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Getting the Right Mix: A Risk-Based Approach to Blended Learning Design for Healthcare Workplace Training

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Abstract

Ensuring employees are competent and confident to perform their duties relies on new employee orientation and ongoing compliance training. Currently, there is no industry standard or evidence-informed decision framework that determines when to use face-to-face, online, or blended learning for healthcare workplace training. This mixed methods research investigated how instructional designers use blended learning to balance the ethical, patient safety, resource, and budget demands inherent in an ever-changing and high-tech workplace, to answer the question: Is there a relationship between delivery modes, interaction type, and perceived risk of the content to be learned in healthcare workplace training? An anonymous online survey asked the opinions of healthcare workplace instructional designers (N = 26) about the use of interaction type and delivery mode for workplace training. The opinions of a subset of participants (n = 19) were analyzed for correlation between their preference for delivery modalities and interaction types in relation to their perceived risk of the content to be learned. Quantitative analysis found: (a) preference for in-person/face-to-face delivery via learner-instructor interaction, specifically for high-risk learning content, (b) less preference for blended learning delivery, and (c) no preference for synchronous online delivery. This study proposes a risk-based instructional design decision-making tool for the healthcare workplace.

Keywords: instructional design, blended learning, workplace training, risk-based, healthcare, operational readiness, quantitative

Introduction

Opening a new healthcare facility and providing safe and efficient care on opening day is an unusual and poorly reported instructional design case (Mullins-Jaime et al., 2021; Reno, 2014). As part of operational readiness for new hospitals, workplace training and performance support are required for thousands of staff, clinicians, and physicians (Canadian Standards Association, 2013). Due to chronic human resource shortages that limit in-person/face-to-face training, a solution is needed to determine the best design of workplace training that balances time, personnel, and budget constraints while providing ethical, justifiable, and sustainable training that meets the educational needs of healthcare workplace learners (Benson, 2004; Kim et al., 2008).

Significant work has been done to study the efficacy of online learning compared to in-person/face-to-face learning, resulting in substantial evidence that blended learning is equally effective (Bernard et al., 2014; Bozkurt, 2022; Cleveland-Innes & Wilton, 2018). However, little information exists about how instructional design decisions are accomplished for blended learning or how interaction types and delivery modes (online or in-person/face-to-face) are determined (Ashraf et al., 2021; Bircă & Matveiciuc, 2021; Horton, 2016; Peltokoski et al., 2016). Though there is a long history of risk-based approaches to decision-making in healthcare, there is no literature that reports instructional designers' preferences for interaction and delivery in relation to applying risk-based approaches to instructional design in the healthcare operational readiness context (Miyazoe & Anderson, 2010; Horton, 2017; Mubayrik, 2018; Pascarella et al., 2021).

Three workplace training design gaps were addressed in this study: investigating the instructional designers' perspective, applying Anderson's (2003) theorem for interaction type in the corporate training setting, and optimizing blended learning design using a risk-based decision approach (Graham & Massyn, 2019; Miyazoe & Anderson, 2012; Parsons & Capka, 1997). This study aimed to answer the research question: Is there a relationship between instructional designers' preference for interaction type, delivery mode, and learning content risk for healthcare workplace training?

Methods

Research Design and Data Collection

The participants in the study were past or present instructional designers of healthcare workplace training. Participants were excluded if they had no healthcare workplace instructional design experience. A minimum sample size of 30 was required; however, the ideal sample size of 138 would have provided adequate power to minimize Type I and Type II errors.

A non-probabilistic, purposive sampling and snowball procedure were used to collect data between 24 June and 30 September 2023, after Athabasca University Research Ethics Board approval.

The participants were recruited via email and invited to complete a previously pilot-tested, 10-question, anonymous online survey hosted on the Athabasca University LimeSurvey portal (https://secure3.athabascau.ca/limesurvey/index.php). Participants self-selected to complete the five-part mixed methods questionnaire and to pass it to other colleagues who matched the participant demographic.

Data Analysis

Though the data collection questionnaire included closed and open-ended questions, no narrative responses were received, resulting in solely quantitative results.

The data was evaluated via correlation analysis using IBM SPSS Statistics (Version 25). Due to the small sample size, the following techniques were employed where appropriate and possible:

- The bootstrap resampling method was used for determining confidence intervals (IBM, 2021; Scott et al., 2013; Zapf et al., 2016).
- Krippendorff's alpha was used to evaluate composite reliability within the risk-rated data (Hayes & Krippendorff, 2007).
- Strength of relationships was determined using:
    - Cramer's V to test the effect size of a relationship (Akoglu, 2018), and
    - Bayes' factor to indicate the strength of the likelihood ratio (Jarosz & Wiley, 2014; Rosenfeld & Olson, 2021).

The significance level for this study ($p < .05$) was set before data collection. Where multiple significance tests were applied to the datum, the Bonferroni correction was used to adjust the significance level to control for Type 1 error (Field, 2018).

Results

Participants

A variety of Canadian workplace instructional design roles were represented in the $N = 26$ participant sample, including clinical educators (57.7%), workplace teacher/instructors (23.1%), operational readiness commissioners (7.7%), learning consultants (3.8%), peer mentor/coaches (3.8%), and learning development department staff (3.8%). The participants' instructional designer experience ranged from less than one to more than 20 years in healthcare workplaces such as acute care facilities, health authorities, long-term care, and other health organizations.

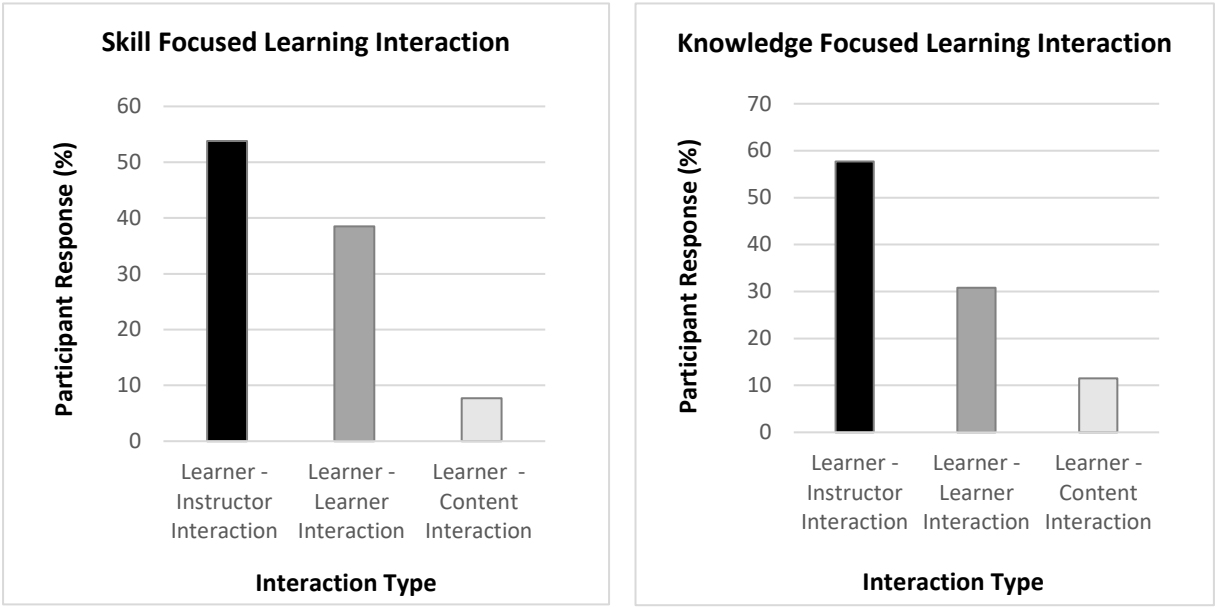
Interaction Preference

Participants were asked to indicate their interaction preference for knowledge- and skill-focused learning (Figure 1). Most participants preferred learner-instructor interaction for both knowledge- and skill-focused learning. Learner-content interaction was least preferred.

The chi-square test (X^2) of independence was used to examine the relationship between knowledge- and skill-focused interaction preference orders. The analysis resulted in X^2 (25, $N = 26$) = 27.009, $p = .355$. These results indicate that the null hypothesis cannot be rejected (unrelated variables/no relationship) and therefore, no statistically significant difference exists between skill- and knowledge-focused interaction preference.

Figure 1

Participants' Interaction Preference by Type of Learning

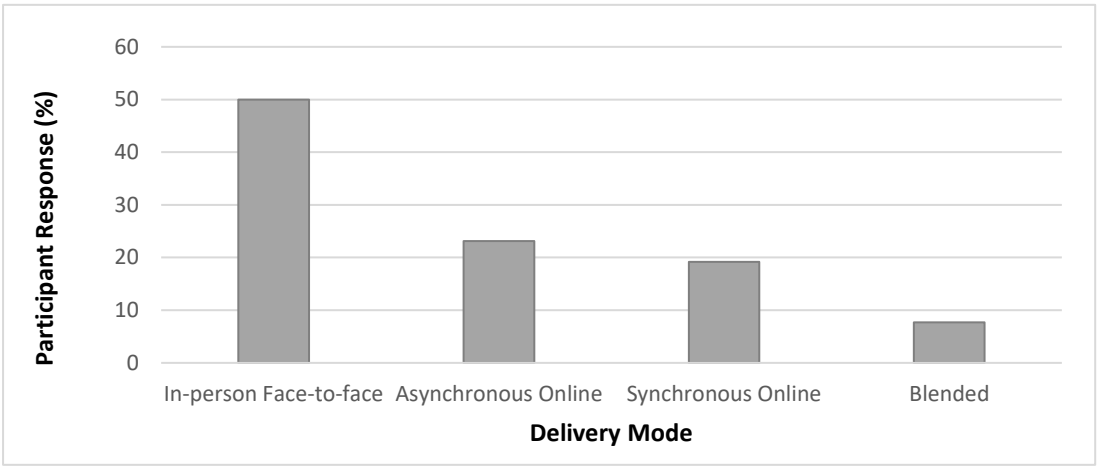


Delivery Mode Preference

Participants were asked to indicate their general preference for delivery mode (Figure 2). Most participants (50.0%) preferred in-person face-to-face delivery. Blended learning was preferred the least (7.7%).

Figure 2

Participants' Delivery Mode Preference

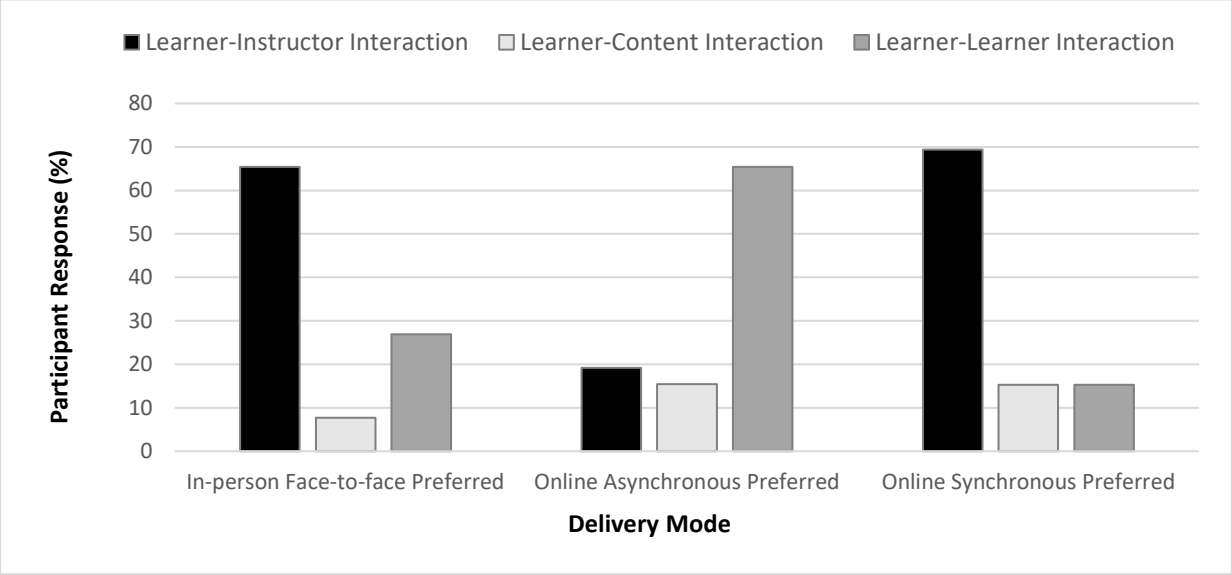


Combined Interaction Type and Delivery Mode Preference

Participants provided their preference for interaction type in combination with delivery mode, indicating a preference for learner-instructor interaction for both in-person/face-to-face and online synchronous delivery. In contrast, learner-learner interaction was preferred for online asynchronous delivery. See Figure 3.

Figure 3

Participants' Interaction Preference by Delivery Mode

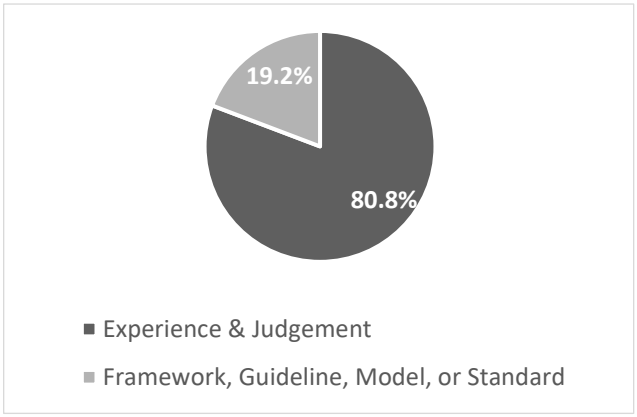


Blended Learning Design Practice

Participants provided their preferred method for blended learning design decisions, based on either experience and judgement or a decision tool (Figure 4). For participants who indicated that they used a decision tool, they were also asked to elaborate on what process, why, and how they used it.

Figure 4

Participants' Blended Learning Design Decision Process and Frameworks



Blended Learning Frameworks Used by Participants

- Universal Design Standards for Learning
- Kern's Model for Curriculum Development
- Kirkpatrick Evaluation Model
- Internally developed departmental templates
- Needs Assessment
- Knowledge-to-action framework
- Guideline for blended learning
- Community of Inquiry framework

A chi-square likelihood ratio test was completed to examine the relationship between decision method and experience: X^2 (5, N = 26) = 4.25, p = .514. The null hypothesis (no relationship) cannot be rejected, and therefore, it is reasonable to conclude that the participants' preferred blended learning decision method and experience level are independent.

Participants listed a variety of decision frameworks as evidence of the tools they used to identify blended learning design; however, no explanations were provided about why and how the decision tools were chosen or used. Each decision framework was provided only by one participant, with no overlap.

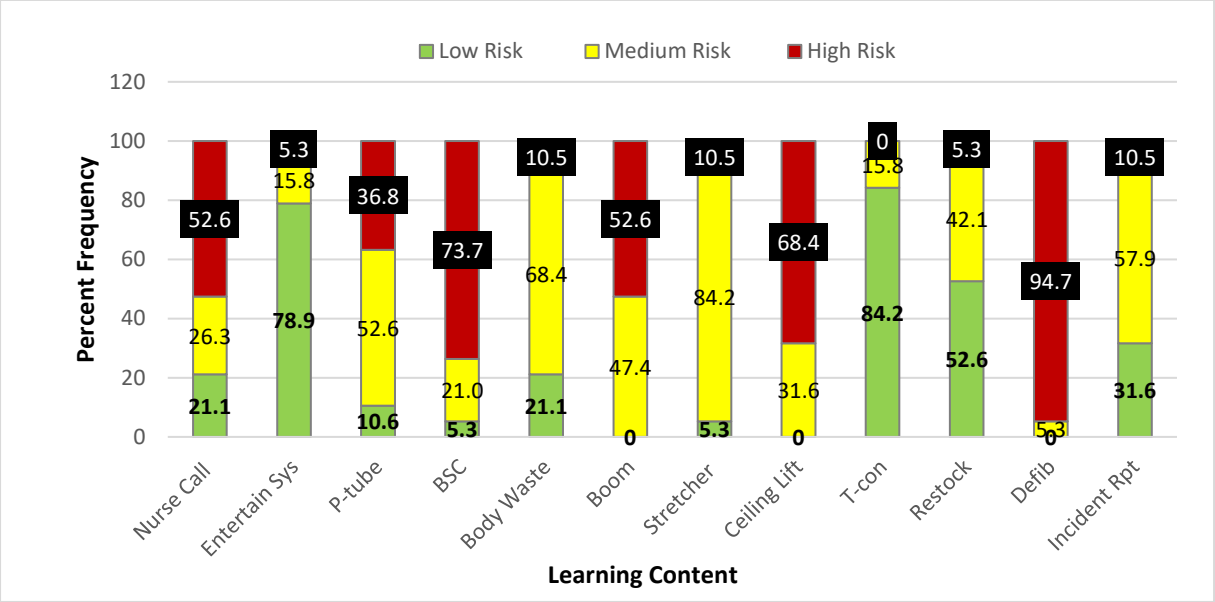
Risk-Rated Learning Content

A subset of participants (*n* = 19) risk-rated 12 samples of potential healthcare workplace learning content (Figure 5). Based on responses, 42% of the sample contents were rated high risk, 33% medium risk, and 25% low risk. Participants were asked but did not comment on why they made their choice.

Krippendorff's alpha (K-alpha) was used to estimate the intercoder reliability (assessment of agreement), because K-alpha is suitable for any number of raters and variables with greater than two categories. The interrater reliability estimate was calculated as K-alpha = .4880, where a K-alpha < .60 indicates a significant level of disagreement (Hayes & Krippendorff, 2007).

Figure 5

Participants' Risk Rating for Various Learning Contents



Note: Nurse Call = emergency communication system; Entertain Sys = patient's in-room entertainment system; P-tube = pneumatic tube transportation system; BSC = biological safety cabinet; Body Waste = waste management macerator and disposal system; Boom = articulating ceiling mounted equipment and medical gas system; Stretcher = patient transport bed; Ceiling lift = ceiling mounted patient lift; T-con = teleconferencing equipment; Restock = consumables re-supply process; Defib = cardiac defibrillator/Code Blue; Incident Rpt = critical incident reporting process.

Discussion

This study establishes a proof of concept that leverages a risk-based approach to decision-making for workplace blended learning, based on the perspectives of healthcare workplace instructional designers regarding interaction type, delivery mode, and perceived risk scores of learning content. The study results address several gaps in the literature and have the potential to enhance workplace and patient care safety. However, this study's sample size, statistical

power, and absence of qualitative data are insufficient to unequivocally establish a complete risk-based instructional design decision matrix (Kyonka, 2019).

Interaction Type and Delivery Mode Preference

Of the three types of interaction evaluated for delivery of knowledge and skill-focused learning (Figure 1), learner-instructor interaction is most preferred, and learner-content interaction is least preferred. The preference frequencies for skill-focused and knowledge-focused interaction (Figure 1) are similar, confirming that designers do not discriminate between skill- and knowledge-focused learning, indicating that knowledge type is not a confounding variable when learning content is assessed for risk level.

Participants indicated an overall preference for in-person/face-to-face interaction (Figure 2), over online (synchronous and asynchronous) or blended delivery. This preference suggests poor recognition, acceptance, or uptake of the blended learning delivery format in the healthcare workplace training environment, implying that healthcare workplace training is in a state of transition or that there are barriers that negatively impact the use of blended learning. In a post-COVID world, this result is somewhat surprising, considering the growing popularity of blended learning, significant attention in the literature about its benefits, and the human resource shortages affecting healthcare (Benson, 2004; Bernard et al., 2014; Bozkurt 2022; Peltokoski et al., 2016).

Chi-square analysis indicated that preference for learner-instructor interaction in combination with in-person/face-to-face and synchronous delivery (Figure 3) is not due to chance, confirming that participants agreed on the specific interaction type for these delivery modes. No statistically significant evidence indicated any interaction preference for the asynchronous delivery mode.

Blended Learning Design Practice

The majority of designers (80.8%) who chose experience and judgement over a decision framework, guideline, model, or standard to make blended learning design decisions were those in the 1–5 years' experience category. Without the benefit of qualitative data, one can only speculate about this finding. Seemingly, it would be more appropriate for novice designers to use a design framework since they may not yet have acquired extensive experiential knowledge to guide their instructional design choices. Based on the finding that fewer than 20% of participants use a design tool and that the frameworks they use are unique to each participant, this study suggests there may not be an accepted blended learning guideline for instructional design in the healthcare workplace learning context. There may be room for development and use of a decision-making tool that better fits this learning environment.

Risk-Based Blended Learning Design

The lack of interrater reliability (low K-alpha) for risk-rated learning content indicates that individual designers have definite opinions that may be leveraged to stratify interaction type and delivery mode (Figure 5). When the instructional designers' preferences for delivery mode and interaction type are ordered by frequency and combined with the risk ratings, a risk-based decision matrix emerges (Table 1).

Three statistically significant correlation tests (shown in bolded text in Table 1) provide support for the proposed decision framework:

- High-risk-rated learning content strongly correlates with a preference for learner-instructor interaction.
- Medium-risk-rated learning content shows a moderately strong correlation with a preference for learner-content interaction.
- High-risk-rated learning content shows a very strong association between learner-content interaction and in-person/face-to-face delivery.

However, learner-content interaction via face-to-face delivery is not supported by the frequency results; a contrary finding perhaps due to the statistical errors common to small sample size studies (Button et al., 2013). Further study involving a larger sample is needed to determine which, if any, of these statistically significant results are accurate.

Notably, the proposed blended learning decision matrix does not include synchronous online learning delivery for any risk level or interaction type, and blended learning ranks lower than in-person/face-to-face and asynchronous delivery, suggesting that the healthcare workplace training field has not yet recognized or accepted the advantages of blended learning.

Table 1

Risk-Based Training and Orientation Matrix

Risk Level	Preferred Delivery Mode	Preferred Interaction Type
High Risk	**1. In-person / Face-to-face**	**Learner-Instructor**
	2. Blended	**Learner-Content**
	3. Asynchronous Online	Learner-Learner
Medium Risk	1. Asynchronous or Blended	**Learner-Content**
	2. In-person / Face-to-face	Learner-Instructor
	3. In-person / Face-to-face	Learner-Learner
Low Risk	1. Asynchronous Online	Learner-Content
	2. In-person / Face-to-face	Learner-Learner
	3. Blended	Learner-Instructor

Note: This matrix is based on instructional designers' preference frequencies for interaction type and delivery mode. Bold font indicates statistically significant findings. The double-ended arrow indicates a significant correlation between learner-content interaction and in-person/face-to-face delivery.

Conclusion

As a proof of concept, the major outcome of this study is a risk-based decision support matrix that suggests high-risk learning content is best provided by an instructor in a in-person/face-to-face setting, medium- and low-risk training is better provided in a learner-driven, asynchronous manner using learner-content interaction, and synchronous online learning would be best avoided. However, this study's results, specific to the healthcare workplace training context, must be tempered with the limitation that the conclusions are based on quantitative data without the benefit of explanation from qualitative findings and on a small sample size, which likely resulted in Type II (false negative) errors, where the hypothesis (no relationship) is false but not rejected in error.

Author's Contributions

I designed and developed the study, collected and analyzed data, and wrote the article.

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Ethics Statement

The Athabasca University Research Ethics Board has reviewed and approved the research described in this article (Ethics File No. 25242).

Conflict of Interest

The author does not declare any conflict of interest.

Data Availability Statement

Data for this research is unavailable as outlined in the approved Athabasca University Ethics Board submission (File No. 25242). Participants were guaranteed that no individuals or agencies apart from the original researcher would have access to the raw data. No consent was obtained to allow data to be deposited in a data repository.

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