded for transcription. The findings are discussed in a narrative format together with themes derived from the analysis and interpretation of the data.

Thematic analysis was employed to manually align and analyse data by colour-coding the different themes that initially emerged through iterative reading and coding of the verbatim transcripts. The process facilitated an interpretive comprehension of meaning, providing insights into the participants' domains, and allowed for reflection on their practices (Creswell, 2013). Simultaneously, the researcher's subjectivity and positionality in the research process were acknowledged.

Further coding and interpretation were simplified by using ATLAS.ti software to complete the analysis and multi-layered interpretation first, according to the institution and then according to the participants from each institution. Empirical findings were integrated with the literature findings to inform the knowledge-building process. Themes were refined and interpreted by linking them to initiation, implementation, and continuation of curriculum according to Fullan's (2015) change theory. Siemens' (2005) connectivism theory helped to interpret the perceived relationships between knowledge nodes, including lecturers, curriculum, programme development units, management, and accreditation bodies.

FINDINGS

The research problem was that there is a lack of attention to how variations in lecturers' educational backgrounds, professional training, years of experience, and institution type influence their engagement with and perspectives on curriculum planning. A lack of institutional involvement impacts lecturers' knowledge, training, and motivation negatively. Therefore, the research aimed at investigating how lecturers across private and public higher education institutions in South Africa perceive and apply curriculum alignment and digital mapping, and how knowledge, training and the process can be enhanced. The main research question was: How do lecturers perceive curriculum alignment through digital mapping in higher education institutions in South Africa?

The themes discussed in the following subsections explain the research findings related to DCM practices, as perceived by the 13 participants from the four institutions, and how they made sense of DCM for curriculum alignment purposes.

Theme 1: Lecturers' conceptualisation of digital curriculum mapping for curriculum alignment

Variations in the conceptual understanding of DCM

The individual lecturers interpreted and defined DCM as influenced by their knowledge of curriculum change and how changing to a digital system can affect their engagement with curriculum and students. Their inconsistent definitions indicated a lack of DCM knowledge and its application. Even when unfamiliar with the term 'DCM', three lecturers could explain its principles based on their curriculum involvement. Some lecturers perceived DCM as a static tool, while others could appreciate its dynamic methodology:

> If you have a week-by-week structure, you may look at the outcomes you achieve in a particular week to see whether it maps with your overall outcomes for a module, and that would be linked to your overall outcomes for your programme, degree or high certificate. (11P2)

> Electronic platforms can map a curriculum, such as a unit or programme curriculum. (11P3)

> [DCM is an] electronic system that we as lecturers can use, where we can, for example, post our objectives. It's an electronic system that we can use or is available to guide our thinking process through the curriculum, asking certain questions and giving us a broad overview of what we've done. (I3P2)

Institutional factors shaping DCM

The way DCM is introduced and supported varies across institutions as organisational structures, policies, and the exclusion of lecturers from curriculum processes impact their knowledge and ability to engage with curriculum (Joyner et al., 2016). Research has indicated that knowledge and ability are crucial for developing interactive DCM software and processes (Bester & Scholtz, 2012; Bester & De Graaff, 2012).

The lack of knowledge of curriculum content, pedagogical resourcefulness, and technological application hinders the implementation of technology-enhanced approaches (Fullan, 2015). Consequently, implementation is characterised by tension and an awareness of the gap between the current state and envisioned goals and changes (Maart et al., 2021). Understanding individual perspectives on change within the institutional context is crucial, as DCM methodology may be implemented, harming its use. Therefore, Okoye et al. (2021) prefer a hybrid curriculum application between the teacher and learner.

Lecturers' varying perceptions and explanations of DCM were shaped by limited institutional awareness, conflicting curriculum approaches and constrained curriculum experiences (Balzer, 2016). These differences can be attributed to insufficient training and a lack of knowledge of digital mapping systems. Vandeyar (2020) argues that institutional structures and processes that do not agree and support curriculum training and the mutual alignment of DCM projects can lead to curriculum failure. Moreover, insufficient communication and limited knowledge about curriculum mapping can result in resistance to change and the proper implementation of curriculum change (Govender, 2018).

Theme 2: Lecturers value DCM in theory but lack training

Lack of training in the use of digital mapping

The findings highlight lecturers' limited training and insufficient technological proficiency, which contribute to perceived challenges and gaps in their professional skill sets. Despite these constraints, most of the participants could recognise the value of DCM as a tool and process for enhancing curriculum clarity, communication, and alignment. Participants' experiences of DCM differed, shaped by their professional profiles and differing curriculum approaches (Binga & Ngibe, 2021). It was found that training was primarily focused on developing content and did not take the form of planned or structured guidance for using DCM as a tool. Lecturers expressed their training in curriculum mapping as:

> A broader approach to the colloquia that we have. We introduce the initial concepts in a manner that fosters a broad, cross-institutional discussion to create awareness. (11P1)
>
> We do not have formal training in curriculum mapping, but we offer numerous opportunities to help lecturers understand the content design process. We also run workshops. (11P1)
>
> I have not received any specific training, but we hold at least two colloquia per academic year, as well as several other opportunities for professional development. However, these are more *ad hoc* and planned when a need is identified. (11P1)

Participants with dual lecturer and academic support roles expressed their lack of formal training in DCM:

> In the postgraduate diploma, one of the modules is in the curriculum. So, there we do the broad curriculum, what's curriculum, and we touch on curriculum mapping. As lecturers, we didn't have formal training or any specific background, but when we worked with the Centre for Teaching and Learning, a staff member with whom we collaborated had extensive knowledge of curriculum mapping. But it's, I would say, in-service training, not formal. (I3P1)

These findings highlight the informal, fragmented nature of lecturers' existing professional development, where DCM is not systematically addressed.

Type of institution

The type of institution impacts what is required from the lecturer's professional profile and the specific skill sets at the stage of appointment When lecturers are not trained in curriculum development, their training is often outsourced to external institutions, which typically offer lesser postgraduate courses in education (PGCE) rather than a formal Postgraduate Diploma in Education (PGDip), as should be the case. This statement is confirmed by one of the participants describing their training as:

> None, formally. It is an institution that works with many vocational staff, so we have almost nobody here who is trained as a lecturer. So, it is an internal function where you learn from all around you, but we embrace that by sending most of our lecturers to PGCHE. (I4P4)

These findings were further supported by literature that has shown a lack of structured process and approach for training lecturers in DCM, as many HEIs do not provide specific guidelines or training in curriculum mapping (Segabutla & Evans, 2019). DCM initiators often have a professional or personal interest in driving the process (Botha, 2016). The inference is that although the research participants understood the value and need for digital curriculum mapping, institutional policy and training support were inadequate, and the required technology was still unavailable (Matlakala & Maritz, 2019). The inference is that the selected South African HEIs for the research did not prioritise DCM training or a formal Postgraduate Diploma in Education (PGDip) (Watson et al., 2020).

Perceived value of DCM training and application

According to the South African Qualifications Authority, lecturers typically perceive a lack of training in digital curriculum mapping as a challenge and a gap in their curriculum development and skills. Regarding the question of whether participants had received training in curriculum development, it became clear that only four participants understood the principles and benefits of DCM in programme development and curriculum planning. The answers showed a gap between participants' views of curriculum development and the application of digital curriculum mapping, as demonstrated in the following comments:

> That would mean there is a programme where you can map out your curriculum, but, in this case, for me, it is opening Google Sheets and writing out what we will do every term and every week. The mere fact that you can have an overview of it and see that it has a logical progression of content that the students need to cover. My understanding of the term means it's using electronic programmes of some sort to plan and structure a curriculum. (I4P1)

Digital curriculum mapping can only be effective when those involved understand the need for change (Fullan, 2015):

> In my experience as a lecturer, people don't think of it, and we often don't get the time to think about how our module fits into the bigger picture and how we can enhance it by re-examining our outcomes. I believe that the process of curriculum involves input on changes and suggestions for improving quality. I think that would be very valuable because, ultimately, I am the one standing in front of these students and teaching them. Whereas, if I don't have the input, I don't think the teacher's feedback gets incorporated into the curriculum. Therefore, I believe the process of questioning certain aspects of the curriculum should be mapped in this way. How is this learning outcome mapped concerning the others? (I3P3)

Oversight of stakeholder needs and requirements

Another concern regarding institutional strategies and processes was the oversight of stakeholder needs and requirements during curriculum mapping and alignment. This can be noticed from the following response:

> The way that our process works is the curriculum: the developers will come to the curriculum team and present their curriculum. So, they will have developed according to a set of standard templates and a guideline document, then present it to the curriculum team. Multiple people in the team are looking at that curriculum from different perspectives, so I tend to look at it from a technical perspective, such as how it will work in Moodle. (I1P4)

Recommendations for improving DCM addressed specific curriculum alignment and learner-centred teaching issues as follows:

> Regarding South Africa and the needs we must address. We still have a powerful content-centred approach, which has not shifted to a learning-centred approach. I think those are some of the challenges we can address through training. Those are the two things I think are important—empowerment, training, and technology. (I3P2)

Theme 3: Need for more systematic and collaborative implementation of DCM

Collaboration gaps and the role of Support Units

South African HEIs implement DCM to address diverse accreditation requirements. However, the participants expressed concern because they were not adequately involved and could not comprehend specific applications. Initial curriculum processes were typically unstructured and poorly planned, not integrated, lacked attention to change management principles, and were delayed by unreliable support. Therefore, the lecturers required clear expectations and communication from implementers, including systems and processes that would support them in meeting expectations. Only two participants reported the effective implementation of DCM in their institutions as positive, enhancing their curriculum planning proficiency and knowledge.

Limited integration of DCM within institutional systems

Effective curriculum development and curriculum advancement require the integration of content knowledge, pedagogical knowledge, and technological knowledge (Mishra & Koehler, 2007). However, the findings showed that systems and technology implementation in the selected institutions remained unregulated, with each institution developing and implementing curriculum mapping according to its particular approach. Participants' answers indicated that systems were not cohesive with other institutional curriculum strategies and processes. One participant suggested a curriculum mapping system that integrates all institutional systems, offering multiple benefits and providing all stakeholders with access to module information:

> I would recommend that there should be an electronic system that links to an institutional system, that links to other systems, student systems, and the learning management system, where you can access information about a particular module very readily available for everyone. (I3P3)

Institutional contexts and needs remain distinct, as does the underlying motivation for implementing DCM. One participant reported that their institution underwent a management change, leading to a new mission, strategies, processes, and management approaches. For such significant changes, implementing mapping and aligning it with new processes could support institutions in programme development and enable them to continue with their existing work.

> Until last year, we had quite a strong pipeline of modules and programmes being developed for accreditation. With the transition to the [institution], they have a very different process for choosing which programmes to develop for accreditation. (I1P4)

> We are small enough to view it from an institutional perspective, rather than simply a faculty or departmental perspective, so I think the quality unit is important. All people are involved. (I1P1)

> Mostly, it comes from a programme manager. We have programme leaders and programme coordinators who are responsible for developing a new programme. The programme coordinator then ensures that the right modules get developed and presented to the curriculum team at the right time. They are the persons who specify the requirements that the alignment must meet. (I1P4)

Another participant required guidance to support curriculum developers and offer instructional design support for content developers when changing the approach to programme delivery; a problem also experienced by Govender (2018). The institutional focus on designing curricula for accessibility and decolonising the curriculum was highlighted. A notable challenge was implementing modules that meet institution-specific requirements, particularly where lecturers lack design qualifications. Therefore, digital curriculum mapping training can benefit institutions (Maart et al., 2021).

> I'm specifically looking at instructional design support from curriculum and content developers. I'm looking at our institution; for example, we've decided to go blended. A lot of lecturers are not qualified to design a blended learning experience. I'm thinking about the current debates on decolonisation. How to decolonise your curriculum and how to select material. Those things do not come naturally. (I3P2)

> I was socialised into this thinking early in my career. It has influenced the way that I do things. It was always just the way that I do things. (I1P2)

Theme 4: Lack of diversity and inclusivity reflected in DCM implementation

The influence of DCM on curriculum alignment is constrained by diverse approaches and practices adopted across institutional curriculum development processes (Botha, 2016). The research included 13 participants from two private and two public institutions, one of which also contained satellite campuses in historically disadvantaged rural areas, which means the findings cannot be generalised to experienced, well-trained lecturers in larger, financially secure HEIs in South Africa. The varied training profiles require carefully planned and structured curriculum guidelines, supported by experienced curriculum developers from larger HEIs in South Africa. At the time of the interviews, the institutions' educational systems and structures did not support connecting curriculum stakeholders at all levels. Implementation methods were less effective due to a lack of diversity and inclusivity among lecturers, as indicated by the following participants:

> [I just have] a Postgraduate Diploma in Higher Education that I am currently busy with. (I3P1)

One of my master's degree modules was a curriculum development module. (I1P2)

I earned a higher diploma through Unisa in tertiary education, in which there was at least one, probably two, modules on curriculum development. (I1P4)

I have a formal qualification in higher education. (I3P3)

I took the PGCHE course that UP provides. (I4P1)

We did a postgraduate or at least a half certificate in higher education. And that was probably the closest I have ever come to curriculum development training. (I4P2)

DISCUSSION

The research findings have indicated that most of the participants from the selected institutions value DCM as a tool and process for curriculum alignment. However, a digital curriculum mapping application needs to be systematically implemented with collaboration within the institution and with other institutions. Inadequate communication and a lack of lecturer involvement negatively impact the use of DCM. Siemens' (2005) connectivity theory highlights the inconsistent perception of DCM, emphasising the need to connect the different nodes to facilitate the flow of information. The unstructured use of DCM contradicts the idea of a well-organised, general HEI curriculum development and learning system.

One of the most vital concerns is that some SAHEI curriculum developers have the knowledge and expertise and are well-connected to the curriculum and DCM levels, while others have little inclusivity, expertise and experience. The conclusion is that adequate training and effective communication are crucial for developing an inclusive SAHEI DCM network system. Furthermore, training is essential to resolve the inconsistent formulation and ideation of curriculum, the lack of involvement, and exclusion from engagement and communication, thereby impeding the effective implementation of DCM. The inference is that lecturers can only recognise their role as stakeholders in curriculum development and the value that they add to the process if they have the necessary content, pedagogical and technological knowledge to develop and coordinate courses effectively (Khuzwayo & Booi, 2021). These findings confirm Siemens's theory that effective interconnected systems improve curriculum practice in which lecturers value a systematic and collaborative approach rather than a fragmented implementation of DCM.

Some participants could accurately describe DCM as both a tool and a process, underscoring how institutional context and prior involvement in curriculum development significantly influence understanding. The absence of standardised language and formal training for all institutions leads to inconsistent conceptualisation, indicating the general need for a more structured and comprehensive approach to DCM responsiveness and communication.

A fragmented approach to DCM implementation policy, combined with inadequate communication regarding processes and tools, contributes to inadequate buy-in and resistance to change. Moreover, the absence of institutional pedagogical knowledge resources and support prevents sustained commitment to curriculum processes and the effective use of DCM technologies.

Findings also showed that where DCM was implemented, the process lacked organised monitoring and adjustment. Persistent gaps in training and understanding, as well as the need for more inclusive and collaborative implementation practices, underscore the necessity for continuous evaluation and adaptation of the curriculum. Without change and pedagogical progress, inadequate knowledge of content, digital curriculum alignment and the application of state-of-the-art technology will delay DCM enhancement.

CONCLUSION

While lecturers regarded digital curriculum mapping as a valuable tool and process for curriculum alignment, its broader notion was influenced by contextual facts. These included fragmented policy frameworks for DCM implementation, institutional cultures and power dynamics surrounding lecturer appointments and skills, as well as significant disparities in technological and financial resources across institutions, hampering the effective and sustainable adoption of DCM practices.

Lecturers are aware of the need to synchronise educational programmes within their institutions, as well as with those of other institutions. Nonetheless, institutional scenarios for lecturer training in digital curriculum development vary significantly. Institutional development strategies continue to exclude role-player participation, failing to consider lecturer expectations and bearing. Furthermore, professional training influences the implementation, while lecturer skills determine the successful adoption of DCM. Faculty require expertise to create and implement curricula for effective lecturer-student engagement and learning. Lecturers need to understand the layers, methodologies, and complex interplay between content knowledge, pedagogical knowledge, and technological knowledge to develop and coordinate courses effectively. The conclusion is that DCM should be adjusted to changing educational conditions and offer lecturers as curriculum developers the responsiveness to engage with students for optimal learning.

Recommendations

In a country with significant disparities in the educational system, the South African Council for Higher Education should develop policies on digital curriculum mapping to establish a robust framework, along with the necessary technology, to train lecturers in DCM technology, pedagogy, and content knowledge. Mapping systems should be aligned with programme requirements and be adaptable to institutional contexts and needs. Interactive mapping systems are needed for stakeholders to access accredited programmes and curriculum information. Institutions should be provided with and informed about mapping systems, processes and guidelines for training. Alternatively, lecturers should be supplied with outsourced professional curriculum development services.

Structures are necessary to connect curriculum stakeholders, including developers, accreditors, and implementers. All stakeholders should be efficiently trained in digital curriculum development, design and review processes. Lecturers should be afforded opportunities for discussions on curriculum and enhancement, considering industry needs, student requirements, and responsive access to digital programme information and design. Ample time is needed for curriculum mapping and updating. Curriculum technology should be well-researched and aligned with institutional and external stakeholder processes and requirements. The purposefully designed integrated systems should be well-researched and regularly refined. Standardised curriculum training and professional curriculum development should be aligned with curriculum processes and cycles and address the curriculum needs of lecturers. Change management principles are key to the successful implementation of DCM.

Notably, lecturers are obligated to remain up to date with the curriculum and their role in the development process. Curriculum alignment with external and institutional requirements should be balanced with new research, student needs, and industry contributions to ensure a comprehensive approach. Such a step involves a commitment to lifelong learning in curriculum development, as well as learning and teaching strategies. Students can help by actively participating and providing feedback on their learning journeys.

Limitations of the study

The qualitative research was limited to in-depth interviews with 13 lecturers from four purposefully selected private and public higher education institutions in South Africa, as it required an intensive investigation and comprehension of the participants' pedagogical, technological, and curriculum content knowledge. The study did not focus on the perceptions of lecturers on what digital curriculum mapping systems they would prefer to use. The educational system is an open and complex system that continually evolves; therefore, the following recommendations are proposed for future research.

Recommendations for further research

Research on the implementation and application of digital curriculum mapping (DCM) in South African higher education institutions could examine the impact of DCM on HEI institutions and explore potential training opportunities for current and newly appointed lecturers. Another interesting study could be to investigate possible technology and DCM software applications available for South African HEIs, with recommendations on curriculum mapping, policy, and governance.

Value and contribution of the study

This study highlights the importance of lecturer participation across various stages of curriculum development and professional curriculum training in HEIs. It provides practical guidance for lecturers and institutions investigating digital systems for aligning curriculum mapping. Located in a South African context, it reflects on lecturers' perceptions and experiences of curriculum processes, as well as their pedagogical and technological knowledge. This study provides

evidence to support more informed curriculum design and enhancement through digital lecturer-student curriculum dialogue and feedback.

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