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Building Community for Completion: Doctoral Students' Perceptions of Technology Integration within Dissertation Committee Collaboration

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Building Community for Completion: Doctoral Students' Perceptions of Technology

Integration within Dissertation Committee Collaboration

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Abstract

The COVID-19 pandemic highlighted the prevalence of technology-mediated collaboration and mentorship between dissertation committee members and doctoral student scholars. Qualitative research methods were used to explore the role of technology for collaboration and building community within dissertation committees, focusing on dissertation scholars' perspectives. The study was based on one overarching research question: *How do doctoral students describe the integration of technology for collaborating with dissertation committees?* Doctoral scholar participants described the importance of technological literacy within dissertation committees, most indicating that the COVID-19 pandemic exacerbated the importance of fluency with technology. Other participants portrayed the importance of technological literacy within dissertation committees as inevitable, regardless of the pandemic. The study found that doctoral students perceive technology-mediated collaboration as a crucial component for dissertation committee collaboration, creating opportunities for further study and exploration about whether the technological literacy was a factor in dissertation committee selection.

Keywords: Dissertation Process, Dissertation Committee, Adult Technological Literacy, COVID-19 Pandemic

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Digital literacy and technological literacy are increasingly important for scholars (Ince et al., 2019; Maryland Department of Labor Adult Learning, 2021). The emergence of Internet-connected software changed the way doctoral students collaborate, conduct research, and compose dissertation manuscripts (Ince et al., 2019). Prior to the primacy of Internet-connected software, standalone word processing applications and citation management tools contained dissertation processes and content within individual computers, frustrating collaboration (Ince et al., 2019). Web-connected, real-time document editing, online meeting, chat platforms, and other collaboration technologies impact the way scholars conduct research and build community within dissertation committees (Ince et al., 2019). Dissertation scholarship increasingly requires technical fluencies to supplement research and writing capabilities (Ince et al., 2019). The continued diffusion of Internet-connected software enabling efficient, precise scholarship expands the need for doctoral students to acquire adroitness with collaboration technologies (Ince et al., 2019).

Doctoral students and committee supervisors made quick pivots to virtual instruction during the COVID-19 pandemic, utilizing web capability and communication technologies in response to the disruption (Chakma et al., 2021; Guerin & Aitchison, 2021). The onset of the COVID-19 pandemic in early 2020 was a barrier to doctoral student experiences within graduate studies as numerous institutions made the rapid switch from classroom to online and hybrid delivery models (Chakma et al., 2021; Elfman, 2021; Guerin & Aitchison, 2021). The onset of the pandemic fundamentally changed the way doctoral students received mentorship and interrupted the student supervisory process. Thus, technological literacy emerged as an important

competency in transforming the advising and mentoring process for doctoral students (Soltovets, Chigisheva, & Dmitrova, 2019).

Challenges to Doctoral Student Program Completion

Historically, most students that gain acceptance to doctoral programs do not reach degree completion (Guerin & Aitchison, 2021; Rigler et al., 2017). Aside from completing dissertation research and writing, a critical success factor in completing the arduous process is forming meaningful relationships with committee members (Ibrahim, 2018). In fact, rapport with dissertation committee members is the most important success factor (Heinrich, 1991, 1995; Heiss 1970; Spillett & Moisiewicz, 2004; and Zhao, Golde, & McCormick, 2007 as cited by Burrington et al., 2020). Since a roadmap for doctoral success hinges on communication and relationship building with dissertation committee members, it is a concern that the first wave of the pandemic left many graduate students with limited contact to supervisors (Burrington et al., 2020; Chakma et al., 2021).

Supervisory Mentoring as a Core Concept in Doctoral Student Development

Jameson and Torres (2019) explain that the connection between doctoral student and chair exists as one of the most crucial success indicators in the process. Development of a mentor-mentee relationship requires commitment of time, dedication to the dissertation research process and application of knowledge and skills in scholarly writing. Building trust and rapport occurs within the context of social exchanges as value is traded in consulting-style interactions (Blau, 1986; Gruman et al., 2016, Homans, 1961). Investing in interactions and relationships by mentor and mentee requires ongoing communication and commitment from student and supervisor (Blau, 1986; Homans, 1961; Jaldemark & Lindberg, 2013; Jameson & Torres, 2019).

Emerging Impact of Technology on Doctoral Learning

Fluency with technology is necessary for navigating the modern era, including fulfilling education requirements and communicating with dissertation committee members (Burrington et al., 2020; Chakma et al., 2021; Cianca, 2020; Davis et al., 2019; ITEEA, 2020). Optimizing technology-mediated interactions with dissertation committee members requires the ability of both students and committee members to use technology effectively (Elfman, 2021). Dissertation committees are increasingly leveraging virtual mediation for collaboration activities as technology advances (Guerin & Aitchison, 2021). The pandemic accelerated technology integration into doctoral study and forced scholars and committee members to adapt abruptly as the option for in-person interaction was eliminated for most institutions (Guerin & Aitchison, 2021).

Adjusting to remote scholarship requires comfort with using virtual learning and collaboration technologies (Guerin & Aitchison, 2021). Adeptness with technology platforms is also described as digital or technological literacy (ITEEA, 2020; Maryland Department of Labor Adult Learning, 2021; Neves & Henriques, 2020; Rosen, 2020). Technological literacy and digital literacy are similar concepts with subtle differences (ITEEA, 2020; Maryland Department of Labor Adult Learning, 2021; Neves & Henriques, 2020; Rosen, 2020). Digital literacy emerged from library science, focusing on information gathering and application (Maryland Department of Labor Adult Learning, 2021; Neves & Henriques, 2020; Rosen, 2020). Technological literacy originated from industrial arts as practices broadened into technology and digital systems (Moye & Duggar, 2016). Technological literacy concentrates on selection, use, and application of technology systems and design processes, and skills required to implement and use technology competently (ISTE, 2017; ITEEA, 2020; Information Technology Educators

of Minnesota [ITEM], 2019). For the purpose of this study, digital literacy will be considered a component of the more encompassing concept of technological literacy.

Current research related to technology-mediated dissertation development focuses on how feedback is delivered and the mechanics of remote oversight of students' dissertation activities, yet the experiences of students and perceptions of the technological literacy of committee supervisors is unexamined. As Burrington et al. (2020) explicitly asserted, "there is comparatively little literature that examines this [the committee and students] dyad from the point of view of the doctoral student" (p. 10). This study aimed to gather and analyze dissertation scholars' perceptions of technological literacy and electronically mediated collaboration within dissertation committees.

Purpose and Rationale

The purpose of this study was to explore the experiences of doctoral scholars that are in the dissertation development stage of the journey to understand how students perceive technological literacy within dissertation committees in relation to the COVID-19 pandemic. Gaining insight into student perceptions of the role of technology in dissertation committee collaboration within a post-pandemic world will inform education practices for dissertation committee supervisors and committee members.

Theoretical Framework

Framing the study, it is not unusual for social exchange theory to be applied to education, albeit not directly in a dissertation committee context (O'Brien & Kollock, 1991). The lens of this study blends social exchange theory with the idea of technology-mediated supervision for dissertation development (Blau, 1986; Burrington et al., 2020; Homans, 1961; Jaldemark & Lindberg, 2013). Jaldemark & Lindberg's (2013) research focused on undergraduate students, so

it is important to note that the social exchanges and power differentials between supervisors and students at the graduate and undergraduate level may have some variance. Social exchange theory and technology-mediated supervision scaffold the exploration of dissertation collaboration and consulting facilitated with online communication technology.

Literature Review

Examining technological literacy, dissertation development in a virtual environment, and the role of software in dissertation collaboration and development activities provides background necessary to inform the study. Students are expected to significantly advance the existing body of knowledge within their field by working with a dissertation committee (Skakni, 2018). The extensive amount of research and collaboration activities necessary to make a meaningful, novel scholarly contribution involves effort and tools for all parties involved in dissertation activities (Chakma et al., 2021; Elfman, 2021; Ibrahim, 2018).

Online learning requires the intentional creation of support structures to mitigate barriers created by the limitations of virtual conferencing software (Fuller et al., 2014). The lack of in-person, non-verbal communication in the virtual realm may slow the organic growth of bonds between students and faculty committee members (Suhonen & Sutinen, 2014). Considering the importance of the student-committee relationship in dissertation development and successful completion, the advent of broadband-powered multimodal communication technologies introduced the technical capability to create technology-enabled academic networks within doctoral programs (Fuller et al., 2014; Ibrahim, 2018; Heinrich, 1991, 1995; Heiss 1970; Spillett & Moisiejewicz, 2004; and Zhao, Golde, & McCormick, 2007 as cited by Burrington et al., 2020).

Online programs utilize content and software applications accessed via web-enabled devices within students' homes or offices (Ivankova & Stick, 2006). Completing a dissertation

primarily off-campus reduces frequent, tangible prompts and ongoing engagement with the dissertation committee (Burrington et al., 2020; Fuller et al., 2014). Student confidence in committee members, useful feedback, and maintaining the quality of the scholarship are important mechanisms that dissertation supervisors must steward to support successful dissertation completion in a virtual environment (Burrington et al., 2020). Another critical aspect of support for online dissertation scholarship involves moral support via virtual socialization in a psychologically safe space, facilitated by what Chakma et al. (2021) described as a “teaching-mentoring role” assumed by dissertation supervisors (p. 40). Such a role is enabled potently by combinations of learning management software (LMS) systems and online conferencing and collaboration tools, depending on the technological fluency of dissertation supervisors (Chakma et al., 2021).

Technological literacy is fluency, proficiency, and comfort with using, contributing to design, and leveraging technology effectively, both professionally and personally (ITEEA, 2020; Jablansky et al., 2019; Moye, 2019). Technologically literate people consider the implications of technology within social contexts and select, operate, and maintain the ideal tools for various purposes (ITEEA, 2020; Jablansky et al., 2019; Moye, 2019). Individuals fluent with technology are able to select the most effective software tool for a specific need and successfully leverage it to gain the maximum benefit from the tool (ITEEA, 2020; Jablansky et al., 2019; Moye, 2019). Technologically literate dissertation committee supervisors proficiently use software to provide feedback and maintain engagement with students to sustain momentum toward completion (Burrington et al., 2020; ITEEA, 2020).

Research Question

This inquiry was based on one overarching research question: *How do doctoral students describe the integration of technology for collaborating with dissertation committees?*

Research Methods

Qualitative research methods are often used within the social sciences and education (Merriam & Tisdell, 2016). Qualitative methods, employing a phenomenological approach, accommodated the study of doctoral student perceptions of technology integration within dissertation committees. Phenomenology was appropriate as the research approach to describe the essence of doctoral candidates' lived experiences in the context of completing the dissertation (Mohanty, 2011).

Sampling and Participants

The research team used purposeful sampling to recruit participants for the study. The power of purposeful sampling lies in selecting information-rich cases for study (Patton, 1990). Information-rich cases provide depth of qualitative data concerning issues of central importance to the purpose of the research. Thus, the target sample to support the purpose of the study was doctoral students in an Education Doctorate program.

Participation criteria required students to be enrolled and in good standing in a regionally accredited online or hybrid doctoral program. Participants were also required to be actively engaged in the dissertation development process with an established committee.

Data Collection and Analysis

The researchers of the study used surveys to record participant experiences which yielded information-rich data in alignment with the purpose of the research, as well as to address the

research Likert-type survey questions produced insight into doctoral student perceptions of the role of technology within dissertation committee collaboration activities (Gall et al., 2017).

Data analysis consisted of open coding of survey responses. Once initial categories were annotated, the research team used content analysis to identify trends, keywords, and emerging patterns (Merriam & Tisdell, 2016). Content analysis established attitudinal and behavioral responses to survey questions and revealed response patterns to provide thick, rich descriptions of participant experiences of the phenomenon under study.

Findings

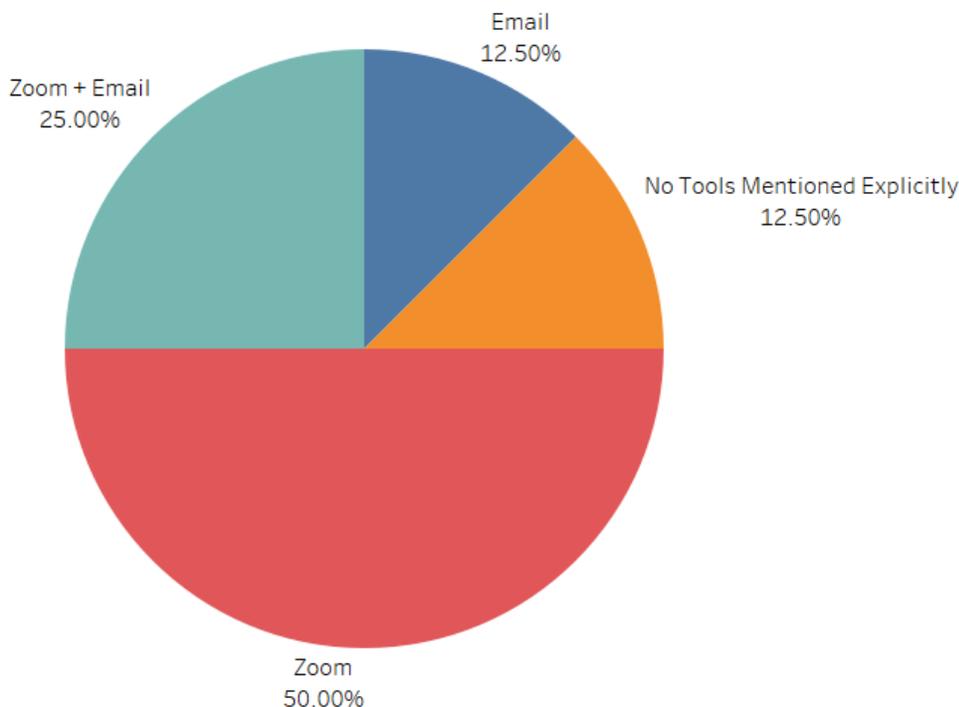
Likert scale survey questions produced insight into doctoral student perceptions of the role of technology within dissertation committee collaboration activities. Most respondents (75%) indicated that the COVID-19 pandemic increased the need for understanding technology to facilitate dissertation committee activities. Some disagreed or strongly disagreed (25%). One respondent that strongly disagreed indicated that the increased use of technology for dissertation collaboration would happen regardless of the pandemic. The other participant that disagreed commented that an online program was explicitly chosen because the use of technology allowed the flexibility necessary to complete the program.

All respondents (100%) either agreed or strongly agreed that their dissertation committee members fluently utilize collaboration technology to engage in dissertation development activities. All respondents (100%) either disagreed or disagreed strongly that the increased use of technology would be a reason to pause dissertation activities until the pandemic subsides.

Specifically, half of the participants (50%) strongly agree that the pandemic created a need for increased use of technology within dissertation committee engagement and activities. Most (75%) of participants agree that their committee uses and is fluent with technology, while

25% strongly agree. Most (75%) of participants strongly disagree that the increased reliance on technology during the pandemic would be a reason to pause studies, while 25% disagree.

Online, synchronous meeting software, such as Zoom, is described as collaboration technology used for dissertation committee collaboration by 75% of survey respondents, with 37.5% mentioning email. Grouping technology-enabled collaboration mediums (see Figure 1), most respondents mentioned synchronous, online conference software (Zoom specifically) in their comments while some respondents mentioned email in addition to Zoom (25%) and one participant only mentioned email (12.5%). One respondent did not mention any collaboration tools specifically but alluded to the choice to engage in online study specifically because it uses technology platforms to facilitate coursework and dissertation development.

Figure 1.*Technology-Mediated Collaboration Methods***Discussion**

Dissertation development and completion depends heavily on building connections and mentor-mentee relationships between students and committee members (Ibrahim, 2018; Jameson & Torres, 2019). Building rapport requires exchanges of value between supervisors and students (Blau, 1986; Homans, 1961; Jaldemark & Lindberg, 2013; O'Brien & Kollock, 1991). The COVID-19 pandemic forced hybrid learning into programs traditionally taught primarily on campus and subsequently into dissertation committee activities (Chakma et al., 2021; Guerin & Aitchison, 2021). Participants in the study suggested that technological literacy and the use of collaboration software is necessary, most agreeing that the pandemic contributed. Others acknowledged the importance of technological fluency in the dissertation development process

while suggesting that the nature of online programs and the general direction of doctoral scholarship were already creating a need for technology-mediated interactions. Better stated, the all participants agreed that the ability to navigate in a technology-mediated world is crucial within dissertation committee interactions. The study also revealed that all participants described dissertation committee members as able to utilize technology to effectively facilitate the dissertation process.

None of the participants would delay dissertation activities until the pandemic subsides to reduce reliance on virtually mediated collaboration. Survey respondents describe synchronous meeting software and asynchronous email communication as tools used for collaborating with dissertation committee members, providing insight into the types of software where fluency was observed. Participants not describing specific collaboration software tools alluded to the use of software by describing the choice to apply to an online program to leverage electronic collaboration tools for the completion of the dissertation process.

There were some limitations to the study. First, the survey was sent to 20 doctoral students meeting criteria outlined to be qualified to participate. Of the 20 students, eight completed the survey, answering all questions. The survey was a blind survey and was fully anonymized. Despite the sample group being a mixture of males and females of varying backgrounds, it is not possible to know which individuals completed the survey. The study was delimited in a few ways that may also impact findings. First, to try to guarantee anonymization and garner acceptable participation and completion rates within a small, busy population (doctoral students in the midst of writing dissertations), the survey did not include demographic questions and was designed to be brief.

The study results suggest that, in a post-COVID-19 world, doctoral students, dissertation supervisors, and committee members should be capable of effectively using technology for dissertation development activities. Elaborating further, confidence with video conferencing software and email are minimum requirements for organizing dissertation collaboration and priming the relationship between the supervisor, committee members, and the student (Blau, 1986; Homans, 1961; Jaldemark & Lindberg, 2013; O'Brien & Kollock, 1991).

There are opportunities for further study. It would be worthwhile to explore whether doctoral students considered technological fluency while selecting committee members or if fluency was present because of adaptations made after the onset of COVID-19. Another future study prospect entails asking probing questions and examining committee member technological literacy and technology use outside of online meeting and email software. Further research should also focus on document reviews and observations of exchanges between dissertation committee supervisors and doctoral students to gain deeper insight into technology-mediated collaboration for dissertation development.

References

- Adhvaryu, A., Kala, N., & Nyshadham, A. (2018). *The skills to pay the bills: Returns to on-the-job soft skills training* (No. w24313; p. w24313). National Bureau of Economic Research. <https://doi.org/10.3386/w24313>
- Aliyu, A. A., Bello, M. U., Kasim, R., & Martin, D. (2014). Positivist and non-positivist paradigm in social science research: Conflicting paradigms or perfect partners? *Journal of Management and Sustainability*, 4(3), p79. <https://doi.org/10.5539/jms.v4n3p79>
- American Association of Community Colleges. (2017). *Community colleges: Addressing the skills gap*. Community College Press.
- Baldwin, R. (2013). Liberal arts colleges are disappearing. *Futurist*, 47(1), 2–2.
- Bariso, J. (2020, August 24). *Google's plan to disrupt the college degree is absolute genius*. Inc.com. <https://www.inc.com/justin-bariso/google-career-certificates-plan-disrupt-college-degree-university-genius.html>
- Blau, P.M. (1986). *Exchange and Power in Social Life* (1st ed.). Routledge.
- Bourdieu, P. (1973). Cultural reproduction and social reproduction. In *Knowledge, education, and cultural change* (pp. 71–112). Tavistock.
- Bourdieu, P. (2021). *Forms of capital*. Polity Press.
- Brinkmann, S., Kvale, S., & Flick, U. (2018). *Doing interviews* (Second edition). SAGE.
- Brown, L., Walser, A. D., & Beharry, R. (2017). Creating Institutional Bridges to Engineering for Underserved Populations: Examining Associate-to-Bachelor Engineering Programs. *Proceedings of the ASEE Annual Conference & Exposition*, 8156–8167.
- Brynjolfsson, E., Horton, J., Ozimek, A., Rock, D., Sharma, G., & TuYe, H.-Y. (2020). *Covid-19 and remote work: An early look at US data* (No. w27344). National Bureau of Economic

- Research. <https://doi.org/10.3386/w27344>
- Bureau of Labor Statistics. (2017). *Employment projections* [Data set]. Bureau of Labor Statistics. <https://www.bls.gov/data/>
- Burrington, D., Madison, R. D., & Schmitt, A. (2020). Dissertation Committee Chairs' Current Practices to Support Doctoral Students in an Online Doctoral Program. *Online Journal of Distance Learning Administration*, 23(3), 1–13.
- Butrymowicz, S., & Kolodner, M. (2020, June 17). *For-profit colleges, long troubled, see surge amid pandemic*. The New York Times. <https://www.nytimes.com/2020/06/17/business/coronavirus-for-profit-colleges.html>
- Calhoun, D. W., Green, L. S., & Burke, P. (2017). Online learners and technology: A gap in higher education and student affairs professional preparation. *Quarterly Review of Distance Education*, 18(1), 45–61.
- Chakma, U., Bingqing Li, & Kabuhung, G. (2021). Creating online metacognitive spaces: Graduate research writing during the COVID-19 pandemic. *Issues in Educational Research*, 31(1), 37–55.
- Chen, C. (2021). Effects of the application of WebQuest to technology education on business management students' critical thinking psychology and operation capability. *Contemporary Educational Technology*, 13(1), 1–8.
- Cianca, S. (2020). *Teaching elementary stem education*. Taylor & Francis.
- Clarke, R. (2020). *Design thinking*. American Library Association.
- Clarke, R. I., Amonkar, S., & Rosenblad, A. (2020). Design thinking and methods in library practice and graduate library education. *Journal of Librarianship and Information Science*, 52(3), 749–763.

- Claudia Neves & Susana Henriques. (2020). Exploring the impacts of distance higher education on adult learners' lives and reclaiming lifelong learning as a human development process. *Open Praxis*, 12(4), 439–456. Directory of Open Access Journals.
<https://doi.org/10.5944/openpraxis.12.4.1084>
- Cook, A., Bechtel, M., Anderson, S., Novak, D., & Nodi, N. (2020, July 21). *What business leaders should know about Web 3.0*. Deloitte Insights.
<https://www2.deloitte.com/us/en/insights/topics/digital-transformation/web-3-0-technologies-in-business.html>
- Couch, J. D., & Towne, J. (2018). *Rewiring education: How technology will help unlock every student's potential*. BenBella Books.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (Fifth edition). SAGE Publications.
- Davis, B., Francis, K., & Friesen, S. (2019). *STEM education by design: Opening horizons of possibility*. Routledge.
- De Vries, M., Fletcher, S., & Kruse, S. (2016). *Technology education today: International perspectives*. Waxmann Verlag GmbH; eBook Academic Collection (EBSCOhost).
- Dewey, J. (1938). *Experience and education*. Free Press.
- Doctor of education core courses*. (n.d.). Winona State University. Retrieved July 3, 2020, from <https://www.winona.edu/doctor-education/courses.asp>
- Doyle, A., Seery, N., & Gumaelius, L. (2019). Operationalising pedagogical content knowledge research in technology education: Considerations for methodological approaches to exploring enacted practice. *British Educational Research Journal*, 45(4), 755–769.

- Du Toit, A. (2020). Threading entrepreneurship through the design process in technology education. *African Journal of Research in Mathematics, Science & Technology Education*, 24(2), 180–191.
- Dweck, C. S. (2009). Mindsets: Developing talent through a growth mindset. *Olympic Coach*, 21(1), 4–7.
- Edgar, T. W. & Manz, D. O. (2017). Exploratory study in Research Methods for Cyber Security. Science Direct, 2017
- Edmundson, A., & Bennett, J. M. (2015). Globalized e-learning. In *The SAGE Encyclopedia of Intercultural Competence*. SAGE Publications.
http://search.credoreference.com/content/entry/sageic/globalized_e_learning/0
- Ekpenyong, L. E., & Edokpolor, J. E. (2018). Constructivist approaches: An emerging paradigm for the teaching and learning of business education. *Nigerian Journal of Business Education (NIGJBED)*, 3(1), 149–158.
- Elfman, L. (2021). A New Normal. *Diverse: Issues in Higher Education*, 37(26), 14–16.
- Erlanson, D. A., Harris, E. L., Skipper, B. L., & Allen, S. D. (1993). *Doing naturalistic inquiry: A guide to methods*. SAGE Publications.
- Evalina, R. T. U., Darmawan, D. S., Vip Paramarta, U. I., Bakri, R., & Farida, D. M. (2021). Effect of organizational learning on the hard skills, soft skills and innovation of employees: Evidence from information technology industries. *Information Technology in Industry*, 9(1), 1085–1098. <https://doi.org/10.17762/itii.v9i1.242>
- Fetherston, M., Cherney, M. R., & Bunton, T. E. (2018). Uncertainty, technology use, and career preparation self-efficacy. *Western Journal of Communication*, 82(3), 276–295.
<https://doi.org/10.1080/10570314.2017.1294704>

- Fuller, J. S., Risner, M. E., Lowder, L., Hart, M., & Bachenheimer, B. (2014). Graduates' reflections on an online doctorate in educational technology. *TechTrends*, 58(4), 73–80. Retrieved June 25, 2020, from <https://doi.org/10.1007/s11528-014-0771-4>
- Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational research: An introduction* (8th ed). Pearson/Allyn & Bacon.
- Guerin, C., & Aitchison, C. (2021). Doctoral writing and remote supervision: What the literature tells us. *Innovations in Education & Teaching International*, 58(6), 624–634. <https://doi-org.wsuproxy.mnpals.net/10.1080/14703297.2021.1991429>
- Guo, F., Kang, N., & Shi, J. (2018). Preparation for the scholar's role: First-year doctoral students in Tsinghua university. *Asia Pacific Education Review*, 19(2), 169–185. Retrieved June 18, 2020, from <https://doi.org/10.1007/s12564-018-9529-6>
- Gous, I. G., Mhichíl, D. M. N. G., Beirne, D. E., & Costello, D. E. (2019). Reimagining future-ready curricula, Teaching and learning in online education. *ICD World Conference on Online Learning*, 1. <https://doi.org/10.5281/zenodo.3804014>
- Guba, E. G. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *ECTJ*, 29(2), 75. <https://doi.org/10.1007/BF02766777>
- Guinan, P. J., Parise, S., & Langowitz, N. (2019). Creating an innovative digital project team: Levers to enable digital transformation. *Business Horizons*, 62(6), 717–727. <https://doi.org/10.1016/j.bushor.2019.07.005>
- Gura, M. (2016). *Make, learn, succeed: Building a culture of creativity in your school*. International Society for Technology in Education.
- Gruman, J. A., Schneider, F. W., & Coutts, L. M. (Eds.). (2016). *Applied social psychology: Understanding and addressing social and practical problems*. SAGE Publications.

- Harel, I., & Papert, S. (1991). *Constructionism: Research reports and essays, 1985-1990* (Massachusetts Institute of Technology, Ed.). Ablex Publishing.
- Heckathorn, D. D. (1997). Respondent-driven sampling: A new approach to the study of hidden populations. *Social Problems*, 44(2), 174–199.
<https://doi.org/10.1525/sp.1997.44.2.03x0221m>
- Hill, L. H., & Conceição, S. O. (2019). Program and instructional strategies supportive of doctoral students' degree completion. *Adult Learning*, 31(1), 36–44. Retrieved June 17, 2020, from <https://doi.org/10.1177/1045159519887529>
- Holmes, B., Willis, K., & Woods, E. (2016). Strategic onboarding of online doctoral students: Creating a pathway to academic persistence. *Asian Journal of Social Sciences and Management Studies*, 3(2), 136. Retrieved June 15, 2020, from <https://doi.org/10.20448/journal.500/2016.3.2/500.2.136.139>
- Homans, G. C. (1961). *Social behavior: Its elementary forms*. Harcourt, Brace.
- Hora, M. T., Benbow, R. J., & Smolarek, B. B. (2018). Re-thinking soft skills and student employability: A new paradigm for undergraduate education. *Change: The Magazine of Higher Learning*, 50(6), 30–37. <https://doi.org/10.1080/00091383.2018.1540819>
- Hwang, G.-J., Chang, S.-C., Chen, P.-Y., & Chen, X.-Y. (2017). Effects of integrating an active learning-promoting mechanism into location-based real-world learning environments on students' learning performances and behaviors. *Educational Technology Research and Development*, 66(2), 451–474. Retrieved June 16, 2020, from <https://doi.org/10.1007/s11423-017-9567-5>
- Hyde, B. (2021). Critical discourse and critical reflection in Mezirow's theory of transformative learning: A dialectic between ontology and epistemology (and a subtext of reflexivity)

- mirroring my own onto-epistemological movement). *Adult Education Quarterly*, 074171362110036. <https://doi.org/10.1177/07417136211003612>
- Ianos, M. G., & Brezeanu, T. (2020). Web 2.0 potential to support soft skills development. *The 16th International Scientific Conference ELearning and Software for Education*. The 16th International Scientific Conference eLearning and Software for Education. <https://doi.org/10.12753/2066-026X-20-162>
- Ibrahim, A. (2018). Directive, collaborative, or non-directive? Thesis supervision approaches in the United Arab Emirates. *Issues in Educational Research*, 28(3), 679–700.
- Ibrahim, R., Boerhannoeddin, A., & Bakare, K. K. (2017). The effect of soft skills and training methodology on employee performance. *European Journal of Training and Development*, 41(4), 388–406. <https://doi.org/10.1108/EJTD-08-2016-0066>
- Ince, S., Hoadley, C., & Kirschner, P. (2019). The role of libraries in teaching doctoral students to become information-literate researchers: A review of existing practices and recommendations for the future. *Information and Learning Sciences*, 120(3), 158–172. <https://doi.org/10.1108/ILS-07-2018-0058>
- Information and Technology Educators of Minnesota. (2019). *ITEM information & technology literacy standards*. [https://www.mnitem.org/resources/Documents/ITEM%20Standards%20\[2019\].pdf](https://www.mnitem.org/resources/Documents/ITEM%20Standards%20[2019].pdf)
- International Society for Technology in Education. (2017). *ISTE standards for students: A practical guide for learning with technology*. International Society for Technology in Education.
- International Technology and Engineering Educators Association. (2012). *Technological design, standard edition—Grades 9-12: A standards-based high school model course guide*

- [PDF]. ITEEA. <https://www.iteea.org/Publications/STEMProducts/141753.aspx>
- International Technology and Engineering Educators Association. (2020). *Standards for technological and engineering literacy: The role of technology and engineering in STEM Education* [PDF]. ITEEA. <https://www.iteea.org/File.aspx?id=177416>
- International Technology and Engineering Educators Association. (2021). *Iteea—Engineering by design*. ITEEA. <https://www.iteea.org/Community/36937/3441.aspx>
- Ivankova, N. V., & Stick, S. L. (2006). Students' persistence in a distributed doctoral program in educational leadership in higher education: A mixed methods study. *Research in Higher Education*, 48(1), 93–135. Retrieved June 15, 2020, from <https://doi.org/10.1007/s11162-006-9025-4>
- Jablansky, S., Alexander, P. A., Dumas, D., & Compton, V. (2020). The development of relational reasoning in primary and secondary school students: A longitudinal investigation in technology education. *International Journal of Technology and Design Education*, 30(5), 973–993. <https://doi.org/10.1007/s10798-019-09529-1>
- Jaldemark, J., & Lindberg, J. O. (2013). Technology-mediated supervision of undergraduate students' dissertations. *Studies in Higher Education*, 38(9), 1382–1392. <https://doi-org.wsuproxy.mnpals.net/10.1080/03075079.2011.626851>
- Johnson, M. (2020). Training for the 21st Century. *Midwest Quarterly*, 61(3), 342–347.
- Juvova, A., Chudy, S., Neumeister, P., Plischke, J., & Kvintova, J. (2015). Reflection of constructivist theories in current educational practice. *Universal Journal of Educational Research*, 3(5), 345–349. <https://doi.org/10.13189/ujer.2015.030506>
- Kane, G. (2019). The Technology Fallacy. *Research-Technology Management*, 62(6), 44–49. <https://doi.org/10.1080/08956308.2019.1661079>

- Kane, G., Andrus, G., Copulsky, J., & Nguyen Phillips, A. (2019). *The technology fallacy: How people are the real key to digital transformation*. The MIT Press.
- Kelley, M., & Salisbury-Glennon, J. (2015). The role of self-regulation in doctoral students' status of all but dissertation (ABD). *Innovative Higher Education*, 41(1), 87–100.
Retrieved June 26, 2020, from <https://doi.org/10.1007/s10755-015-9336-5>
- Kumar, R. (2018). *Research methodology: A step-by-step guide for beginners* (5th edition). SAGE Publications.
- Lewis, T. (1999). Research in technology education—Some areas of need. *Journal of Technology Education*, 10(2), 41–56.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. sage.
- Lynch, M., Kamovich, U., Longva, K. K., & Steinert, M. (2019). Combining technology and entrepreneurial education through design thinking: Students' reflections on the learning process. *Technological Forecasting and Social Change*, 119689.
<https://doi.org/10.1016/j.techfore.2019.06.015>
- MacDonald, A., Wise, K., Tregloan, K., Fountain, W., Wallis, L., & Holmstrom, N. (2020). Designing steam education: Fostering relationality through design-led disruption. *International Journal of Art & Design Education*, 39(1), 227–241.
<https://doi.org/10.1111/jade.12258>
- Marcum, D. (2014). The digital transformation of information, education, and scholarship. *International Journal of Humanities & Arts Computing: A Journal of Digital Humanities*, 8, 1–11.
- Măruñțelu, C.-L. (2020). Constructivism—A pedagogical approach for the 21st century. *Ovidius University Annals, Series Economic Sciences*, 20(2), 401–405.

- Maryland Department of Labor Adult Education. (2021). *Digital literacy framework for adult learners*. Maryland Department of Labor.
<https://www.dllr.state.md.us/gedmd/digitalliteracyframework.pdf>
- McLain, M., Irving-Bell, D., Wooff, D., & Morrison-Love, D. (2019). How technology makes us human: Cultural historical roots for design and technology education. *The Curriculum Journal*, 30(4), 464–483. <https://doi.org/10.1080/09585176.2019.1649163>
- McTighe, J., & Silver, H. (2020). *Teaching for deeper learning: Tools to engage students in meaning making*. ASCD.
- Menano, L., & Fidalgo, P. (2017). *Art and technology: The practice and influence of art and technology in education*. Sense Publishers.
- Mendoza, P. (2007). Academic capitalism and doctoral student socialization: A case study. *The Journal of Higher Education*, 78(1), 71–96. Retrieved June 26, 2020, from <https://doi.org/10.1353/jhe.2007.0004>
- Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation* (4th ed.). Jossey-Bass.
- Mezirow, J. (1990). *Fostering critical reflection in adulthood: A guide to transformative and emancipatory learning*. Jossey-Bass.
- Mohanty, J. N. (201). *Edmund Husserl's Freiburg Years: 1916–1938*. Yale University Press.
- Morris, T. H. (2018). Adaptivity through self-directed learning to meet the challenges of our ever-changing world. *Adult Learning*, 30(2), 56–66.
<https://doi.org/10.1177/1045159518814486>
- Moustakas, C. E. (1994). *Phenomenological research methods*. SAGE Publications.
- Moye, J. J. (2019). Preparing technology- and engineering-literate students—It's not left to

- chance. *Technology & Engineering Teacher*, 78(7), 8–13.
- Moye, J. J., & Duggar, W. E. Jr. (2016). The legacy project: William E. Dugger, Jr., DTE. *Technology and Engineering Teacher*, 36–39.
- Moye, J. J., Reed, P. A., Wu-Rorrer, R., & Lecorchick, D. (2020). Current and future trends and issues facing technology and engineering education in the United States. *Journal of Technology Education*, 32(1), 35–49.
- National Academy of Engineering. (2017). *Engineering technology education in the United States*. The National Academies Press. <https://doi.org/10.17226/23402>
- National Academy of Engineering & National Research Council. (2002). *Technically speaking: Why all Americans need to know more about technology*. The National Academies Press. <https://doi.org/10.17226/10250>
- Neves, C., & Henriques, S. (2020). Exploring the impacts of distance higher education on adult learners' lives and reclaiming lifelong learning as a human development process. *Open Praxis*, 12(4), 439. <https://doi.org/10.5944/openpraxis.12.4.1084>
- Niu, Y., Hunter-Johnson, Y., Xu, X., & Liu, T. (2019). Self-perceived employability and subjective career success: Graduates of a workforce education and development program. *The Journal of Continuing Higher Education*. *The Journal of Continuing Higher Education*, 67(2–3), 55–71. <https://doi.org/10.1080/07377363.2019.1660843>
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16(1), 160940691773384. <https://doi.org/10.1177/1609406917733847>
- O'Brien, J. A., & Kollock, P. (1991). Social Exchange Theory as a Conceptual Framework for Teaching the Sociological Perspective. *Teaching Sociology*, 19(2), 140–153.

<https://doi.org/10.2307/1317845>

- Parker, A. (2011, November). Soft skills: A case for higher education and workplace training. *T+D*, 65(11), 16–16.
- Patton, M. (1990). *Qualitative Evaluation and Research Methods*. Sage.
- Patton, M. Q. (2014). *Qualitative research & evaluation methods: Integrating theory and practice*.
- Paulus, T. M., & Lester, J. N. (2021). *Doing qualitative research in a digital world*. SAGE Publications.
- Peláez, M. J., Coe, C., & Salanova, M. (2020). Facilitating work engagement and performance through strengths-based micro-coaching: A controlled trial study. *Journal of Happiness Studies*, 21(4), 1265–1284. <https://doi.org/10.1007/s10902-019-00127-5>
- Piaget, J. (1957). *The construction of reality in the child*.
<http://www.vlebooks.com/vleweb/product/openreader?id=none&isbn=9781136316944>
- Posselt, J. (2018). Normalizing struggle: Dimensions of faculty support for doctoral students and implications for persistence and well-being. *The Journal of Higher Education*, 89(6), 988–1013. Retrieved June 15, 2020, from <https://doi.org/10.1080/00221546.2018.1449080>
- Putman, S. M., & Rock, T. (2018). *Action research: Using strategic inquiry to improve teaching and learning*. SAGE Publications.
- Reardon, R. M., & Leonard, J. (Eds.). (2019). *Integrating digital technology in education: School-University-Community collaboration*. Information Age Publishing.
- Rigler, K., Bowlin, L., Sweat, K., Watts, S., & Throne, R. (2017). *Agency, socialization, and support: A critical review of doctoral student attrition* [Paper presentation]. 3rd

- International Conference on Doctoral Education, University of Central Florida, Orlando, FL, United States.
- Rogers-Shaw, C., & Carr-Chellman, D. (2018). Developing care and socio-emotional learning in first year doctoral students: Building capacity for success. *International Journal of Doctoral Studies*, 13, 233–253. Retrieved June 17, 2020, from <https://doi.org/10.28945/4064>
- Rosen, D. (2020). Assessing and teaching adult learners' basic and advanced 21st century digital literacy skills. *Adult Literacy Education: The International Journal of Literacy, Language, and Numeracy*, 73–75. <https://doi.org/10.35847/DRosen.2.1.73>
- Sahin, Y. G., & Celikkan, U. (2020). Information technology asymmetry and gaps between higher education institutions and industry. *Journal of Information Technology Education*, 19, 339–365.
- Sakai-Miller, S. (2015). *Innovation age learning: Empowering students by empowering teachers*. International Society for Technology in Education.
- Santicola, L. (2013). Pressing on: Persistence through a doctoral cohort program in education. *Contemporary Issues in Education Research (CIER)*, 6(2), 253. Retrieved June 22, 2020, from <https://doi.org/10.19030/cier.v6i2.7736>
- Skakni, I. (2018). Doctoral studies as an initiatory trial: Expected and taken-for-granted practices that impede PhD students' progress. *Teaching in Higher Education*, 23(8), 927–944. Retrieved June 18, 2020, from <https://doi.org/10.1080/13562517.2018.1449742>
- Snape, P. (2017). Enduring learning: Integrating C21st soft skills through technology education. *Design and Technology Education*, 22(3).
- Snyder, M. (2018). A century of perspectives that influenced the consideration of technology as

- a critical component of STEM education in the United States. *Journal of Technology Studies*, 44(2), 42–56.
- Suhonen, J., & Sutinen, E. (2014). The four pillar model-analysing the sustainability of online doctoral programmes. *TechTrends*, 58(4), 81–88. Retrieved June 24, 2020, from <https://doi.org/10.1007/s11528-014-0772-3>
- U.S. Department of Education. (2021). *Science, technology, engineering, and math, including computer science*. U.S. Department of Education. <https://www.ed.gov/stem>
- Volk, K. (2019). The demise of traditional technology and engineering education teacher preparation programs and a new direction for the profession. *Journal of Technology Education*, 21(1), 2–18.
- Vygotskij, L. S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, Ed.; Nachdr.). Harvard University Press.
- White, M. G. (2020). Why human subjects research protection is important. *Ochsner Journal*, 20(1), 16–33. <https://doi.org/10.31486/toj.20.5012>
- Wolcott, H. F. (2009). *Writing up qualitative research* (3rd ed). SAGE Publications.
- Yohana, A., & Wijiharta, W. (2021). Integrated college student soft skills development strategy: Literature review. *Youth & Islamic Economic Journal*, 2(1), 13–27.