ASCILITE 2024

Navigating the Terrain:

Emerging Frontiers in Learning Spaces, Pedagogies, and Technologies

Variations of Australian university teachers' conceptions of teaching with GenAI: A phenomenographic qualitative study

Feifei Han
Institute for Learning Sciences and Teacher Education, Australian Catholic University

Henry Cook
School of Education, Faculty of the Arts, Social Sciences & Humanities, University of Wollongong

Robert Ellis
Office of Deputy Vice-Chancellor (Education), Griffith University

The recent emergence of GenAI (GenAI) has generated significant interest and intense debate in higher education learning and teaching. Under this scenario, researchers and policy makers have begun to gain an understanding of what factors may influence university teachers' acceptance and use of GenAI in teaching. Research has shown that how teachers conceptualise teaching shape their pedagogical approach to some degree. Using a phenomenographic qualitative research design, the study examined variations of Australian university teachers' conceptions of teaching with GenAI via semi-structured interviews. Thematic analysis of the interview transcripts was conducted to identify themes prior to a second pass inductive analysis, enabling the researchers to compare and contrast perspectives. Three qualitatively different conceptions were identified: 1) GenAI is used in teaching to develop students' understanding, critical thinking, and reflection; 2) GenAI is used in teaching to reproduce learning and teaching artefacts; and 3) GenAI are just tools, only having limited applications in teaching. Of the three categories of conceptions, only the first category was student-centred/learning-focused conceptions, which aimed to use GenAI in teaching to support students' learning and understanding. This work will provide educators with a framework to utilising GenAI in the classroom to support student-centred learning.

Keywords: GenAI, conceptions of teaching, semi-structured interviews, phenomenographic qualitative study, Australian university teachers

Introduction

Artificial intelligence (AI) technologies are becoming ubiquitous in our daily lives, subtly altering our ways of thinking, behaving, and interacting with one another (Zhang et al., 2023). Rapid growth in the use of AI technologies has been observed in the field of education, where they are radically changing the nature of teaching (Zhang & Aslan, 2021). The recent emergence of GenAI (GenAI) (e.g., by OpenAI and PaLM 2 by Google) has generated significant interest and intense debate within different levels of education, including higher education. Some academics reject or ignore GenAI as they worry that students will develop heavy reliance on AI and will not be able to acquire essential and basic skills (Reiss, 2021). Other educators see that GenAI has a huge potential in education as GenAI may provide students with personalized learning experiences and increase the inclusive and equitable access to education for all students. Under this scenario, researchers and policy makers have begun to gain an understanding of what factors may influence university teachers' acceptance and use of GenAI in teaching (Dehghani & Mashhadi, 2024).

There exists a long history of empirical work about teachers' *conceptions of teaching* on the basis that their conceptions will, to some degree, shape the pedagogical practice they adopt in teaching. Conceptions of teaching are concerned with specific meanings attached to pedagogical strategies to foster learning (Lam & Kember, 2006). Research has shown that teachers hold qualitatively different conceptions of teaching. For

instance, Kember (1997) summarized 13 empirical phenomenographic studies on conceptions of teaching and identified four common conceptions in these studies, including conceptualising teaching as (1) imparting information, (2) transmitting structured knowledge, (3) supporting students' understanding, and (4) teaching as conceptual change; with the first two conceptions being teacher-centred/content-oriented conceptions and the other two as student-centred/learning-oriented conceptions.

Unlike beliefs, which are generally often strongly held and difficult to change as they assume an element of truth and reality for the individual who holds them (Han & Ellis, 2019a); conceptions are relational more readily adaptable, as exposure with new information tends to lead to conceptual change (Trigwell & Prosser, 2020). This means that teachers' conceptions of teaching should be examined in different learning and teaching contexts and designs. Recent research has explored teachers' conceptions of teaching machine learning (Sanusi et al., 2022), conceptions of mobile technology-integrated instruction (Chen & Tsai, 2021), and conceptions of virtual teaching (Naimi-Akbar et al., 2023). There is a lack of research on university teachers' conceptions of teaching with GenAI. The current study aimed to fill this research gap.

Methods

Research design

The study adopted a phenomenographic qualitative research design. Phenomenography aims to understand "qualitatively different ways in which people experience, conceptualize, perceive, and understand various aspects of, and various phenomena in the world around them" (Marton, 1988). Phenomenography was established on the ground that people's knowledge of a phenomenon can be understood and situated within a limited number of categories, which can be logically structured and hierarchically related (Han & Ellis, 2019). Phenomenography has been widely used in educational research to understand individuals' cognitions about learning and teaching, such as conceptions of, and approaches to, teaching (Han & Ellis, 2019b).

Participants

The participants were 30 university teachers recruited from a metropolitan research-intensive Australian university. Previous research has reported that there are disciplinary specific features of teachers' conceptions of teaching (Trgiwell & Prosser, 2020). Therefore, recruitment of the participants will cover the four broad categories of disciplines: hard pure disciplines (e.g., mathematics), hard applied disciplines (e.g., health sciences), soft pure disciplines (e.g., sociology), and soft applied disciplines (e.g., law).

Data collection

Before the data collect, ethics approval was sought from the researchers' institutions. Signed written consent were obtained from all the participants before the data collection. Semi-structured interviews were employed to elicit teachers' conceptions about university teaching with Gen AI. The interviews were open and loosely structured, which allowed the interviewees to have freedom to determine the nature of their responses, and have ample time to reflect upon and to elaborate as desired. Probing questions were used to ask interviewees to expand on their ideas and clarify their thoughts (e.g., "Could you elaborate further please?"). The interviews were audio-recorded and transcribed for the analyses.

Data analysis

Data analyses began with reading the transcripts thoroughly and repeatedly to determine the breadth and depth of the responses. The second round of reading was more detailed with an aim to locate and highlight key statements about the conceptions in each response. Then we listed all possible themes that occurred repeatedly in the responses. In another round of reading of the transcripts, we focused on the highlighted parts in order to identify the dominant characteristics in each category of the conceptions. We then constantly

compared and contrasted the dominant characteristics to develop the definitional properties for each category. Subsequently, we checked these definitional properties against the representative quotes to refine the themes and definitions, which aimed to make sure that each category represented a distinctive theme, forming the final set of categories.

Results and discussion

Three qualitatively different conceptions of teaching with GenAI were identified among 30 Australian university teachers from diverse academic disciplines.

GenAI is used in teaching to develop students' understanding, critical thinking, and reflection

Teachers who conceived teaching with GenAI as developing students' understanding, critical thinking, and reflection held a student-centred lens. Ten out of 30 teachers had this category of conceptions. These teachers considered how teaching with the help of different forms of GenAI could assist students developing in-depth concepts and knowledge through different ways of using GenAI. These educators predominantly saw the use of GenAI as a possible outlet for students to structure their own learning and form their own approaches of knowledge and concept inquiry in learning: e.g., '*… GenAI is where we [teachers] either start or students can facilitate learning outcomes by training or using GenAI to either train and reinforce and refine understanding of concepts.*' (Participant 14)

Practical examples included where educators sought the use of GenAI as a means to recreate environments, scenarios, or interactions for students to inquiry and to evaluate: e.g., '*they construct a story or a case study around somebody who has brain damage in that area and then they instruct ChatGPT or Copilot or whichever to act as the patient, and they interrogate their patient and then they can evaluate how good the AI is at creating the patient or answering the questions in the appropriate way.*' (Participant 30)

In this category, teachers also noted the assistive nature of how GenAI could be used for students to communicate their understanding of concepts: e.g., '*The assistive use of technologies to articulate ideas that our students own, or something along those… that it's something to support students' own ideas and how they articulate.'* (Participant 10)

GenAI is used in teaching to reproduce learning and teaching artefacts

The second category of conceptions limit the contribution of GenAI to the processes of teaching without focusing on students' learning. Educators in this category paid more attention to the efficient nature of using GenAI to reproduce teaching artefacts. They considered the speed and diverse types of outputs which could be made available within the learning and teaching environments. Six participants held this category of conceptions.

A common response within this category highlighted the types of traditional learning and teaching artefacts that could now be easily reproduced through the use of GenAI: e.g., '*I think it's a support tool…has the capacity, for example, to develop assessment questions and it has the capacity to support development of assessment, task and learning activities and things like that*.' (Participant 20)

Others considered how GenAI, being highly efficient in producing artefacts, could provide near unlimited variations of stimulus materials into a learning environment: e.g., '*The creations are then almost like a jigsaw piece puzzle of combined other elements. They're not necessarily unique… it's not so much just an image maker or a text maker. It's a stimulus to give it some parameters and then it will generate lots of possibilities.'* (Participant 1)

Due to their conceptions of reproducing nature of the GenAI, teachers felt ultimately their role should be to help introduce GenAI into the teaching as a facilitative tool, at the same time, to avoid promoting the inappropriate use of GenAI, such as cheating in essay writing: e.g., '*We can't ignore it and we're going to have to teach our students to use it or know how to use it or work with it… whatever the best practices are and we need people who are experts to tell us those things in a way that it supports learning not in a way that it's supporting cheating*.' (Participant 14)

GenAI are just tools, only having limited applications in teaching

Teachers in the third category of conceptions did not go beyond the boundaries of viewing GenAI simply as tools, which had limited applications in teaching and learning processes. These teachers primarily focused on the technical parameters of GenAI, which is limited by its design for broad end-users and the facility it can provide to support different types of educational practices. Fourteen participants held the conceptions of this category.

Educators considered that as GenAI only uses a language model to interface with information, this would inherently limit its ability to transmit knowledge or provide useful conclusions beyond what could be provided by a human: e.g., '*It's not like a Wikipedia knowledge database, it's a language model so it's, you know, something like ChatGPT It's a way of trawling and looking for language patterns, therefore it has limitations as well as benefits … It's a tool.'* (Participant 8)

Some educators even cast doubt on the inherent value of using GenAI in teaching considering how the language models of GenAI operated: e.g., '*When I think of GenAI I really think of them as confection machines that they are simply, they're sampling machines, you know, they're pulling different sources, different tags and then confecting them back together into new forms… It's very obvious what they're doing and the way they're knitting images together.*' (Participant 6)

Other teachers specifically pointed out the incomparable of GenAI to human elements: e.g., '*I think for me it is literally just another tool, so it is a tool like many other tools that we're using. For me, the human, the human element is in, in particular in design is I personally haven't found a way that AI could in any way replace that*...' (Participant 12)

The results describe the qualitatively different conceptions of teaching using GenAI by Australian university teachers. Teacher conceptions that focused on the technical limitations of GenAI are likely to exclude GenAI from pedagogical practices. As this is commonly the case for teachers' acceptance when approaching unfamiliar technologies in learning (Chen et al., 2022). The teachers who conceptualised using GenAI as a way to reproduce learning artefacts or a student-centred way of using GenAI considered a more entangled use of GenAI in their practices. This entanglement represents the combination of context, pedagogy and technology that are embedding in the teaching practice (Fawns, 2022). Hence, it is important that development programs are able to account for purposeful and contextual use and in ensuring that consideration of GenAI use, which are likely to help educators establish conceptions of using GenAI that go beyond a technology-led approach.

Conclusion and future directions

Our study made an initial attempt to explore qualitatively different ways of how Australian university teachers conceive of teaching with GenAI. Of the three categories of conceptions (i.e., developing students' understanding, reproducing learning and teaching artefacts, and having limited applications in teaching), only the first category (a third of the participating teachers) was student-centred/learning-focused conceptions (Kember, 1997), which aimed to use GenAI to support students' learning and develop their understanding. However, due to the small sample size, we were unsure about the distribution of student-centred conceptions of teaching with GenAI with a larger sample. Hence, future studies may consider using an open-ended or a

close-ended Likert scale questionnaire to be administered with a larger sample. Research with large samples will also allow researchers to examine how conceptions of teaching with GenAI may be affected by teachers' backgrounds, such as their academic disciplines, years of teaching experience, and academic ranks. This work will provide educators with a framework to utilising GenAI in the classroom to support student-centred learning as well as recommendations for future sector and institutional policy to support the development of GenAI practice within higher education.

References

Chen, C. H., & Tsai, C. C. (2021). In-service teachers' conceptions of mobile technology-integrated instruction: Tendency towards student-centered learning. *Computers & Education*, *170*, 104224. https://doi.org/10.1016/j.compedu.2021.104224

Chen, C. Q., Wang, C. Y., Shan, X. F., Zhan, L., & Chen, S. J. (2024). An empirical investigation of reasons influencing pre-service teachers acceptance and rejection of immersive virtual reality usage. *Teaching and Teacher Education*, *137*, 104391. https://doi.org/10.1016/j.tate.2023.104391

Dehghani, H., & Mashhadi, A. (2024). Exploring Iranian English as a foreign language teachers' acceptance of ChatGPT in English language teaching: Extending the technology acceptance model. *Education and Information Technologies*, 1-22. https://doi.org/10.1007/s10639-024-12660-9

Fawns, T. (2022). An entangled pedagogy: Looking beyond the pedagogy—technology dichotomy. *Postdigital Science and Education*. https://doi.org/10.1007/s42438-022-00302-7

Kember, D. (1997). A reconceptualisation of the research into university academics' conceptions of teaching. *Learning and instruction*, *7*(3), 255-275. https://doi.org/10.1016/S0959-4752(96)00028-X

Han, F., & Ellis, R. A. (2019a). Identifying consistent patterns of quality learning discussions in blended learning environments. *The Internet and Higher Education, 40*, 12-19. https://doi.org/10.1016/j.iheduc.2018.09.002

Han, F., & Ellis, R. A. (2019b). Using phenomenography to tackle key challenges in science education. *Frontiers in Psychology.* https://doi.org/10.3389/fpsyg.2019.01414

Lam, B., & Kember, D. (2006). The relationship between conceptions of teaching and approaches to teaching. *Teachers and Teaching, 12*(6), 693-713. https://doi.org/10.1080/13540600601029744

Marton, F. (1988). Phenomenography: A research approach to investigating different understandings of reality. In R. Sherman & B. Webb (Eds.), *Qualitative research in education* (pp. 141-161). Routledge.

Naimi-Akbar, I., Weurlander, M., & Barman, L. (2023). Teaching-learning in virtual learning environments: a matter of forced compromises away from student-centredness?. *Teaching in Higher Education*. https://doi.org/10.1080/13562517.2023.2201674

Reiss, M. J. (2021). The use of AI in education: Practicalities and ethical considerations. *London Review of Education*. https://doi.org/10.14324/LRE.19.1.05

Sanusi, I. T., Oyelere, S. S., & Omidiora, J. O. (2022). Exploring teachers' preconceptions of teaching machine learning in high school: A preliminary insight from Africa. *Computers and Education Open*, *3*, 100072. https://doi.org/10.1016/j.caeo.2021.100072

Trigwell, K., & Prosser, M. (2020). *Exploring university teaching and learning: Experience and context*. Springer Nature. https://doi.org/10.1007/978-3-030-50830-2

Zhang, K., & Aslan, A. B. (2021). AI technologies for education: Recent research & future directions. *Computers and Education Artificial Intelligence, 2*, 100025. https://doi.org/10.1016/j.caeai.2021.100025

Zhang, C., Schießl, J., Plößl, L., Hofmann, F., & Gläser-Zikuda, M. (2023). Acceptance of artificial intelligence among pre-service teachers: a multigroup analysis. *International Journal of Educational Technology in Higher Education*, *20*(1), 49. https://doi.org/10.1186/s41239-023-00420-7

Han, F., Cook, H., & Ellis, R. (2024). Variations of Australian university teachers' conceptions of teaching with GenAI: A phenomenographic qualitative study. In Cochrane, T., Narayan, V., Bone, E., Deneen, C., Saligari, M., Tregloan, K., Vanderburg, R. (Eds.), *Navigating the Terrain: Emerging frontiers in learning spaces, pedagogies, and technologies*. Proceedings ASCILITE 2024. Melbourne (pp. 465-470). https://doi.org/10.14742/apubs.2024.1203

ASCILITE 2024

Navigating the Terrain:

Emerging Frontiers in Learning Spaces, Pedagogies, and Technologies