

Hitting the Target: Measuring the Success of Online Learning

An Operational Practice prepared for SCTE by

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1. Introduction

As digital technologies continue to reshape various industries, the corporate world is witnessing an unprecedented shift in its approach toward training and development. Online learning has emerged as a pivotal tool in this context, offering flexibility, scalability and a broad range of learning experiences. The potential benefits of online learning for businesses, such as workforce upskilling, talent retention and increased productivity, are significant. The question of effectiveness remains critical.

In the telecommunications learning and development environment, many courses are geared toward preparing the learner for hands-on work. These courses have historically been conducted through in-person classroom courses. With the advent of online learning, the training medium has shifted, which leads learners and learning and development experts to wonder, “Is this effective?”

This study aims to identify the effectiveness of online learning. In the literature review, we discuss how the learner’s attitude affects online learning outcomes, the role that technology plays in online learning, the effects of self-directed learning and the impact that online learning has on learning performance. Following the literature review, the training course series geared toward field technicians will be scrutinized. From these observations, we hope to measure the effectiveness of online learning in the telecommunications industry.

2. Literature Review

2.1. Learner Attitudes Toward Online Learning

Adult learners are unique in their approach to learning. Their previous life and work experiences inform their ability to understand and assimilate new information (Driscoll, 1998). Therefore, understanding these attitudes toward online learning is crucial in creating successful learning programs. As online education is a relatively new and rapidly evolving field, learners might not be comfortable with it yet. Interestingly, despite the advantages of convenience and accessibility, many still express preferences for the personal interaction and immediacy of feedback found in traditional face-to-face courses (Kuong, 2015). However, once they overcome the initial technological hurdles, learners generally find online platforms user-friendly and easy to navigate (Almahasees et al., 2021). To harness the full potential of online learning, an attitude shift toward positivity and readiness is needed (Hergüner et al., 2020).

2.2. Role of Technology in Online Learning

Technology plays a pivotal role in online learning, acting as the bridge between content and learner. It is not just about technology though; successful online learning also requires time investment and support from leadership or peers (Noosegard & Ørngreen, 2015). Learning management systems (LMS) like Blackboard or Cornerstone have revolutionized online learning settings, offering a centralized hub for learning materials and a powerful source of analytics. However, the digital divide can pose a challenge, as access to stable internet is not universal. This can impact the efficacy of online learning, especially in multimedia-rich environments (Seladorai & Mohamed, 2021). It underscores the necessity of strong infrastructure to ensure every learner can access the content (Gaebel et al., 2013). With the increasing digitization of workforce training, it is clear the future of employee development is intertwined with online learning (Chen, 2008).

2.3. Self Directed Learning

The nature of online learning often necessitates a self-directed approach, where learners are responsible for their own learning journey. This sense of autonomy can be empowering for adult learners, providing control over their learning process (Knowles et al., 1998). However, the tendency for learners to choose safe, comfortable paths could inhibit their growth, posing an interesting conundrum for content designers (Knowles et al., 1998). It is also worth noting that not all adults may be fully equipped for self-directed learning and, in such cases, instructional scaffolding is essential to guide learners effectively (Jumaat & Tasir, 2014).

Online learning is essential for learning and development organizations because it opens up learning outside of the traditional classroom, which allows for self-directed learning. Online learning is an ideal platform that can be used both in the classroom as well as outside the classroom, giving autonomy to learners to seek their knowledge in a way that resonates with them. “Although this time in our work lives may be a period of stability – at least in comparison to the last few years – there is still an ongoing workplace change that organizations must adapt to – the increases in employee agency. This means organizations need the help of software and services designed and adapted for addressing The Great Resignation” (Stevenson et al. 2022).

2.4. Impact of Online Learning on Performance

The impact of online learning on performance is multi-faceted. It is not just about imparting knowledge, but how it can be applied in a practical context. Factors such as the quality of learning materials, the learner's motivation, the robustness of the technological infrastructure and the relevance of the content to the learner's job all play a role in the efficacy of online learning. Therefore, a successful e-learning initiative must be closely aligned with organizational objectives and learner interests, and should foster a supportive learning environment (Chen, 2008). Business objectives can be measured from online training through on-the-job training (OJT) effectiveness. OJT effectiveness items can include overall task achievement, job accomplishing satisfaction and job performance (Cheng & Chen, 2008). If the impact of OJT effectiveness is measurable, a measure of the training effectiveness can be completed too. This leads us to the notion that a majority of studies report online programs as effective or even superior to traditional classroom learning, signifying the transformative potential of online learning in the workplace (Noosegard & Ørngreen, 2015). OJT effectiveness helps to measure the success of online learning.

2.5. Conclusion

Existing research provides insights into how learner attitudes affect online learning outcomes, the role that technology plays in online learning, the effects of self-directed learning and the impact that online learning has on learning performance. Core adult learning theories on self-direction support the effectiveness of online learning methodologies, and more recent research highlights potential challenges for learners. There is still a gap in the collective body of work, specifically related to the opportunities to clearly align quantitative performance data back to online learning experiences in the workplace.

This quantitative study examines the effectiveness of targeted online learning materials within the workplace. Through an investigation of the learner attitudes, technology, self-directed learning and the success of online learning, we will seek to understand how online learning materials impact learning and business outcomes. To do this, we pose following questions:

- Do short, targeted online modules and online learning materials impact learner experience and business outcomes?
- What are the attitudes of online learners?
- What is the role of technology in online learning effectiveness?
- How does online learning impact performance in the workplace?

3. Research Methods

As detailed in the literature review, there is a gap in current research that directly addresses aligning quantitative performance measures back to online learning programs. To investigate a relationship between performance and online learning, a quantitative method that seeks to understand performance measures of a sample group was used. This quantitative method provides the opportunity to both understand learner perceptions and attitudes of online experiences and to subsequently identify possible relationships to performance. Quantitative data provides a more concrete picture of impacts to job performance, helping to validate the investments of learning and development organizations into their online learning programs.

3.1. Participants

The participants whose performance and attitudes were investigated as part of the study are frontline field technicians in a large telecommunications organization who participated in a series of online training courses on proactive maintenance. These modules covered topics including core technical concepts such as modulation error ratio (MER), downstream uncorrectables and signal-to-noise ratio (SNR), as well as instructions on how to use internal telemetry tools for problem diagnosis and troubleshooting steps to resolve such issues.

3.2. Data Collection

The internal research of the proactive maintenance series covered four major topics. The first topic was learner attitudes. Ten proactive maintenance online learning courses were identified as the main courses in question and their data was assembled. At the time of data collection, the minimum number of completions for all e-learns was 10,400 and the maximum was 12,800, with a mean of 11,500. The users or learners who completed these courses are field technicians with varying degrees of experience. 1,039 user ratings from the LMS were also obtained. A report that generated multiple choice evaluations from users was also compiled and included 82 multiple choice evaluations between all proactive maintenance courses. The multiple-choice evaluation statements were as follows:

- Select the statement that best describes examples and activities in the course.
- Select the statement that best describes the use of technology in this course.
- Select the statement that best reflects your ability to apply course information.
- Select the statement that is most applicable.

A retroactive observation of the technology used in this online learning series was also completed. This observation included information covering the implementation of the series, the technology used to design the series and the technology used by the learners. Information about the online learning series courses was also collected. This included the naming scheme of the lessons, the duration of the entire series and the expected duration of each course.

The final collection of data came from the learning and business outcomes. For the learning outcomes, data retrieved identified the changes to trouble calls and their resolution. Business outcome information was also provided by the proactive maintenance department and included information covering success rate, ticket completion and “refer to maintenance” work orders. The final data point was the metrics derived from completions of proactive maintenance courses and the total assignments.

3.3. Data Analysis

Post-training learner evaluation data were exported from the LMS into an Excel spreadsheet, and all personally identifiable user data was removed. The star ratings were organized and aggregated as an average overall score by individual course and by overall program (all courses). The post-training survey data was organized by question and responses into table format and expressed as a percentage of positive responses.

Performance data were gathered from internal work order data systems and organized into an aggregate score known as “proactive maintenance success.” Proactive maintenance success was identified as all impairments being resolved and compliant telemetry on the account for 48 hours post truck roll. These data were expressed as a graph showing overall company performance for all employees (see Figure 1).

4. Results

4.1. Post-Training Evaluation Survey Results

To examine this online learning program's effectiveness, the course evaluations were first considered. A cumulative average rating of 4.58 stars out of five stars was recorded from the ten e-learns. User-generated responses and evaluations from the entire training series were positive overall. Of the 10 courses identified for this study, the lowest star rating for a course was 4.4 stars and the highest rating was 4.7 stars. The average between all courses was 4.58 stars.

Users were presented questions that asked them to characterize their impressions of the course. Question 1 asked learners to consider the examples and activities in the course and rate whether they helped the learner understand the content. The overall score for Question 1 was 81 percent positive, with the majority of learners indicating they felt the examples and activities helped (See Table 1).

Table 1 – Evaluation Results – Question 1

| Select the statement that best describes examples and activities in the course. | 58 |
|---|----|
| The examples or activities in the course did not help my understanding of the content. | 11 |
| The examples or activities in the course somewhat helped me to understand the content. | 12 |
| The examples or activities in the course helped me to understand the content. | 12 |
| The examples or activities in the course significantly helped me to understand the content. | 23 |

Question 2 asked learners to consider the use of technology in the course and their overall impressions of whether technology enhanced or interfered with their ability to learn. The score for this question was 63 percent positive, with 20 of the total 54 respondents indicating the use of technology “did not enhance” or “interfered with” their learning (see Table 2).

Table 2 – Evaluation Results – Question 2

| Select the statement that best describes the use of technology in this course (if applicable). | 54 |
|--|----|
| Technology used in the course interfered with my ability to learn. | 10 |
| Technology used in the course did not enhance my ability to learn. | 10 |
| Technology used in the course enhanced my ability to learn. | 13 |
| Technology used in this course greatly enhanced my ability to learn. | 21 |

Question 3 asked learners to consider their confidence level relative to their ability to apply what they learned back on the job. The majority of learners were favorable on this question, with an overall positive score of 62.5 percent. Despite this positive response overall, it is noteworthy that 21 learners of 56 total respondents still rated it as “not at all” or “somewhat” confident (see Table 3).

Table 3 – Evaluation Results – Question 3

| Select the statement that best reflects your ability to apply course information. | 56 |
|---|----|
| I am not at all confident in my ability to apply the course content to my job. | 10 |
| I am somewhat confident in my ability to apply content to my job. | 11 |
| I am confident in my ability to apply course content to my job. | 10 |
| I am very confident in my ability to apply course content to my job. | 25 |

The final evaluation question asked learners to consider whether the overall information was useful and could be applied back on the job. 25 of the 36 total respondents to this question indicated that the content was useful, for an overall score of 69.4 percent (see Table 4).

Table 4 – Evaluation Results – Question 4

| Select the statement that is most applicable. | 36 |
|---|----|
| This course did not provide information which I can apply in my role. | 11 |
| This course provided useful information which I can apply in my role. | 25 |

4.2. Performance Results

Course attendees’ performance was measured relative to an overall proactive maintenance success score. Proactive maintenance success is identified as all impairments being resolved and compliant telemetry on the account for 48 hours post truck roll.

Before the introduction of the e-learns, proactive maintenance success rates hovered around 80.96 percent. Following the introduction of the online learning series, an increase in success rates can be clearly seen. From July of 2022 to January of 2023, success rates climbed to a peak of 88.40 percent and the average success rate was 87.83 percent.

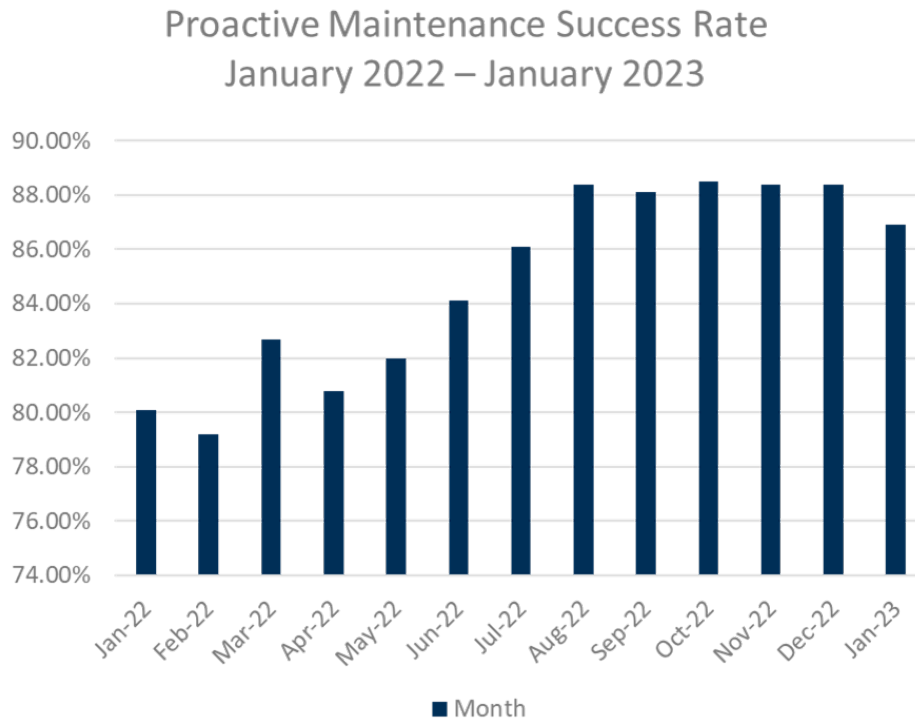


Figure 1 – Proactive Maintenance Success Rate

5. Discussion

This research sought to examine the effectiveness of online learning and was completed in the context of telecommunications training, focusing specifically on one e-learn series. We aimed to evaluate learner attitudes toward the series, the role that technology played, the effects of self-directed learning and the impact of online learning on job performance and business outcomes.

5.1. Learner Perceptions

Learners' overall star ratings of the courses were overwhelmingly positive (4.58 out of 5 stars), indicating that the perception of these online courses was generally positive for the majority of learners, aligning with the research (Almahasees et al., 2021). While these star ratings do not provide the context needed to fully identify the impact of online learning effectiveness, they do shed light on the learner attitudes. These e-learns were well-received by the thousands of learners that completed the courses.

The post-course evaluations provide additional insights into learner attitudes through multiple-choice evaluation statements. While the examples and activities included in the training series are different from face-to-face activities or hands-on examples that would be presented in facilitated courses, learners still feel that the activities and examples helped them to better understand the content. Of the 58 users that responded to this survey statement, 47 responded positively. This is an 81 percent positivity rate for the examples and activities. The proactive maintenance online series included many examples of real-world telemetry that users would see on their signal level meters when on a proactive maintenance trouble call.

Similar to what Driscoll (1998) identified, learners were able to make the connections between their own equipment and the new processes.

Considering the topic of learner experience, our research found that 63 percent of learners (34/54) reported the technology in the training series enhanced their learning experience. This aligns with the literature suggesting technologically mediated instruction can provide a more flexible self-paced learning environment (Noosegard & Ørngreen, 2015). This could also be attributed to the robust LMS that the programs reside in. The LMS provides an all-in-one experience for the user so they can access the online learning courses at any time and any place. Also, due to the way these courses were created and the understanding that learners may have limited access to strong internet connections, learners can still access these courses from anywhere with minimal internet connection. This allows users to self-direct their learning experience even more, no matter where they are or what device they choose to access the training with.

A sizable portion of learners, 37 percent, felt that technology did not enhance their learning or interfered with their ability to learn. This could be attributed to potential barriers such as digital literacy. These results underline the importance of intuitive, user-friendly online course design.

The findings from Question 3, related to ability to apply the learnings, suggest a strong correlation between online course participation and confidence in job-related application. 82.1 percent (46/56) of participants expressed confidence in their ability to apply the course information to their job. This supports the argument that effective online learning can provide pragmatic skills transferable to the work environment (Chen, 2008). Training's effectiveness can be measured by this ability to apply learned concepts, which can lead to enhanced performance.

The final survey question covered the application of course information to their job role. The relevance of learning material to an individual's role is a crucial aspect of effective training. Of the participants who responded, 69.4 percent (25/36) affirmed that the training series provided them with information applicable to their job. This finding supports the literature assertion that aligns between the learning content and real-world job roles and the enhancement of the training's effectiveness (Chen, 2008). However, the data also implies that 30.6 percent (11/36) of responding learners did not find the course content to be directly applicable to their roles. This gap in relevancy for learners points toward an opportunity for further refinement of the proactive maintenance series content. Further refinement may lead the content of online learning to be more relevant to the diverse group of learners.

5.2. Business Performance

Our study found a significant increase in success rates following the June 2022 release of the training series. Before the introduction of the e-learns, proactive maintenance success rates hovered around 80.96 percent. Using the January 2022 and January 2023 data points, we see an approximate 6.9 percent increase in success rates. Most notably, this growth in success rates was not a temporary boost, but rather showed sustained positive changes after the introduction of the training. These findings are in line with our research that suggests a strong correlation between effective online training and improved performance metrics (Cheng & Chen, 2008).

5.3. Study Limitations

This study, while providing valuable insights, is marked by several limitations that we must consider when interpreting the results. Limitations are expected in studies, especially when working in an evolving

business environment and these limitations do not discredit the evidence that we uncovered in the research (Kirkpatrick, 1996).

The first limitation is the lack of a fully controlled research group. While this training series is geared toward field technicians, it is not exclusive to field technicians. This may introduce minor variability and inconsistency in the data.

The second limitation is the limited evaluation options. The evaluations used in this research are pre-set and were not customized for these courses. Without the ability to set custom evaluations, the study may have missed information pertaining to the attitudes of the learners. Tailored evaluations could provide more precise insights into how we measure and enhance the success of online learning.

The final limitation is the variables that coincide with the introduction of the training series. Other variables may have affected the business outcomes, such as the enhancements to tools used by technicians and the reprioritization of proactive maintenance severity levels. These factors could change the relationship between the online training and the observed increase in proactive maintenance success rates.

These limitations highlight areas that could be addressed in future research, potentially leading to a better understanding of the dynamics of online learning. It is essential that readers consider these limitations when interpreting the conclusions drawn from this study.

6. Conclusion

This research explored the effectiveness of online learning in the context of the telecommunications industry, focusing on the proactive maintenance e-learn series. The investigation covered a diverse range of factors, including learner attitudes, technology's role, self-directed learning and the impact on business outcomes.

The findings indicate that a majority of the learners found the use of technology as an enhancement to their learning experience and felt confident in applying the course content to their jobs. Further evaluations prove that learner attitudes are overwhelmingly positive when completing online learning. These positive responses, combined with the demonstrated increase in business success rates, provide robust evidence supporting the effectiveness of online learning.

This study also identified areas for potential improvement. A sizable portion of learners did not see technology as an enhancer or did not find the course content directly applicable. Addressing these areas could further boost the success of future online learning initiatives.

In conclusion, while online learning shows significant promise as an effective medium for training in the telecommunications industry, there is still room for enhancement and a continued need for investigation. With further research and improvements to our online learning materials, we can further optimize the impact of online learning on the development of our workforce and performance of our businesses.

Abbreviations

| | |
|-----|----------------------------|
| LMS | Learning Management System |
| OJT | On-the-job training |
| MER | Modulation error ratio |
| SNR | Signal to noise ratio |

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