Perception of Eswatini Teachers about Effectiveness of online course "Certificate in Online Teaching for Educators"

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Abstract

This study evaluated the impact of a 6-week fully online Certificate in Online Teaching for Educators (COTE) program on graduates' teaching practices. A survey was distributed to 350 COTE graduates, with 24 respondents completing the questionnaire. Results showed that most participants applied learnings from COTE to their teaching including designing online lessons, creating multimedia resources, facilitating virtual classes, using new educational technologies, implementing authentic assessments and providing meaningful feedback. Over 70% of respondents felt more confident facilitating online learning, better able to engage students virtually, and expanded their knowledge of online pedagogy after completing COTE. The findings suggest that despite its short duration, COTE positively influenced graduates' preparedness and skills in key areas of online instruction. However, the low response rate limits generalizability. Further research with larger samples is needed to corroborate the impact of COTE on online teaching practices.

Keywords: *Teaching practices, short course in online teaching for educators, impact study, Eswatini*

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Introduction

Providing high-quality education in the open, distance, and e-learning (ODeL) modality has become increasingly crucial, especially in resource-constrained countries like Eswatini. Student satisfaction is a vital measure of educational effectiveness, as it reflects the institution's ability to engage and support learners throughout their academic journey (Ferreira-Meyers, 2023). However, beyond just satisfaction, it is essential to understand the impact of educational programs on the professional practices of the students, particularly in the case of educator training.

The Institute of Distance Education (IDE) at the University of Eswatini offers a unique six-week, fully online Certificate in Online Teaching for Educators course. This program aims to equip in-service teachers and lecturers with the necessary skills to effectively design, facilitate, and evaluate online learning experiences. Evaluating the impact of this course on the participants' teaching practices, including their integration of digital media, online facilitation and discussion, and assessment strategies, is crucial for understanding the program's effectiveness and identifying areas for improvement.

Surveys are a common and effective method employed by institutions like IDE to assess the impact of their educational programs. By gathering feedback from students, these surveys provide valuable insights into the learners' perceptions of how their learning experiences have influenced their professional development and classroom practices. This feedback serves as a quality assurance mechanism, enabling universities and stakeholders to identify and address any gaps or areas requiring improvement before they adversely impact the institution's reputation and enrollment figures. Furthermore, regularly monitoring survey responses keeps educators informed about advancements in technology-related fields and provides valuable insights into best practices for teaching online courses. This information is particularly relevant in the context of Eswatini, where the demand for accessible and effective ODeL solutions continues to grow, driven by the need to expand educational opportunities and address the challenges posed by resource constraints.

The rapid shift to online education due to global events has created a pressing need for educators to develop skills in online teaching. While short online courses like the Certificate in Online Teaching for Educators (COTE) have been developed to address this need, there is limited understanding of how effectively these courses prepare educators for online instruction, particularly in the context of Eswatini. This study aims to address this gap by evaluating the impact of the COTE program on graduates' teaching practices and confidence in online instruction.

In this short study, the researchers aim to assess the impact of the IDE's Certificate in Online Teaching for Educators course on the participants' teaching practices, with a focus on their application of the knowledge and skills gained during the program. The findings of this study will contribute to the ongoing efforts to enhance the quality and relevance of ODeL programs in Eswatini and similar contexts, ultimately supporting the professional development of educators and improving educational outcomes for students.

Literature Review

Since the early 2020's a number of interesting studies discuss online teacher training programs and their impact. For example, the Erasmus+ training program "Online course design

and tutoring", reported by Đenić et al. (2022) successfully motivated vocational teachers to participate and successfully complete it, improving their professional, pedagogical, and technological competencies. In a study undertaken in Nepal, Joshi et al. (2023) noted that online training effectively enhances digital pedagogical skills in remote area teachers, with gender, qualification, and teaching level playing a role in their improvement. Earlier on, Vilppu et al. (2019) discovered that participation in a brief online pedagogical training program led to a transformation in how university instructors interpreted teaching and learning situations. Importantly, Haarala-Muhonen (2023) observed that pedagogical training enhances teachers' learning-focused approach to online teaching and diverse use of digital tools, while ICT training has no significant impact on digital tool use. This also suggests that short online training programs have the potential to influence teaching practices positively. Marrero et al. (2010) demonstrated that educators found live, online short courses to be valuable for professional development, particularly in terms of collaboration and flexibility. Leoste et al. (2022) gave evidence on how online STEAM teacher training programs effectively enhance early childhood teachers' digital competences and achieve learning outcomes in a shorter period compared to in-person courses. Sieber (2005) emphasized the significance of effective online teaching practices, with a focus on learning processes and student engagement. Others like Navarro and McGrath (2022) and Yelne (2022) stressed the importance of well-designed course content, instructor support, and the creation of an online learning community for effective online instruction. Lastly, Galikhanov and Khasanova (2019) pointed out that the success of online teaching primarily depends on the quality of the faculty involved. In summary, these research papers collectively suggest that short online courses can significantly enhance online teaching skills by altering interpretations of teaching-learning situations, offering professional development opportunities, highlighting effective teaching practices, and prioritizing course design and instructor support.

Borup et al. (2020) examined a 5-week fully online professional development course for instructors in the western United States. Earlier, Herman (2012) looked at a 6-week online teaching certificate programme offered by a virtual university in the Midwest United States. McConnell et al. (2013) studied a fully online 5-week teaching course for instructors across disciplines at a Canadian university. These are all comparable to the fully online 6-week COTE programme in Eswatini when it comes to their duration and the online format of the training. Rhodes and Bond (2020) interviewed faculty who completed a fully online 6-week teaching certificate programme at an Australian university. All the previously mentioned studies evaluated short online professional development courses in higher education contexts, ranging from 5-6 weeks in duration. This is directly comparable to the 6-week fully online COTE programme offered in Eswatini.

COTE Course: Approach, Development, Content and Delivery Mode

The COTE (Certificate in Online Teaching for Educators) program is a unique six-week, fully online professional development course offered by the Institute of Distance Education (IDE) at the University of Eswatini. The program is designed to equip in-service teachers and lecturers with the necessary skills to effectively design, facilitate, and evaluate online learning experiences.

The program's design is informed by research on the characteristics of effective continuing professional development (CPD) programs. It incorporates five out of the seven key

characteristics identified in the literature, including teachers participating as a group, endorsing their participation, opportunities for reflection and feedback, involving outside expertise, and providing active learning opportunities to apply what they have learned. The program does not, however, include sustained CPD over time or focus on subject-specific knowledge.

The COTE program is delivered entirely online using the Moodle learning management system, with additional support and community-building through the use of WhatsApp. This approach aligns with the growing trend of teachers participating in and receiving professional development through digital mediums, as highlighted by recent research. Additionally, the program's design involves teachers in the development and implementation process, a characteristic of successful CPD programs.

The COTE program consists of four modules, each focusing on a different aspect of online teaching and learning: designing and developing online courses, creating digital learning materials, developing online facilitation skills, and creating authentic online assessments. The content of these modules is informed by the latest research on effective instructional approaches, opportunities for reflection and collaboration, and the inclusion of built-in feedback and follow-up.

The program was initially piloted with 11 participants from the University of Eswatini and schools across the country, representing primary, secondary, and tertiary education levels. The pilot phase allowed the design team to observe the participants' interactions, gather feedback, and make necessary adjustments before the program's full implementation. This iterative approach to program development aligns with the literature's recommendation that all stakeholders should work in cycles of examining data, setting goals, evaluating, reflecting, and revising to ensure maximum teaching and learning outcomes.

Kirkpatrick and Kirkpatrick's 2016 Evaluation Model

The evaluation model that appears most applicable to this study is the Kirkpatrick Four-Level Training Evaluation Model (2016), which is particularly well-suited for assessing the effectiveness of training programs like the Certificate in Online Teaching for Educators (COTE). While the study does not explicitly address Level 1 (Reaction), it aligns closely with Level 2 (Learning) by assessing participants' expanded knowledge of online pedagogy and educational technologies. The primary focus of the study corresponds to Level 3 (Behavior), evaluating how participants applied COTE learnings to their teaching practices. Level 4 (Results) is indirectly addressed through the assessment of educators' increased confidence and ability to engage students virtually. The study also incorporates elements of outcome-based evaluation by focusing on specific program outcomes, formative evaluation in its potential to improve future COTE iterations, and self-report evaluation through its reliance on participants' self-reported data. This multi-faceted approach, primarily guided by the Kirkpatrick model but incorporating aspects of other evaluation methods, allows for a comprehensive assessment of the COTE program's effectiveness, providing a rich understanding of its impact on participants' teaching practices and confidence in online instruction.

Research Objectives

The objectives of the study were:

1. To evaluate the extent to which graduates of the Certificate in Online Teaching for Educators (COTE) program apply the knowledge and skills gained from the course in their teaching practices.
2. To assess the impact of the COTE program on graduates' confidence in facilitating online learning and engaging students in virtual environments.
3. To identify specific areas of online pedagogy that COTE graduates report as having improved as a result of completing the program.
4. To explore any challenges or limitations graduates face in applying COTE learnings to their teaching contexts.
5. To gather insights on potential improvements or additional components that could enhance the COTE program's effectiveness in preparing educators for online teaching.

Research Questions

The research questions for this study are given below:

1. To what extent do COTE graduates apply the knowledge and skills gained from the program in their online teaching practices?
2. How has completing the COTE program influenced educators' confidence in facilitating online learning and engaging students virtually?
3. What specific aspects of online pedagogy do COTE graduates report as having improved as a result of the program?
4. What are the perceived strengths and limitations of the COTE program in preparing educators for online teaching?
5. How does the impact of COTE vary among educators with different levels of prior experience in online teaching?
6. What additional support or training do COTE graduates feel they need to further enhance their online teaching skills?

Research Methodology

This study was a cross-sectional survey study. A non-probability sampling technique i.e., convenience sampling, was used as participants were selected based on their completion of the program rather than being randomly selected from a larger population. The sample size of 350 is adequate for the scope of the study, considering it represents a diverse group of participants from various educational settings and backgrounds.

Data Collection Instrument: Data for this study were collected using an online survey created with Google Forms. The survey consisted of 20 multiple-choice questions relating to various aspects of online teaching and the perceived impact of the programme. The data collection procedure involved distributing the survey electronically to the 350 graduates through their provided contact information in WhatsApp groups previously used for course interaction. While this method ensures convenient access to the survey for the target population, it may introduce bias, as only graduates who were part of these WhatsApp groups and had provided contact information would have received the survey.

Data Collection Procedure: The survey was distributed electronically to the 350 graduates through their provided contact information in the WhatsApp groups previously used to interact with the participants during the course. An introductory message explained the purpose of the survey and provided a link to access the Google Forms survey.

Informed Consent: Participants were informed of the voluntary nature of their participation and the assurance of data confidentiality. They were required to provide informed consent before proceeding with the survey.

Survey Completion: Participants were given adequate time to complete the survey, and reminders were sent as necessary to maximize response rates. The survey was accessible via computer or mobile devices.

Low Response Rate: Despite the distribution to 350 potential participants, only 24 individuals responded to the survey. Several factors could contribute to this notably low response rate:

(i) *Survey Fatigue:* Participants may have previously received multiple surveys or communication from the program, potentially leading to survey fatigue, which can reduce response rates.
(ii) *Time Constraints:* The timing of the survey may not have been optimal for many participants due to their teaching commitments, administrative duties, or other personal and professional responsibilities.
(iii) *Lack of Incentives:* The survey may not have offered incentives or rewards for participation, which can influence response rates.
(iv) *Non-Responsive Sample:* The initial WhatsApp message may not have been read by all 350 graduates, as contact information may become outdated over time, leading to a non-responsive sample.

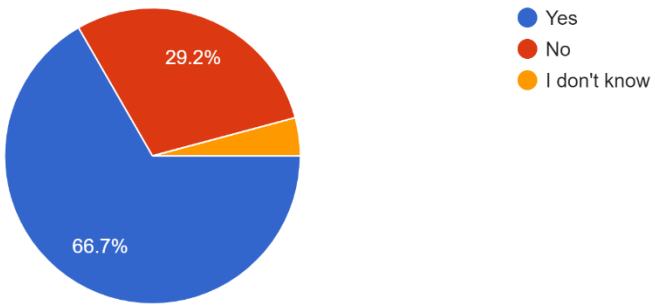
Ethics: The study adhered to ethical guidelines, ensuring participants' anonymity and confidentiality. Informed consent was obtained and no personal identifying information was collected. Data were used solely for research purposes.

Results

Below are the raw data as extracted from Google Forms and a discussion on the importance and relevance of the research findings.

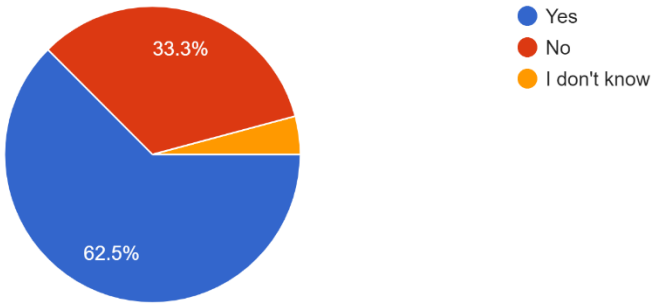
1. Overall, have you applied much of what you learned in COTE to your teaching?

24 responses



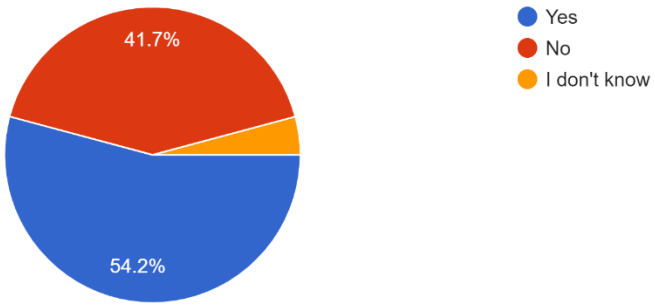
2. Have you designed any online lessons since completing the COTE program? Yes/No/I don't know

24 responses



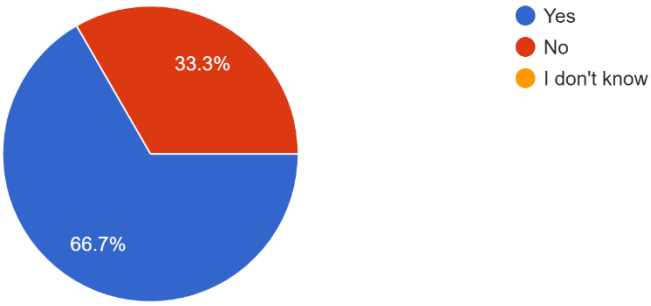
3. Have you created multimedia resources to integrate into online instruction?

24 responses



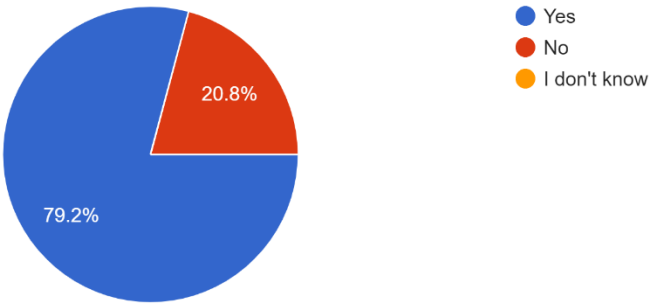
4. Have you facilitated any virtual classes since finishing COTE?

24 responses



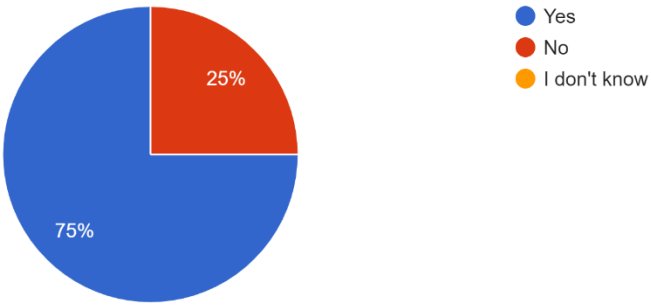
5. Do you feel more confident facilitating online learning after COTE?

24 responses



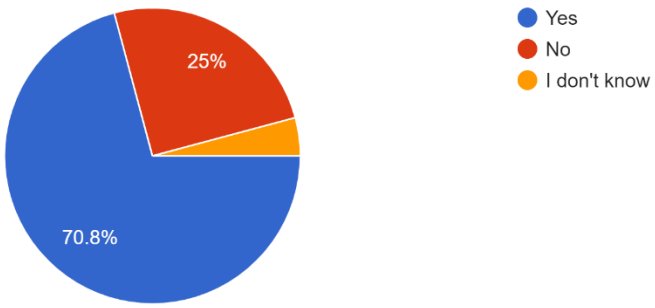
6. Have you used any collaboration tools virtually that you learned about in COTE?

24 responses



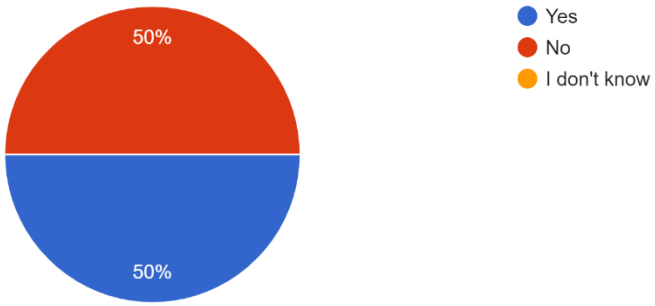
7, Have you used any new educational technologies for online teaching that you learned in COTE?

24 responses



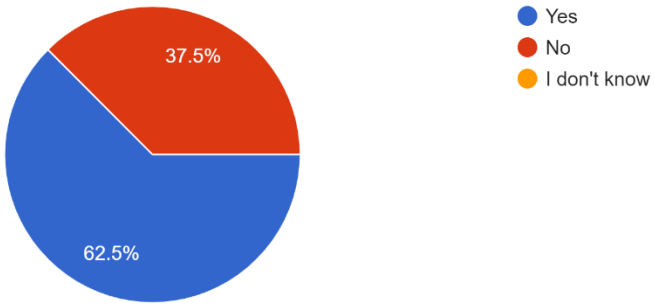
8. Have you designed any authentic online assessments since COTE?

24 responses



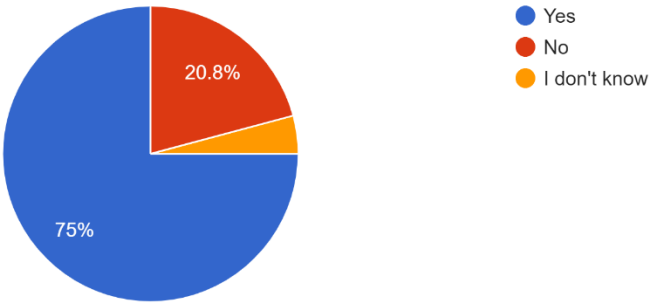
9. Have you implemented any of the online assessment methods covered in COTE?

24 responses



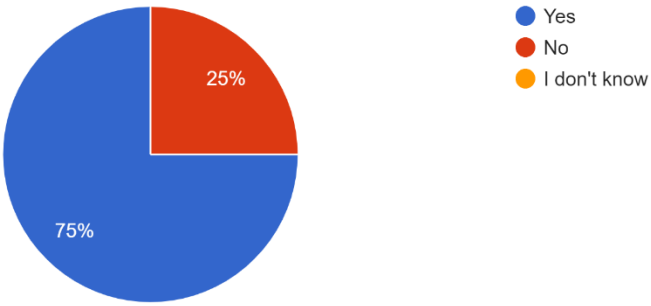
10. Do you provide more personalised feedback on student work after COTE?

24 responses



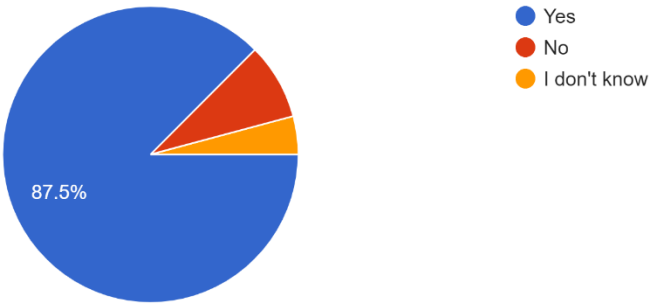
11. Are you able to better engage students/learners in the online environment after COTE?

24 responses



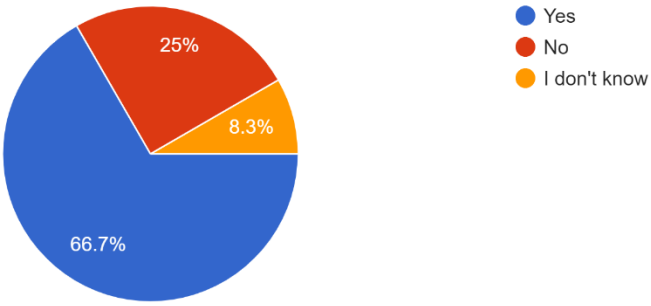
12. Do you use more learner-centered approaches than before COTE?

24 responses



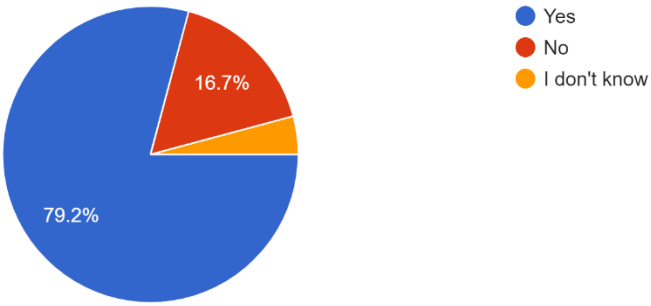
13. Are your online materials more accessible and inclusive after learning from COTE?

24 responses



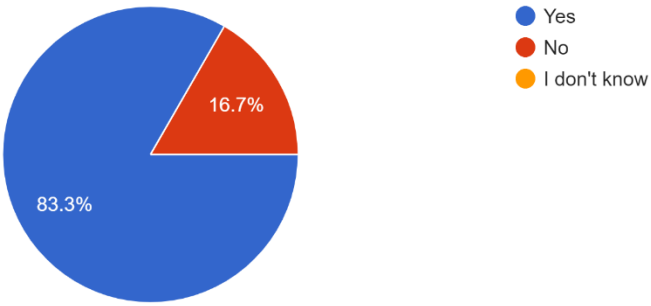
14. Are you able to resolve common technical issues better after participating in COTE?

24 responses



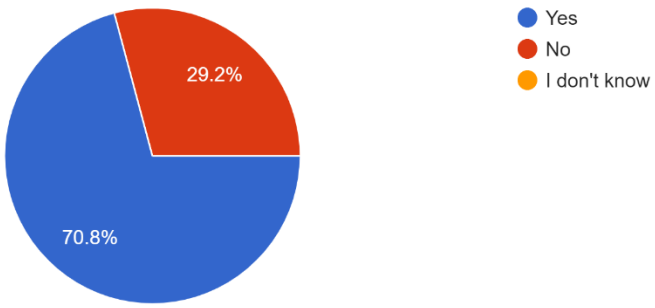
15. Do you have expanded knowledge of online pedagogy from COTE?

24 responses



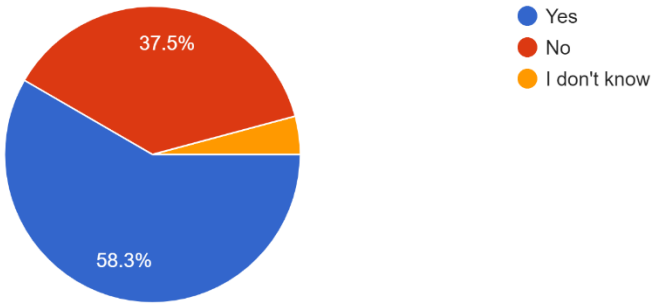
16. Are you able to apply your learning from COTE to blended contexts too?

24 responses



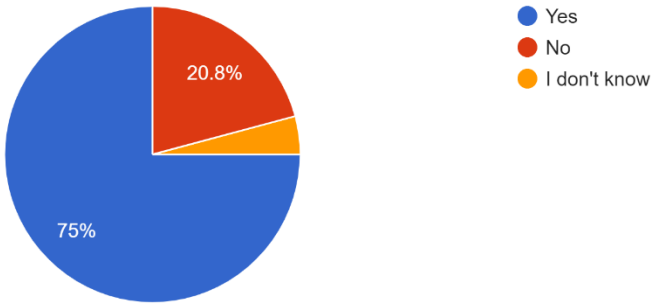
17. Do you use any course design methods from COTE for your current teaching?

24 responses



18. Has your social, teaching, and cognitive presence online increased based on COTE?

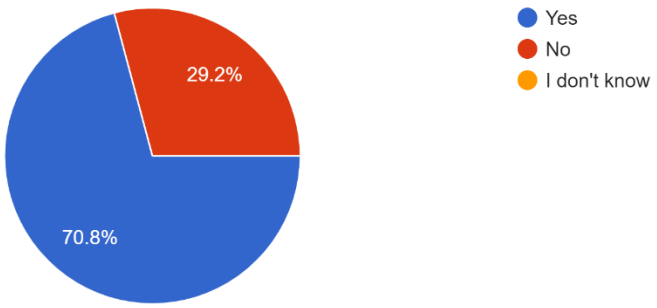
24 responses



Martin (2018) revealed that timely response to questions and feedback on assignments were perceived as highly helpful facilitation strategies for establishing instructor presence, connection, engagement, and learning. Participants seemingly mirror what they have seen modelled in the COTE course.

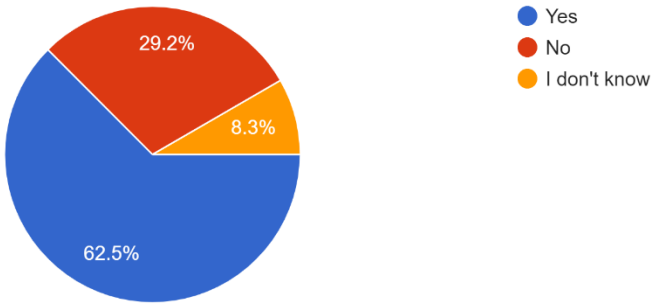
19. Are you able to design more meaningful online discussions after COTE?

24 responses



20. Do you provide better feedback on online assignments after COTE?

24 responses



In total,16 respondents (66,7%) said they have applied much of what they learned in COTE to their teaching whereas 15 respondents (64,5%) have designed online lessons since completing COTE. Thirteen (13) respondents (54,2%) have created multimedia resources for online instruction after COTE and 16 respondents (66,7%) have facilitated virtual classes since finishing COTE. Eighteen (18) respondents (75%) feel more confident facilitating online learning after completing COTE and 17 respondents (70,8%) have used new collaboration tools virtually that they learned about in COTE. Twelve (12) respondents (50%) have used new educational technologies for online teaching from COTE whereas 14 respondents (62,5%) have designed authentic online assessments since taking COTE. Eighteen (18) respondents (75%) have implemented online assessment methods from COTE and 18 respondents (75%) provide more personalized feedback after COTE. Twenty-one (21) respondents (87,5%) are better able to engage students online after COTE and 16 respondents (66,7%) use more learner-centered approaches after taking COTE. Nineteen (19) respondents (79,2%) have more accessible/inclusive online materials after COTE and 20 respondents (83.3%) are better at resolving technical issues after COTE. Seventeen (17) respondents (70,8%) have expanded knowledge of online pedagogy from COTE whereas 14 respondents (58,3%) can apply COTE learnings to blended contexts. Eighteen (18) respondents (75%) use course design methods from COTE in their teaching and 17 respondents (70,8%) have increased online social, teaching, and cognitive presence after COTE. In total, 15 respondents (62,5%) can design more meaningful online discussions after completing COTE.

Discussion

While the study's low response rate limits generalizability, it provides valuable preliminary evidence of the positive impact of COTE on participants' teaching practices. Recommendations for future research include strategies to increase survey response rates, conducting follow-up studies with larger samples, and exploring differences in program impact based on participants' backgrounds and contexts. Additionally, examining sustained changes in teaching practices over time and identifying specific components of COTE's curriculum that most influence online pedagogical readiness will contribute to further program improvement and effectiveness.

This study demonstrated that a majority of COTE graduates applied skills and knowledge from the 6-week online program to their own teaching practices. Over 75% of respondents reported increased confidence facilitating online learning, while 70% expanded their online pedagogy knowledge. These findings align with previous research showing that short online training courses can enhance online teaching readiness (Herman, 2012; Rhodes & Bond, 2020).

Specifically, the results show that over 75% of respondents reported increased confidence in facilitating online learning, expanded knowledge of online pedagogy, and improved ability to engage students virtually after completing COTE. Additionally, a significant portion of participants integrated new educational technologies, designed online lessons and multimedia resources, facilitated virtual classes, and implemented authentic assessments. These findings align with previous research highlighting the effectiveness of short online training courses in enhancing educators' digital competence and readiness for online teaching roles.

The integration of course design methods, collaboration tools, and inclusive online materials by 70-75% of respondents underscores the importance of well-designed online courses and meaningful learner engagement. The integration of new educational technologies and authentic assessments by over 60% of participants also reflects improved digital competence, comparable to outcomes from similar short online teaching programs as supported by Borup et al. (2020) and McConnell et al. (2013), who discussed the positive outcomes of short-duration online training courses in enhancing educators' digital competence. Furthermore, the ability of 75% of participants to provide personalized feedback reflects the value of COTE's emphasis on quality facilitation strategies. These results align with literature emphasizing the significance of factors such as course quality, student-instructor interaction, and perceived value in online teaching effectiveness. This corroborates existing evidence that effective online teaching requires well-designed online courses, meaningful learner engagement and collaboration, and attention to accessibility. For example, Martin (2018) and Sieber (2005) both emphasized the importance of course design, learner engagement, and collaboration in effective online teaching.

In addition, 70-75% of respondents indicated applying course design methods from COTE, using new collaboration tools virtually, and designing accessible and inclusive online materials. The fact that 75% of participants indicate that they are able to provide personalized feedback after participating in the program further demonstrates the value of COTE's modelling of quality facilitation strategies. This statement reflects the discussion in Martin (2018), which highlights the significance of timely feedback and interaction for effective online teaching practices.

Li et al. (2021) identified that factors such as service quality, course quality, student-instructor interaction, and perceived value can influence learners' continuance intentions and retention in online learning.

The evaluation of the Certificate in Online Teaching for Educators (COTE) program can be effectively analyzed using Kirkpatrick's 2016 four-level evaluation model, providing a comprehensive assessment of its impact on participants' teaching practices.

> Level 1 - Reaction: While not explicitly measured in this study, the positive feedback and high application rates suggest that participants reacted favorably to the COTE program. Future research could include immediate post-course surveys to capture participants' initial reactions more directly.
>
> Level 2 - Learning: The study demonstrates significant learning outcomes, with over 70% of respondents reporting expanded knowledge of online pedagogy. This aligns with Kirkpatrick's second level, indicating that COTE effectively transferred knowledge to participants.
>
> Level 3 - Behavior: This level is strongly evidenced in the study's findings. A majority of COTE graduates applied skills and knowledge from the program to their teaching practices. Over 75% of respondents integrated course design methods, used new collaboration tools, and designed accessible online materials. Additionally, 60% implemented new educational technologies and authentic assessments. These behavioral changes reflect the successful transfer of learning to on-the-job application, a key indicator in Kirkpatrick's model.
>
> Level 4 - Results: While the study does not directly measure organizational results or student outcomes, it provides indirect evidence of potential impact. The increased confidence in facilitating online learning (reported by over 75% of respondents) and improved ability to engage students virtually suggest positive outcomes that could lead to enhanced student learning experiences. Future research could focus more explicitly on this level by examining student performance or institutional metrics.

The study's findings align with Kirkpatrick's 2016 model, demonstrating the COTE program's effectiveness across multiple levels of evaluation. The high rates of skill application and reported improvements in key competencies suggest that the program successfully moves beyond mere reaction and learning to actual behavioral change in teaching practices.

While the findings suggest an overall positive impact on graduates' teaching practices, the low survey response rate means results may not represent perceptions of the entire population of 350 COTE graduates. Follow-up research with larger samples could strengthen the evidence regarding the benefits of COTE for enhancing online pedagogical readiness. Nonetheless, this initial study contributes valuable insights into participants' perceived improvements in key online teaching competencies after completing the 6-week program.

There are some limitations to the study, namely that the study's low response rate may limit the generalizability of the findings to the broader population of program graduates. The study relied on self-report data, which may be subject to response bias. The methodology employed in this study involved surveying 24 graduates of the Certificate in Online Teaching for

Educators program using Google Forms. While the response rate was notably low, data analysis aimed to provide valuable insights into the effectiveness of the program in improving participants' online teaching skills and practices. Despite the limitations associated with the response rate, the study's findings still contribute to the understanding of the impact of the program on graduates' online teaching readiness

Conclusion

This study explored the perceived impact of a 6-week fully online Certificate in Online Teaching for Educators (COTE) program on graduates' teaching practices and skills. Despite the limited sample size due to a low survey response rate, the findings suggest that COTE positively influenced participants' preparedness for key aspects of online instruction. A majority of respondents reported applying learnings from COTE to enhance their online course design, facilitation, assessment, and use of educational technologies. Over 70% felt more confident teaching online, expanded their knowledge of online pedagogy, and improved their ability to actively engage learners virtually after completing the program.

While the low response rate affects generalizability, the study provides preliminary evidence that even short-duration online training can increase educators' competence and readiness for online teaching roles. Follow-up research with more robust samples is recommended to further investigate the impact of COTE and corroborate the current findings. Nonetheless, the study offers valuable insights into participants' perceptions of how a 6-week online certificate program helped develop their skills in critical areas of online teaching and course delivery.

A number of recommendations are noted below. First, it would be useful to find a way to increase the survey response rates in future studies by incentivizing participation, ensuring current contact details, and minimizing survey fatigue. Because new iterations of the COTE program delivery are taking place since the date of this publication, it is necessary to conduct follow-up research with larger samples of COTE graduates to improve generalizability of findings regarding the program's impact. Further, expanding data collection methods beyond self-report surveys to include interviews, focus groups, or observations will improve the generalizability of the study. In addition, it would be essential to examine differences in COTE's impact based on participants' educational contexts, backgrounds, and prior online teaching experience. Also, exploring long-term or sustained changes to teaching practices over time after completing COTE and identifying specific components of COTE's curriculum and instructional design that most influence online pedagogical readiness will yield interesting results and allow the program to undergo further transformation in order to better serve the client base. In line with this, I would like to investigate how enhancements to COTE could further increase graduates' preparation for online teaching roles, by also conducting non-parametric tests and analyze disaggregated data with respect to demographic variables to provide more robust insights.

References

Đenić, S., Petrovic, V., & Štrbac-Savić, S. (2022). Vocational Teacher Training in Online Course Design and Tutoring: Motivating Teachers to Participate in the E-training. Proceedings TIE 2022. https://doi.org/10.46793/tie22.341q.

Ferreira-Meyers, K. (2023). Importance of measuring student experience in a short online course for educators. Advances in Online Education: A Peer-Reviewed Journal, 2(1), 71-81.

Galikhanov, M.F., & Khasanova, G.F. (2019). Faculty Training for Online Teaching: Roles, Competences, Contents. Higher Education in Russia.

Haarala-Muhonen, A., Myyry, L., Pyörälä, E., Kallunki, V., Anttila, H., Katajavuori, N., Kinnunen, P., & Tuononen, T. (2023). The impact of pedagogical and ICT training in teachers' approaches to online teaching and use of digital tools. *Frontiers in Education*. https://doi.org/10.3389/feduc.2023.1223665.

Joshi, D., Adhikari, K., Chapai, K., & Bhattarai, A. (2023). Effectiveness of online training on digital pedagogical skills of remote area teachers in Nepal. *International Journal of Professional Development, Learners and Learning*. https://doi.org/10.30935/ijpdll/13666.

Kirkpatrick, J. D., & Kirkpatrick, W. K. (2016). Kirkpatrick's four levels of training evaluation. Association for Talent Development.

Leoste, J., Lavicza, Z., Fenyvesi, K., Tuul, M., & Õun, T. (2022). Enhancing Digital Skills of Early Childhood Teachers Through Online Science, Technology, Engineering, Art, Math Training Programs in Estonia. , 7. https://doi.org/10.3389/feduc.2022.894142.

Li, Y., Nishimura, N., Yagami, H., & Park, H. (2021). An Empirical Study on Online Learners' Continuance Intentions in China. *Sustainability, 13*, 889.

Marrero, M.E., Woodruff, K.A., Schuster, G.S., & Riccio, J.F. (2010). Live, online short-courses: A case study of innovative teacher professional development. The International Review of Research in Open and Distributed Learning, 11, 81-95.

McKimm, J., & Jones, P. (2017). Twelve tips for applying change models to curriculum design, development and delivery. Medical Teacher, 40, 520-526.

Navarro, J., & McGrath, B. (2022). Strategies for Effective Online Teaching and Learning. *Handbook of Research on Future of Work and Education*. https://doi.org/10.4018/978-1-7998-8275-6.ch029.

Ohvanainen, J., & Hakala, E. (2014). Introducing a Change Path Framework for an Industrial Company Entering Service Business.

Sieber, J.E. (2005). Misconceptions and realities about teaching online. Science and Engineering Ethics, 11, 329-340.

Smolander, K., Larsen, E.Å., & Päivärinta, T. (2009). Explaining Change Paths of Systems and Software Development Practices. Integrated Spatial Databases.

Vilppu, H., Södervik, I., Postareff, L., & Murtonen, M. (2019). The effect of short online pedagogical training on university teachers' interpretations of teaching–learning situations. Instructional Science, 47, 679-709.

Yelne, D. (2022). Impact of online education and its effective practice. International Journal of Scientific Research in Engineering and Management. https://doi.org/10.55041/ijsrem12858.