Arroyo, P & Villanueva, S. G. (2024). An Exploration of Psychological Safety and Team Behaviors in a Construction Global Team. In D. B. Costa, F. Drevland, & L. Florez-Perez (Eds.), *Proceedings of the 32nd Annual Conference of the International Group for Lean Construction* (IGLC32) (pp. 1135–1146). doi.org/10.24928/2024/0153

THE RIGHT KIND OF WRONG IN CONSTRUCTION: ANALYSIS FROM A GENERAL CONTRACTOR PERSPECTIVE

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ABSTRACT

The idea that not every mistake is preventable and that we can make mistakes and not be ashamed of them if we learn from them is not new in Lean Construction; however, new research from the field of psychology sheds light on human behavior and our willingness to explore and learn from failure. This paper explores how these new findings apply to construction. In this paper, we study different types of failure using Edmonson's classifications of basic, complex, and intelligent failure. We illustrate with cases of failure collected in the Building Quality Builders Class, which is an internal training provided by a general contractor in the USA. Finally, we present strategies for preventing basic and complex failures and encouraging intelligent failures in the context of construction projects. More research is needed to develop a culture to foster learning from all types of failure.

KEYWORDS

Failures, psychological safety, continuous improvement, quality, and learning.

INTRODUCTION

Understanding how mistakes happen, what the consequences are, and how to learn from them and prevent them has been at the center of lean and quality research for a long time. However, there is a lack of a comprehensive framework to make sense of how to deal with different types of mistakes or failures and how to understand human behavior in relationship with failure. Are all mistakes preventable? What messages are we sending to construction workers when we believe that?

Many construction companies use slogans such as "Do things right the first time," "zero defect zone," etc. According to Latzko & Saunders (1996), Dr. Edwards Deming was very clear that these slogans, even though well-intentioned, alone do not create change and can also work against a culture of reporting mistakes.

What type of culture allows the creation of high-performance teams? Amy Edmonson's research points out that teams that have a better reporting culture perform better; they are not afraid of sharing their mistakes and create an environment of psychological safety (Edmonson, 2023; Edmonson, 1999; Edmondson & Bransby, 2023). The concept of psychological safety has been studied in construction, as well as its relationship with lean construction and positive impacts on quality performance (Gomez et al., 2019, 2020, and 2023; Gomez, 2023).

Creating a culture where people feel safe and empowered to share and learn from each other's mistakes is not an easy task. This paper explores the different types of mistakes that

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happen in construction using Edmondson's (2023) classification of mistakes, tries to make sense of these problems, and discusses strategies to encourage learning in a General Contractor context.

LITERATURE REVIEW

This section presents a literature review of both the ideas presented in Edmonson's (2023) book and lean management practices.

RIGHT KIND OF WRONG

Edmonson (2023) published a book called *Right Kind of Wrong*; in this book, the Harvard professor summarizes years of research on the topic of understanding failure and our emotional and social response to it. Edmondson has studied the human capacity to learn from mistakes for a long time; she has stated that this is easier said than done (Edmonson, 1996). She is well known for leading the research on Psychological Safety (Edmonson, 1999), which she defines as feeling safe to take interpersonal risks, speak up, disagree openly, and surface concerns without fear of negative repercussions or pressure to sugarcoat bad news. This concept is key to avoiding the fear of learning from mistakes.

In addition, and what is more relevant to this paper, is her recent differentiation in the different types of failures and the strategies that can be applied in organizations to deal with them. Table 1 describes the classification she proposed according to the context in which they occur.

Table 1: Types of failure (Modified from Table 1.1 in Edmonson, 2023)

Context	Uncertainty	Stage of Knowledge
Basic Failure	Low	Well- developed
Complex Failure	Medium	Well-developed knowledge, vulnerable to unexpected events
Intelligent Failure	High	Limited

Cannon & Edmondson (2005) defined strategies to fail intelligently. Different types of failure will require different strategies, given that the context and the reasons they might happen are different.

LEAN AND MISTAKES

In Lean philosophy, mistakes are not viewed as failures but rather as opportunities for learning and improvement. The Lean approach encourages a culture of continuous improvement, where identifying and addressing mistakes is an integral part of the process. This perspective aligns with the broader Lean principles of minimizing waste, optimizing processes, and creating value for the customer. The Lean literature is wide in its approach to dealing with mistakes; we highlight some of the core concepts from our review:

Mistake proofing

Nakajo and Kume (1985) observed that humans are prone to making mistakes in the face of complex information or when subject to various interpretations. Mistakeproofing "makes it impossible for an error [mistake] to occur or makes the error [mistake] immediately obvious once it has occurred" (ASQ, n.d.). The process of mistake-proofing involves a thorough examination of mistakes, analyzing their consequences, and implementing measures to prevent their recurrence (Nakajo and Kume 1985, Shingo 1986, Godfrey et al. 2005, Tommelein and

Demirkesen 2018). In the event of an error, the aim is to detect the error as close as possible to its occurrence to minimize associated damages.

In construction projects, mistakes can stem from misinterpreting information or individual judgment. Within the framework of Built-in Quality (BiQ), mistakeproofing principles contribute to fostering a culture of prevention and enhancing people's awareness of improvement opportunities (Shingo 1986, Tommelein and Demirkesen 2018).

First Run Studies

FRS involves prototyping production processes to gain insights and identify areas for enhancement. This aids in developing efficient operations that align with established expectations (Ballard and Tommelein, 2016; 2021).

Continuous Improvement and Plan-Do-Check-Act (PDCA) Cycle

Mistakes are seen as valuable learning opportunities. When mistakes occur, they provide insights into what went wrong and why. Understanding the root causes of mistakes allows organizations to implement changes that prevent similar issues in the future.

Lean philosophy emphasizes continuous improvement, also known as Kaizen. Mistakes are considered important feedback for this improvement process. Teams are encouraged to analyse mistakes, make adjustments, and implement changes to enhance processes and outcomes.

PDCA involves a cycle of formulating hypotheses, conducting experiments, testing, and acting based on the outcomes. The emphasis is on learning and perpetual enhancement by implementing corrective measures and averting the recurrence of issues. This iterative process is set in motion either through proactive planning, execution, and the identification of improvement opportunities or as a response to the failure to deliver high-quality products (Shewhart, 1939; Deming, 1986).

The PDCA cycle is a fundamental concept in Lean. When mistakes happen, the PDCA cycle plans improvements, implements changes, checks the results, and acts on the findings. This iterative process ensures that organizations are continually refining their processes.

Root Cause Analysis

When mistakes occur, Lean principles encourage a thorough investigation into the root causes. This involves repeatedly asking " why " to uncover the underlying issues rather than addressing only the surface symptoms. By addressing root causes, organizations can implement more effective and sustainable solutions. It is a methodical approach to learning from breakdowns or failures, promoting continuous learning and improvement (Fischer et al., 2014

Blame-Free Culture:

Lean promotes a blame-free culture where individuals are not punished for making mistakes. Instead, the focus is on identifying systemic issues and finding solutions collaboratively, and allowing for innovations to happen (Angelis and Fernandes, 2012). This approach fosters a positive and open working environment, encouraging employees to share insights without fear of reprisal, which is connected with the concept of Psychological safety (Edmonson 1999).

Respect for People:

Lean philosophy places a strong emphasis on respecting people and their contributions. This includes recognizing that everyone is fallible and can make mistakes. Organizations can create an environment that encourages creativity and problem-solving by acknowledging mistakes without blame.

In summary, the Lean philosophy views mistakes as opportunities for improvement rather than failures. Embracing a mindset that values learning, continuous improvement, and a blame-free culture helps organizations foster innovation and resilience in the face of challenges.

METHODOLOGY

The research questions are:

- *RQ1: what are examples of the three types of failure in construction (basic failure, complex failure, and intelligent failure)?*
- *RQ2: what strategies can we use for each type of failure in a construction company?*

This paper uses exploratory case studies (Yin, 2013) to analyze documented mistakes and lessons learned documented by a General Contractor. The researchers also worked on the construction company at the time of the research and had access to several data points. The following data inputs were used to explore the kind of mistakes or failures reported by employees:

- Cases were documented through Building Quality Builders (BQB) classes (Arroyo and Gomez 2021, Arroyo et al. 2022), where project participants were asked to share a story on the misalignment of expectations resulting in rework. Please note that not all these examples happened at their current employment; some of these stories are from early in the person's career, and many happened in a different company. Both researchers are also facilitators of this class.
- Insurance claims and lessons learned from them. The first author participated in a one-day workshop prepared annually by the insurance team, where several instances of mistakes were studied and analyzed. The results of these findings are not shared publicly. However, it helped guide the selection of cases to understand typical problems or mistakes in the construction industry.

This study does not present a comprehensive study of all mistakes that happen in the company. Rather, we are more interested in understanding the nature of the mistakes and examples to categorize them according to Edmonson's (2023) classification: *basic failures*, which are preventable in nature; *complex failures* that happen when multiple people and factors interact in somewhat unpredictable ways; and *intelligent failures*, which are calculated risks to learn something new. After understanding the nature of each type of example we propose strategies to deal with them based on the literature review and the company best practices.

RESULTS AND DISCUSSION

The following section presents examples of each type of failure documented in the BQB class and discusses strategies to prevent them.

BASIC FAILURES

There is no shortage of basic failure examples in the data set; in every BQB session, people tell their stories of misalignments of expectations and re-work. Here are some that we are qualifying as basic failures because they are preventable and with low uncertainty:

Wrong layout.

"Had a surveyor measuring floor levels for a building tie-in and did not communicate long enough about his exact scope. I took measures, and I assumed he was going to pull measures off a benchmark on the print and correlate back. He never saw the benchmark on the drawing and used a "0" datum. Luckily we caught later that a BM on the drawing for first floor was off that tied into the whole civil package." – Senior Superintendent

This mistake is clearly a human error, easily preventable by setting a clear benchmark for surveying and making sure all surveyors know such a point was defined; the cause of this could have been a lack of communication or knowledge from the surveyor.

Bathroom Pod manufacturing error.

"*At (Bathroom Prefab Facility), consistency is key. We had a lack of communication recently which resulted in not installing a piece of door trim consistent with the customer approved mock-up bathroom pod. This resulted in rework for about 30 pods. This could have been easily avoided with a simple visual board showing expectations, or just a look at the mock-up pod." – Production Control at Prefab*

To prevent the mentioned mistake, ensure consistent communication and adherence to customer-approved requirements; the cause could have been a lack of internal communication in the prefabricated plant or a lack of education of plan workers. Readily available visuals in the field are also a great way of avoiding basic failure.

Ordering the wrong equipment.

"During my first internship, there was a discrepancy with the data communication and power supply equipment as 1-phase power supply was ordered on bulk while the equipment called for (in the specs was*) 3-phase power. The project was a demolition, add-on to existing Main Computer Room .... the facility was the main operation center for the airport.." – Project Engineer*

The need for constantly back-checking information is crucial in construction, especially for bulk and long lead items. Ordering the wrong equipment can have devastating consequences for the project; clear roles and responsibilities and diligent checking of documentation are needed.

Concrete finish unrealistic and misaligned expectations.

"On multiple projects recently, polished concrete has been a finish chosen by the project architect. As it is a trending finish these days, the designers love the look of the concrete in small doses and then tend to apply that look to large format areas and typically it doesn't work or doesn't meet with clients expectations. The design team has an acceptable level of defects in the concrete but it is rarely ever completely understood by the client and rejected because of the misunderstanding or miscommunication of what's expected. Everyone loves a 10' x 10' mock up in a controlled environment, but in the harsh realities of construction, the end product is very difficult to deliver to a client or designer who wants a level of perfection that cannot be provided." – Senior Superintendent

This mistake is preventable by setting a clear expectation of what level of finish can be achieved on a large scale for concrete; the cause of this could have been a lack of communication from the contractor to educate the architects and owner. We have seen other teams clearly defining metrics for success in Concrete. Making Mock-ups more realistic is key to success.

"On our project, we are having a misunderstanding between the owner & architect and the concrete contractor. The owner knows the look they want, and they know 1 way to achieve it, but it requires a lot of rework. They've specifically said they want to minimize the rework on this project while achieving the same look. The concrete contractor has been stood down multiple times to review that the owner wants them to control everything they can to minimize the rework. Part of the struggle is based on the assumptions at buy-out and going the extra mile in the field and making sure the terms are fair to all involved in putting the work in place. Getting the trade partner to slow down and focus on the quality has been a difficult process and they haven't had a real "win" yet." – Project manager

In this case, the owner knows what they want; however, the conditions for the trade partner to execute the job were not aligned early on during the buyout process.

Strategies to prevent basic failures.

Some human factors that create basic failure are inattention, neglect, overconfidence, and faulty assumptions (Edmonson, 2023). We can see those across the examples displayed in the previous section. Typically, basic failures do not have a huge impact if they are caught early on; however, if we keep making the same mistakes as in the case of the bathroom pods, this has severe negative consequences for the project and the company. What are strategies to avoid this type of mistake, and what can we do at a company level? Here are some strategies from the literature review:

- **Befriending error**, according to Edmonson (2023), human beings hate to be wrong, and naturally, this induces shame; we see admitting a mistake as a choice vs. protecting our self-image. To choose to learn is to choose to go past our instincts of finding excuses to protect ourselves from shame. Psychologists have studied *fundamental attribution error* bias; Edmonson (2023) provides a clear example: If I am late to a meeting, it is because the traffic is terrible. If my colleague is late to a meeting it is because he is lazy or disorganized. For people in the construction industry, this is hard; the way the information is requested to learn from a mistake, the way that supervisors respond, and whether there are personal consequences will affect the willingness of a person to speak up; these behaviours set the norms of the project. It requires a psychologically safe environment.
- **Befriending vulnerability**, in addition to befriending error, we must have the courage to admit mistakes and be willing to dig deeper to see one part of it, regardless of how large or small. Edmonson (2023) states that the practice of admitting errors is good for two reasons: one, it makes it easier for others to do the same, and second, other people will see you as more approachable and trustworthy. Brene Brown make the topic of vulnerability relevant, and it is deeply connected with shame (Brown, 2015). The practice of sharing failure stories in the BQB training during the first session helps with both befriending error and vulnerability. Anecdotally, when people do not have a failure story to share from their carries, it brings a warning sign for facilitators; maybe the person is not open to learning yet. However, as the weeks go by in the BQB training people relax and bring up personal failure stories more naturally.
- **Safety first policies** help create a "habit of excellence" when people commit to attention to detail and a culture where every employee is willing to push back against unsafe practices and point out others' small errors; it creates the basis of a psychologically safe workplace. This is consistent with what we have seen in practice when safety leadership encourages and promotes a culture of excellence that every employee is part of., we believe will bring long-term benefits for quality, work environment, and profitability too.
- **Culture of blameless reporting**. Expect and catch errors. A lean example of this is the Andon Cord that Toyota created, where any worker in the manufacturing plant can report a mistake, then the supervisor comes, and together they assess the error and find a solution; if they can't solve it quickly, the line stops. Blameless reporting is key; the promise is that reporting will not be penalized (Edmonson, 2023).
- **Codification (or checklist):** Learn as much as you can from failures, then codify it and create checklists. Gawande (2009) has studied extensively the benefits of checklists in the medical field. However, checklists are not infallible, and they need to be updated

and adapted to the context, especially in construction settings where buildings have unique expectations according to local regulations and owners' needs and wants.

- **Preventive maintenance** programs: processes like identifying distinguishing features to align on measurable acceptance criteria for the project (**add our DFs papers here**), pre-construction meetings, and built-in quality (checking own work before passing it on) can help identify misalignment of expectations of the final product, communicate the right sequence, and catch mistakes as early as possible respectively.
- **Required Training** is key to avoiding basic failure; industries such as aviation are at the forefront of preparing pilots for flying in the first place. Unfortunately, construction industry segregation and hyper-segmentation make the base knowledge very variable; many construction workers are trained by the union, but that is not universal everywhere in the USA. Also, the hourly pay system makes it harder for the project to make the budget and time to educate workers.
- **Error-proofing, or Poka-yoke,** originated in the Toyota production system. This is a very practical tool in the construction industry, too. Tommelein (2008) presents examples to illustrate how mistake proofing applies to the work done within one specialty trade, how manufacturers and fabricators can design their products so they cannot be constructed defectively, and how architects and engineers may conceive of system designs that are less likely to fail during construction or in a product's life cycle. In the case of the GC, one of the bathroom pods, the workers created a Poka-Yoke tool, a C-shaped wood assembly that will help to measure that the total dimension of the pod is within tolerances.

COMPLEX FAILURES

Complex failures are harder to document and understand the whole story. This happens in a more complex environment and is not easily preventable. According to Edmonson (2024), they often include at least one external seemingly unforeseeable factor; here, it is easy to think about supply chain issues during the COVID-19 pandemic that was not foreseeable for most construction projects going on at that time. Another typical unexpected factor is severe weather conditions. The following are some examples of recent complex failures reported by BQB participants where the main issue is a misalignment of expectations among several parties or mistakes where many stakeholders interact:

Managing Tolerances

"…On an exterior of a building to meet schedule and long lead time items we ordered Metal Panels, Concrete Panels and Curtain wall with "Hold to dimensions" Tolerances that threw this work off were the 1st two installations were the Concrete slab on grade and the Steel. These were both installed per their tolerances but it would ultimately throw off the framing, curtain wall, and everything following it. The architect's intention was for the joints of the concrete and metal panels and curtain wall to match, lights, and architectural shade devices to match as well. Some hold to dimension were unachievable because the steel and concrete didn't allow for all of the next finishes to be installed properly and keep the hold to opening sizes. Some of the framing and blue skin and roll on water proofing thicknesses didn't match the mock ups and the variances in the framing didn't allow for proper alignment of the supporting bracket for the Metal and Concrete panels. Several trades had to do quite a bit of shimming and added work to make this work out. Lots of rework in general and the start of all of this work from was tolerances." – Super Intendent

We classified this as a complex failure; there are several components coming together, the team preordered material ahead of time and when installing it the tolerances of all the assembly did not work. Even though tolerances are a known problem, the variance of materials is hard to predict, in addition the was added mistakes in the thickness of the materials received vs the ones the team used in the mock-ups, not sure is this was a procurement mistake or material variation. Finally, the last trades installing had the worst conditions to execute their work.

New Flooring Material Installation

“The client and designer had never before specified or worked with a specialty flooring material (concrete based). Additionally, the flooring material had never been attempted in the city where it was intended to be installed. After a lengthy qualification and bid process, we selected a installer (who met the requirements of the specifications). We performed several mockups, with multiple configurations (stair nosing's, reveals, strips). During the pre-construction portion of the project, the owner stressed the importance of maintaining the schedule and controlling of costs. Once a large section of flooring was installed, the owner was displeased. The designer reached out to factory representatives, and industry experts, who explained the limitations of the product (hazing, wavy finish, cracking at sharp corners). In the end, the owner was painted in a corner (leaves one with no good alternative or solution), no option to remedy the unpleasant installed product, no budget or schedule remaining to pursue other options (hard tile, terrazzo, lvt, etc). Everyone walked away empty.” -Regional Quality Leader

This example was hard to classify because it started as an intelligent failure by recognizing uncertainty in the use of a new flooring product, apparently seeking to innovate with a new product, and making mock-ups to learn and select the right installation partner. However, it is not an intelligent failure because of the big risk taken when the review with the client was made, “*Once a large section of flooring was installed, the owner was displeased”.* The team did not allocated enough resources (time and money) to explore alternatives to this new product if it did not meet owner’s expectations. Basically, it was not planned to be an experiment. They understood the limitations of the product when applied at a large scale after there was no option to change it.

Strategies to learn and prevent complex failures.

In this section we discuss some strategies to prevent complex failures pointed out in Edmonson (2023) in the context of construction projects considering the previous examples:

- Learn from past complex failures. One of the tools this GC uses that can help in this process is Cause Mapping, where several courses can be understood to lead to the failure. The team can decide to implement changes in multiple aspects of the process, this can be applicable to any complex failure in constructions, from tolerances to unwanted finishes.
- Pay attention to early warnings. In this context, some of the early warnings are new materials, new assemblies, and new trade partners. In addition, having a culture that supports project team members raising issues that can lead to mistakes downstream is important. In the case of tolerances issues, a warning before buying metal and concrete panels and coordination early with trade partners can help.
- Leverage the recovery window: Mock-ups- give a recovery window; between what we can learn from the mock-up and the actual installation, there is a window of opportunity for learning and changing the plan; if mock-ups are planned with enough anticipation, construction teams can learn to change the sequence, materials, finishes, among other aspects of the work. Learning from issues in the same building also provides a recovery window. If you have a repetitive construction project and make a mistake on the floor 1, you can improve on floor 2, and so on.

- Welcome false alarms: Edmonson (2023) highlights the strategy of creating a Rapid Response Team (RRT) so employees can raise concerns to them, regardless of them being a false alarm; she provides the example of Andon cords in Toyota. Can we have experts ready to help when a problem starts in construction? This is an interesting approach; many construction companies have expertise in-house, but are experts available and ready to be summoned when needed?
- Embracing the possibility of failure to reduce the occurrence of failure, again practicing, rehearsing, testing, and learning from it is key. The use of first-run studies in construction presents an opportunity to learn in a more controlled environment, Tsao et al. (2000) present an example of how this is applied in metal framing.

According to Edmonson (2023), organizations that do well at avoiding complex failure are not because they somehow figure out how to eliminate human error; on the contrary, they have good records because they learn how to catch and correct errors. That takes practice and includes a culture that celebrates it. Moreover, Edmonson (2023) states "*It's not possible to build a contingency plan for every failure. But it is possible to build the emotional and behavioural muscles that allow us to respond to human error and unexpected events alike with speed and grace.*"

INTELLIGENT FAILURES

Intelligent failures, by definition, happen under uncertain conditions, and they are not preventable because you are testing something you want to learn in new territory. In general, innovation projects and pilots are classified in this category. According to Edmonson (2023), how to tell if a failure is intelligent includes:

- It takes place in a new territory.
- Opportunity driven.
- Informed by previous knowledge.
- As small as possible. Limiting risk exposure.
- Bonus: You learned from it.

The following is an example of an intelligent failure as reported by BQB participants:

Exterior Skin Mock-Up alignment

"We had a very complex exterior skin system with Terracotta tiles. The drawings and specs called out for a specific standard joint dimension, and the specs allowed for a certain tolerance in tile sizes. The mock-up was built, and although it held to the requirements in the contract documents, the design team still did not like the aesthetic. New MACs (Measurable Acceptance Criteria) *had to be negotiated, which was a long and painful process. Fortunately, we discovered this misalignment at a mock-up and not the final install."- Project Engineer*

This is an intelligent failure because the team was able to learn from the mock-up of the exterior system, which is a calculated risk, and understood how to achieve all requirements in addition to the owner's expectations that were not aligned with the trade- partners at that point, which avoided failure at the final installation. As the project engineer reports the process was long and painful, probably because they were learning and adjusting to the new understanding.

Promoting intelligent failures and learning from them.

How do we promote intelligent failures in construction teams? How can we ensure they are willing to take calculated risks to learn something new? According to Edmonson (2023), here are some high-level strategies to overcome barriers to failing well (Figure 1):

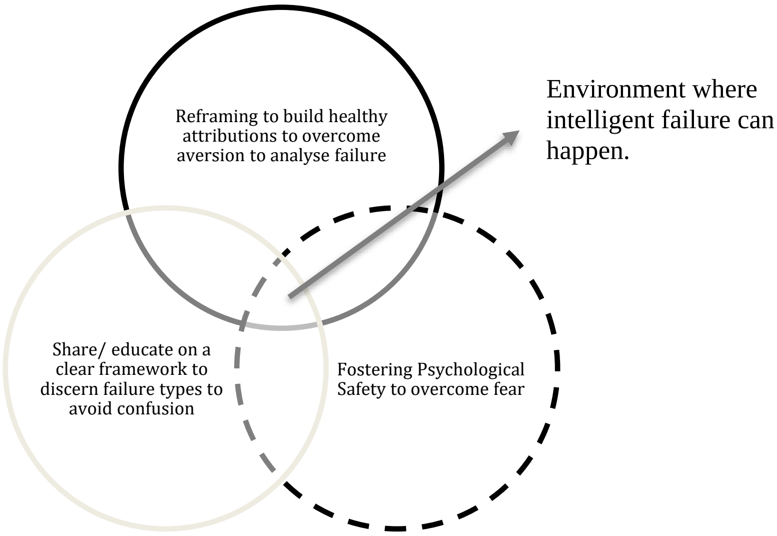

Figure 1: Strategies for creating a culture of intelligent failure.

How can we create a psychologically safe environment in construction? According to Gomez et al. (2019 and 2020), some key skills people must develop are active caring and active listening. None of these skills are common in construction. However, they can be improved if training and practice are provided. It is also important to assess how psychologically safe a project or team is. Doing this opens the possibility of sharing ideas for improvement.

How can we have a healthy attribution to the failure and be willing to understand what role one has played in it? First, we must understand our human pre-conditioning, such as acknowledging that learning from our failures is hard, accepting negative feedback and learning from it does not come naturally to most people, accept that we are blind and limited by our previous experiences. Therefore, our emotional preparation, and the culture we are working on takes a big part on the possibility for learning from intelligent failure or any other type of failure. Edmonson (2023) recommends practices that allow us to learn from failure:

- Thinking carefully about what went wrong and what factors might have caused it. This means avoiding the human tendency to skip the analysis and think we will try harder next time.
- Analysing what different causes of the failure suggest on what to try next. This is particularly useful for creating new best practices for new projects in similar circumstances.
- Digging in to understand your own contribution to the failure (small or large) means avoiding self-serving analysis.

Additionally, to allow for intelligent failures, project teams in construction must set aside the right resources to try new things. For example, many projects do mock-ups with the intention of succeeding in them and probably unconsciously avoiding the potential for learning. Ideally, a mock-up is representative of how the work will be performed at a large scale, and we are testing different ideas; this means that the result of the mock-up can lead to changes in materials or construction assemblies. We wonder how many projects are set up to allow for that learning to happen. In practice, many projects do not have other options to move on with whatever the result of the mock-up is because there is no time allocated for changes. Building a project to allow for true experimentation and learning requires a different setup; an Integrated Project Delivery (IPD) project can probably set the stage for intelligent failure if the right culture is in place.

Finally, education to recognize the different types of failure helps to know when you are dealing with an intelligent failure, which avoids confusion and creating the right incentives.

CONCLUSIONS

This paper studies different types of failure in the construction industry and the human aspects implicit in the possibility of learning from failure. We also illustrated cases of failures in the construction industry and offered a possible categorization within the failure types presented in Edmondson (2023). Understanding failure and its different categories helps us understand what reasonable strategies are to prevent basic failure, learn from complex failure, and encourage intelligent failure in the General Contractor company and in construction projects in general. More research is needed to test recommended strategies in the context of construction projects and see potential improvements. In addition, researchers are curious about how these failure classifications could help teams approach construction mistakes differently, how to train people to reframe their relationship with failures, and how to create a psychological safety culture at a large scale in construction to improve our learning from all types of failures.

ACKNOWLEDGMENTS

DPR Construction, including several employees who have attended Building Quality Builders training over the years, supported the development of the ideas presented in this paper.

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