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FULL REPORT

Leveraging Productive Failure to Deepen Adult Teaching and Learning

A toolkit for adult educators to design lessons based on the Productive Failure approach

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Presented to you by the IAL Productive Failure Project Team

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Innovation Centre, Institute for Adult Learning

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Preface

In 2022, the Innovation Centre at the Institute for Adult Learning embarked on a project to translate Productive Failure[1] (PF) principles for adult teaching and learning to facilitate deep learning amongst learners and build critical core competencies within the Training and Adult Education sector. Eight adult educators (AEs) from diverse backgrounds in the Singapore TAE space participated in co-developing PF for Adult Learning. Each AE participated in two expert-guided rounds of design and development sessions, followed by piloting their PF informed teaching and learning approach. This experimentation process also covered evaluation and validation of the PF infused lesson design and delivery. In concluding how PF applies towards adult teaching and learning, insights from the AEs and their learners were also taken into consideration in this report.

This toolkit guides the AEs to design lesson plans based on the PF approach. AEs are encouraged to utilise their experience and creativity to design their own lessons accordingly. The PF design principles are carefully expounded with key learning points gleaned from the pilot study undertaken by the adult educators from different organisations and contexts, guided by Prof Manu Kapur, Professor Learning Sciences and Higher Education, ETH Zurich, Switzerland.

We would like to acknowledge the AEs who have contributed to the development of the guide and toolkit: Mr David Hendrick Jr (Healthcare), Mr Goh Jiang Rui Eugene (Healthcare), Mr Goh Kaw Sen Karlson (Education), Mr Guo Qiang (Training and Adult Education), Ms Jasvindar Pal Kaur (Education), Mr Khairudin Bin Rahmat (Healthcare), Mr Muhamad Sharul Bin Abdul Latib (Built Environment), Mr Peter Tan (Security), Prof Siti Shaireen Selamat (Early Childhood Education) and Mr Vasanth Sankaran (Training and Adult Education).

Do reach out to the team if you wish to implement PF initiatives in your lesson design and implementation. You can email inlab@ial.edu.sg and/or nilanjana@ial.edu.sg for more information.

Finally, the IAL PF team is pleased to present the PF Toolkit to you as a companion guide to underpin your own experimentation in pedagogical innovation.

Best wishes

IAL PF Team

- A/Prof Sim Soo Kheng
- Ms Nilanjana Saxena
- Dr Bi Xiaofang
- Dr Michael Choy

[1] The Productive Failure methodology utilises a problem-solving approach to get learners to first generate solutions to specially designed challenges. Subsequently, the adult educator builds on learner-generated solutions to distil and co-construct the targeted concepts with the learners. The entire process is deeply experiential and learner-driven within a social collaborative environment.

1. Why Productive Failure? – An Adult Educator's Journey

If you are an adult educator (AE) looking at employing PF methodology in your training or lesson design, you may wish to know that the learning curve may be steep at the start due to the lack of familiarity with the process. See this vignette on what an AE struggled with but eventually mastered the competencies linked to conducting a PF-infused lesson. The key point is put on your seat belt, your thinking cap, and enjoy the journey.

My Journey with Productive Failure

From confusion to clarity, and on to commitment – that summed up my journey when I was learning to use the Productive Failure approach in my lessons. I struggled initially, firstly to grasp the key concepts such as Generation, Exploration, Compare and Contrast, and Consolidation and secondly, to conduct the highly facilitated learner-driven lesson. While I am not a novice AE, I did find PF unfamiliar in sequencing problem-solving before instruction. For my adult learners, I had to convince them to trust the process and work through the issues to arrive at the solution. Several learners were frustrated when they did not know how to begin the role play that I assigned to them to complete, simply because they did not know the steps. They had not been taught. With doubtful eyes and reluctant hearts, some did attempt to work through the role play.

Once the learners embarked on the role play despite their apprehension, the energy and enthusiasm took over and the learners did not let the lack of understanding stop them. In fact, they were creatively generating new steps to reach the outcome the best they could. I was stunned to see the output of their trial and error. Many groups made decent attempts and even if they fell short of excellence, their output was commendable. Even more so, their endeavouring spirit was inspirational. I was blown away when one group could uncover some of the key steps themselves without being taught specifically. Another group could through their self-reasoning and logic, figure out why and how they needed to perform the task using other ways. Amazingly, their approach could really work in real life. In all fairness, the learners worked through the problem themselves and arrived at the solution in good time with reasonable outcomes.

Subsequently, I consolidated the learning by assembling the concepts suggested by the groups, linking their learning with the theoretical constructs. In this case, learners debated their actions, defended their decisions, and actively voiced their thoughts to deconstruct their learning experience and my role was to direct their attention to critical concepts to facilitate deep learning.

I learned an important lesson during this PF session – I can give more credit and autonomy to my learners, to let them drive their own learning and co-construct their knowing. With peer support and a carefully designed lesson, my learners can benefit from the PF experience, especially when learning a key concept for the first time. The journey they undertake makes the learning a lot stickier and is more life-transforming than any presentations that I can make.

I guess you can call me a die-hard fan now!

2. What is Productive Failure?

Productive Failure[2] embodies constructivist principles, where failure is deliberately designed into the learning, to imbue learners with resiliency and learning agility. These are much needed skills as jobs are transformed by new technologies of the Fourth Industrial Revolution (World Economic Forum[3], 2020).

The PF learning environment is designed deliberately to provide learners with the opportunity to innovate solutions while exploring complex and novel problems. This guided exploration also allows learners to activate and differentiate relevant prior knowledge, generate multiple representations of problems, and thereby develop skills needed to solve "wicked" real-world problems.

The central tenet of the Productive Failure methodology is that failure, when well designed, may be beneficial for learning, especially in developing conceptual understanding and transfer (Kapur, 2015; Sinha & Kapur, 2021). According to Kapur, (2015), Productive Failure is a learning design that encourages learners to generate solutions to a novel problem that involves a concept they have not learned yet, followed by consolidation and knowledge assembly where they learn the targeted concept. Because learners have not learned the concept, and further, are asked to generate solutions without any cognitive support or scaffolds, they can be expected to use their prior knowledge to generate sub-optimal or even incorrect solutions to the problem. However, the process can be productive in preparing them to learn better from the subsequent instruction that follows.

A critical feature of PF is therefore not to provide cognitive guidance or support during the generation and exploration phase. The design of the tasks, activities and social surround is developmentally calibrated with each group of learners, through multiple iterations of pilot-testing, refinement, and implementation.

Compared to instruction-first (followed by problem solving) approach which is typically used to reduce learner errors by guiding learners to learn the concepts before they practise or apply their learning. With direct instruction, the targeted domain concepts are formally introduced to support solution schema construction before they undertake problem solving in the subsequent phase (Stockard et al., 2018). In problem-solving first (followed by instruction) approach, learners are given opportunities to explore critical domain features on their own (Loibl et al., 2017). The design incorporates an initial exploration phase where learners use prior knowledge to generate solutions to novel problems, followed by an instruction (or consolidation) phase comprising presentation or practice (Kapur & Bielaczyc, 2012).

As such, the desired outcomes from the use of the design principles (DPs) in the Productive Failure approach are to:

- strengthen conceptual connections within the content areas
- deepen learning (e.g. application and transfer of learning to diverse and different contexts)
- develop learner adaptive capacity through generative and exploratory learning

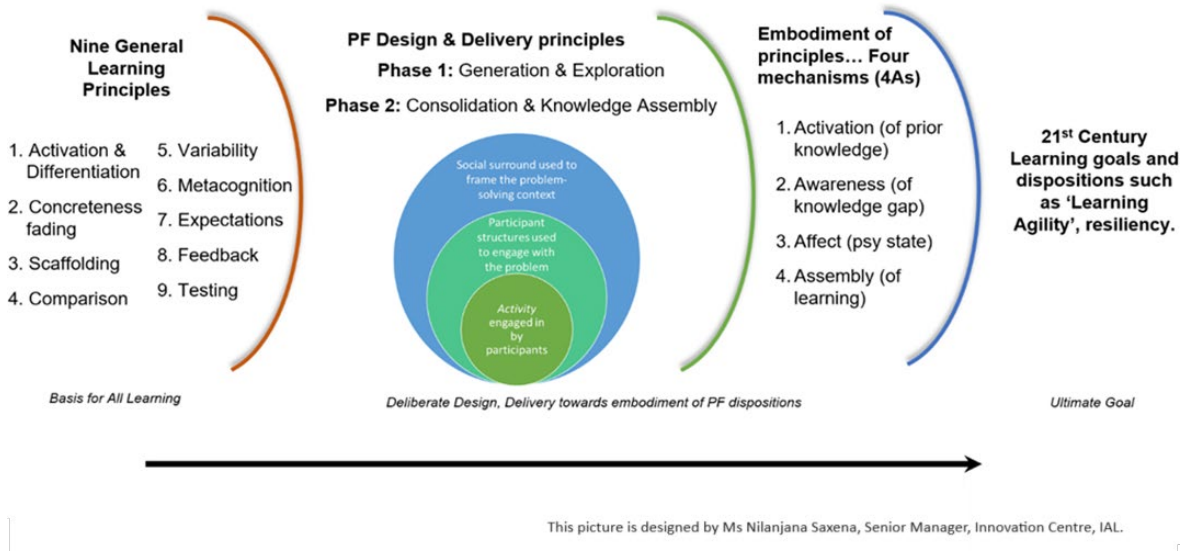
[2] As detailed by Kapur & Bielaczyc (2012), PF has a two-phase design: a generation and exploration phase (Phase 1) followed by a consolidation phase (Phase 2). [Kapur, M., & Bielaczyc, K. (2012). Designing for Productive Failure. *Journal of the Learning Sciences, 21*(1), 45-83. https://doi.org/10.1080/10508406.2011.591717]

[3] World Economic Forum. (2020). Why we need a global reskilling revolution. *World Economic Forum Annual Meeting*, 1-6. https://www.weforum.org/agenda/2020/01/reskilling-revolution-jobs-future-skills/

3. Digging Deep into the PF Design Principles and Mechanisms

The PF design principles are founded on nine general learning principles (e.g. activation and differentiation, scaffolding, metacognition) which govern effective learning activities and approaches. Learners engage in solution construction triggered by the problem presented in phase 1, followed by knowledge assembly to build their understanding underpinned by their solution construction experience in phase 2. See Figure 3.1 below for more details.

Figure 3.1. Illustrating the relationship among the nine general learning principles, the PF model, and the four mechanisms (4As), culminating in 21st century learning goals and dispositions



This picture is designed by Ms Nilanjana Saxena, Senior Manager, Innovation Centre, IAL.

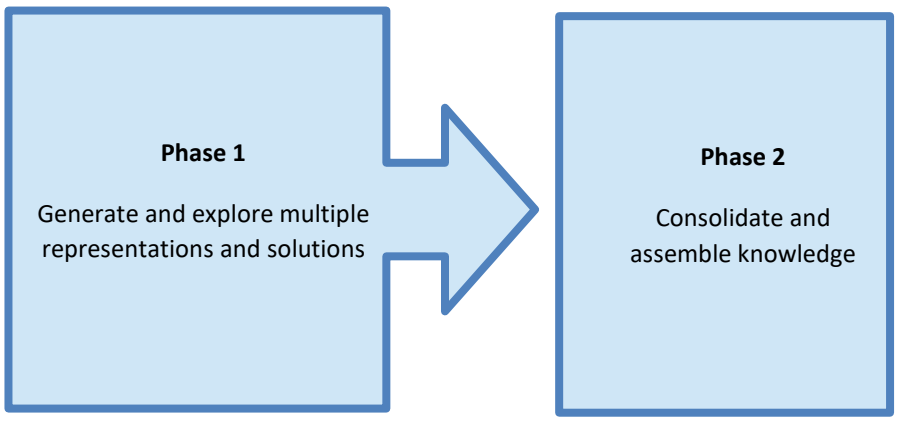
In effect, in the learners' journey through the PF lesson, the four mechanisms (of Activation, Awareness, Affect and Assembly) become evident with learners retrieving prior knowledge to resolve challenges, increasing awareness of their own knowledge gaps, staying motivated within a secure psychological space and constructing their own learning (sense-making) as the lesson progresses. Throughout the entire PF process, AEs have to be mindful of the learners' internal struggles and provide support when needed to ensure learner success even if they may struggle somewhat at the start.

The goal is to develop the meta-competencies and capabilities such as learning agility, resilience, and adaptability, preparing learners for the future work landscape of change and transformation.

3a. Two Phases to Design and Conduct of PF Interventions

In this section, we will examine the PF design principles in detail. As shown in Figure 3.2 below, PF interventions are designed to span two phases.

Figure 3.2. Showing the two phases for the design and conduct of PF-infused lessons



When designing PF-infused lessons, there are two broad phases: **phase 1, Generate & Explore,** followed by **phase 2, Consolidate and Knowledge Assembly**. Learners undertake different activities in both phases. In phase 1, learners leverage their prior experience with peer inputs to propose new solutions to challenging problems. Subsequently, in phase 2, learners make sense of their earlier endeavour by linking their learning with the theoretical concepts presented to consolidate their learning.

3b. The Design Principles: Activity, Participation Structure & Social Surround

During the lesson design and implementation process, the three design principles (Activity, Participation Structure and Social Surround) guide the AEs how to apply the PF approach, according to the respective phases:

- Phase 1: The learners engage in creative solutioning to generate outcomes based on their own experience, prior to any theory-building by the AE.
- Phase 2: The learners construct their understanding through consolidation efforts by their peers and AE to draw together key learning based on the outputs from phase 1.

Table 3.1. Showing the design principles across the two phases for PF-infused lessons

Design Phases	Activity	Participation Structure	Social Surround
1. Exploration & Generation	Design and conduct activities that are adequately complex with *variant-invariant features* to bring about failure in problem-solving, engaging and drawing on learners' experience	Facilitate collaboration among mixed-ability groups to explore solutions and generate thinking and reflection	Set up a safe environment for learners to explore and generate by setting expectations of conduct underpinned by socio-emotional support
2. Consolidation & Knowledge Assembly	*Compare and contrast* learner-generated ideas and distil into critical principles or content for assimilation	Facilitate group discussions and presentations with learner engagement and generation of solutions to arrive at *critical features*	Create a safe space for learners to review, improve and learn from the generated solutions and representations without fear of judgment

For AEs intending to apply PF to their instruction and learning design, do bear in mind that the outputs from the problem-solving activities in phase 1 should drive the consolidation process in phase 2. To put it simply, the quality of the learning in phase 2 depends on how able the learners are in exploring and generating their own solutions in phase 1.

Ensuring a psychologically safe environment is key to the exploration and generation phase so that learners feel uninhibited to share their ideas. Peer learning processes empower learners to play an active role in developing new understanding, positions, and solutions to problems, facilitated by occasional interjections from the adult educator. The learners can move from an initial exchange of gathered information to a state of knowledge co-construction. Being responsible for the outcomes from joint activities builds trust and ownership of the learning space when learners voice their ideas. Sharing this responsibility promotes dialogic exchanges which can be useful to prepare learners for future work.

Likewise, learners should be receptive to the theoretical constructs put forth in the second phase of the lesson. Feeling psychologically safe is important for opinions to be voiced and accepted.

Let's dive deeper into the PF design principles to find out what they mean exactly.

3c. The PF Design and Delivery Principles Unpacked

Phase 1: Generation and Exploration

Table 3.2. Showing the unpacked design and delivery principles of phase 1

Activity	Participation Structure	Social Surround
• Create intuitive hooks or lesson triggers to increase learner motivation • Encourage learners to generate multiple answers and solutions • Leverage variant-invariant features to create issues and challenges in problem-solving • Use contrasting cases to facilitate comparisons • Ensure contextualisation of cases for application	• Enable collaboration in mixed ability groups • Support learners to collaborate through lesson and activity design • Deepen learner thinking by facilitating conversations and reflections	• Create a safe space to generate and explore ideas • Establish behavioural guidelines based on socio norms and values (specific to the content and culture) • Provide affective support to promote learner persistence

Given that the three design principles work together, the AE needs to facilitate the learning activities within a safe social surround environment, guided by the participation structures (peer learning). Described below are some of the AEs' and learners' comments and observations:

AE (Adult Education, pilot 01): *It's important to make sure that in social surround, to consider the design principles for social surround and how to be creative, that safe space and generate them get into explore. So, we have to allow encouragement, but more importantly, as a facilitator, is to set the stage right. Initially, that's why the ground rules and all this come up …*

In the same way, learners participate in the activities and enrich their own learning space.

Learner (Early Childhood course, pilot 01): *It's like a student led session or rather student discovery session… (for AE to) give us a task and then as we discuss about it, as we discover it and then after that, we went around to talk (to) other groups and then after that, we could defend our own thoughts … that kind of bouncing off ideas … it created a richer discussion because of that.*

With the outputs from phase 1, the AE proceeds to consolidate the learning. Seemingly foundational, the challenge is that the variance in the learner outputs generated from phase 1 requires AEs to be agile in assembling these diverse points/solutions to consolidate the learning effectively and efficiently, and that also implies that AEs need to possess a deep level of subject matter expertise and strong facilitation skills to ensure that the learning is effectively carried out. Carefully scaffolding the activities for the learners is part of the process as this approach is new for the learners too.

Learner (First Aid course, pilot 01): … *it's something new because mostly we start from hearing first then followed by hands-on. But this one he used … another approach which is hands-on first and then followed by the theory part so (it is) something new for us.*

Phase 2: Consolidation and Knowledge Assembly

In the second phase, learners are given the opportunity to extract the critical features or first principles from the earlier activities. The contrast in the learner outputs within and among the groups in phase 1 facilitates the theory building in phase 2. Typically, learners undertake the knowledge assembly process themselves, guided by feedback from their peers.

> Learner (Early Childhood course, pilot 01): ... *when I shared about the affirmation, I learn so much from others. The ideas are much better than just from my own because they have so much richness in their experience, so I learn a lot from everyone today.*

The interjection by the AE at critical junctures of the consolidation process is also important to clarify doubts concerning the content. Hence, one AE's competency is to identify the evolving learner needs and the point of interjection to effect the greatest learning impact.

> Learner (Coaching course, Pilot 01): *Of all the scenarios that we actually went through, right, if we could have some sort of demo of what that he would have done, some examples, that will be real, after you have gone through yourself, then how he'll actually do it right. And that will be very interesting to see.*

It is in the consolidation process that the learners, after trialling their ideas or solutions, will receive correction and feedback and in so doing, close the loop on their understanding of the competency, along with other considerations including potential errors and contextual boundaries. See this comment from the AE who allowed his learners to have a go at providing first aid to the simulated casualty.

> AE (First Aid course, pilot 02): *That's the difference that I could see, that people were more engaged, they are more willing to do things, to do more hands on. And then generally, I guess the mood of the class changes. Usually, they're used to first aid class being very one way, I demo straight to you and then you just demonstrate, that's all. But because of this interactive component, they were more willing to do things and try. And if it's wrong, or if it's not the recommended way then we will advise accordingly.*

Journeying with the learners towards the learning outcomes is something that the AE must be constantly mindful of, within the constraints of time and resources.

4. Lesson Plans and Template

4a. Lesson Plan Template

The template (see Table 4.1) is designed to facilitate reflection with questions for the AE developer/designer to determine how to incorporate the activities to bring about the expected responses. The PF principles of Activities, Participant Structure and Social Surround (in the header of the lesson template) frame the design of the lesson plan. The two phases: 1. Generation and Exploration, and 2. Consolidation and Knowledge Assembly will inform the sequencing of the activities over time as learners explore challenges and generate solutions, thus leading to the consolidation of understanding by the learners. The two phases are important and sequenced in this manner to drive deep learning.

Table 4.1. Resources: Lesson plan template

Context: (e.g., Organisations / Sector / Purpose of Training) Intended Learning outcomes: Threshold/Difficult Concept: Issue/Challenge/Problem to be solved: Potential Errors: Task to drive cognitive dissonance: Learner Profile (e.g., experience, cognitive, emotive and sociality levels):						
Time / Duration (min)	Lesson Plan (Activities)	How are the DPs for Activities designed & delivered to achieve the purpose of the Activities? How are these related to the 4As*? Which learning principles have been infused?	How are the DPs of Participant Structure activated in the activities? How are these related to the 4As? Which learning principles have been infused?	How are the DPs in Social Surround used to sustain the activity and participant structure? How are these related to the 4As? Which learning principles have been infused?	What are the intended outcomes in using PF? State perspectives of the learner and AE.	Comments / Resource
Phase 1:						
Generation & Exploration						
Phase 2:						
Consolidation & Knowledge Assembly						

*4As - Activation (of prior knowledge); Awareness (of knowledge gap); Affect (psychological state); Assembly (of learning)

You will encounter a steep learning curve at the start of the journey and the key is to reflect, keep tweaking and improve your practices in the midst of applying what you learned. See the reflection of this AE when he tried PF the second time around.

AE [Adult Education (English), pilot 02)]: … *so what happened was when I jumped in at phase one, all I had to act on a lot of readings, so it was kind of like learn as I go along with the guidance and mentorship of (a peer teacher). But (in the) … second round after the lectures … I have greater confidence … of how these are principles work and how they can be incorporated in the entire process of coding and teaching.*

Take for example, (the concept of) variant- invariant. I was a little bit confused, what it meant. But subsequently for both my own students and for the teachers the workshop that we run, we were able to not just assume but also have check-ins to consolidate what is invariant, what are the base fundamental knowledge, definition, understanding that they have before we move on to the invariant - how do these, how can we modify, how can we change in face of the challenges of phase one.

Let's examine a couple of lesson plans (Coaching 101 and Conduct COJT for Site Auditors) to better understand the PF principles. If you are interested to examine actual lesson plans, see Annex B for these lesson plans.

4b. Sample PF Lesson Plans (Key Highlights)

1: Coaching 101

- Learners explored and generated their own concepts of how coaching can be conducted with minimal understanding of the process drawn from flipped learning.
- There were three rounds of coaching performance where the learners, in groups of 3, were given more complex scenarios to trigger contrasts in performance across groups and scenarios. The confusion showed up especially in the first round of role play as learners grappled with what coaching was, but this cleared up as learners provide feedback to each other after each round, with the facilitator encouraging them along the way.
- Consolidation of learning occurred when the learners were asked to distil key principles from the role play. Further theory-building using demonstration videos at the class level helped anchor the learning further. In the final round of role play, learners could apply what they learned during the consolidation phase while avoiding the mistakes made in the earlier rounds of role play.
- For learners keen to hone their coaching competencies, they could sign up for the individual coaching sessions as a follow-up. This opportunity allows learners to deepen their competencies.

2: COJT for Site Auditors

- Learners prepared their own COJT (Company On-the-Job) plan and are expected to conduct the OJT briefing in different ways without learning how to brief their audience using an OJT blueprint. The different OJT plans resulted in variants to briefing performance across learners.

- The learners engaged in three rounds of COJT briefing followed by peer feedback after each round:
  - Learners were given different scenarios for each round e.g. gov and commercial buildings (for Compare and Contrast activity).
  - They then conducted the briefing on description, safety considerations and resources required.
- Learners compared and contrasted the outputs amongst the groups to distil critical features - components in the "COJT Blueprint" framework, against their own 'method of briefing'.
- AE consolidated the learning on what an OJT blueprint was, followed by the learners reviewing the COJT template to reinforce their learning.
- The learners had to apply their understanding of the COJT blueprint based on a new scenario for assessment.

Both sample lesson plans illustrated the active role of learners in phase 1 activities. Learners generated outputs in phase 1 which were used by the facilitator to consolidate the learning by highlighting the critical features of the activity. While the learners played a dominant role in the conduct of the lesson, the AEs set up the safe environment, provided opportunities for learners to discuss and conducted lesson debriefs to deepen the learners' understanding of the topic. The AEs were the conductors that orchestrated the lesson, for the activities to ebb and flow as learners worked through the tasks to achieve the eventual learning outcomes.

How did the AEs orchestrate their lessons? We will highlight key considerations that you will need to take when designing and implementing PF-infused lessons over the next few sections.

4c. Summary of the Key Learning Points and Errors

Listed below (see Table 4.2 and Table 4.3) are some key issues which emerged from the pilot's runs for both phases.

Table 4.2. Phase 1: Generation and Exploration

Activity	Participation	Social Surround
• The activities do not facilitate the generation of multiple representations and solutions • There were no variant-invariant features to bring about failure in problem-solving • The cases were not contrasting enough, e.g. all learners engage in the same scenario • Computational load was too high, i.e. too difficult for learners to generate solutions	• Collaboration is limited with majority of individual activities. • Insufficient instructions to structure or drive the collaboration • Learning and discussion are superficial with minimal facilitation.	• The space for learners was not safe enough, e.g. rules for discussion and sharing were not clear. • AE did not provide encouragement to the learners.

Table 4.3. Phase 2: Consolidation and Knowledge Assembly

Activity	Participation	Social Surround
• Insufficient opportunities for learners to compare and contrast the learner ideas in order to distil critical features • Lack of debriefing or assembling of the critical features for learners to assimilate the key principles and competencies	• The learners did not individually present their ideas. • The learner explanations were not fully expounded on. • The critical features and their assembly into the canonical form (explanation)	• There was some level of criticism when exploring the affordances and constraints of learner-generated ideas. • As a result, the learners not discussing or questioning the ideas enough for deeper learning

4d. Assessment and Performance Outcomes

Based on the two pilot runs of PF-infused lessons, the evidence of learning gathered includes:

1. Work performance outcomes during training, e.g. role play video clips, practical performance
2. Work outputs after training, e.g. post-training video clips to show improvement at work
3. Performance indicators involving speed, accuracy and competency, e.g. speed in bandaging a casualty correctly
4. Assessment outcomes, e.g. higher scores or faster completion rates
5. Deeper reflections and understanding of the concepts and principles, e.g. articulation of different perspectives in reflections or reports
6. Generation of more creative or innovative solutions and critical analysis, e.g. solutioning of a wicked problem

5. Key Considerations When Applying PF Design Principles

Here, we outline the key considerations that AEs need to be mindful of when implementing the PF design principles. These were the critical elements gleaned from the lessons that AEs learned based on their application of the PF approach over the two pilot runs – pilot 01 and pilot 02. We have separated these considerations into four parts according to the sequence of lesson design and implementation:

a. Aligning the Parameters: AE, Learner, and Content
b. Phase 1: Generation and Exploration
c. Phase 2: Consolidation and Knowledge Assembly
d. Evaluation: Learning and Performance Outcomes

We will examine these considerations in greater detail below.

5a. Aligning the Parameters: AE, Learner, and Content

The characteristics of the adult educators, learners and content interact dynamically during the lesson, often resulting in outcomes which could be different from the lesson intent. It is imperative that you consider these parameters in turn.

- **Alignment of AE's Professional Beliefs with PF Approach**

There is no doubt that your professional beliefs as an AE need to be aligned with the learner-centric philosophy that underpins PF if you wish to embark on this PF journey. The activities guided by PF design principles require learners to take an active role in the enacted curriculum and this was aptly summarised in this comment.

> AE (Early Childhood, pilot 02): *They (AEs) must believe in it. They must believe in the power of the engagement and the fact that you give the space to the students to speak, and that there is no absolute answer there. But there is, you know, there needs to be a space for negotiation, so that you arrive at it together.*

AEs looking to implement PF should also be cognisant that the nature of the content and the types of learners interact to impact the effectiveness of a PF-based lesson.

- **Appropriate Learner Profile**

Here, we are looking at learners who are open to experiment with new ideas and are familiar with reflection and problem-solving activities. As you can discern from the comments highlighted so far, learners and AEs experience a degree of cognitive dissonance and discomfort during PF lessons. There is a tendency for learners to ask for content and for AEs to withhold direct instruction. Letting learners construct their own understanding may be foreign to some AEs. Similarly, some learners may not have the capability to undertake the activities and contribute meaningfully as reflected in this comment by a learner who also trains other courses.

Learner (COTJ course, pilot 02): *it really depends on the audience … because the training that I conduct mostly is, there (are) age factors and language barriers as well. Some might not want to contribute. Some will just listen without understanding.*

The contextualisation of the lesson design to match the learner profiles during the lesson delivery phase is critical to the effectiveness of the lesson. A learner (Early Childhood course, pilot 02) remarked that

> *… not all learners are able to accept this (approach). You have to be prepared to humble yourself, and you need to have the desire to learn. If not … when it comes to this prerequisite, some people will be turned off.*

The PF approach does put the learners through challenging moments so that they arrive at the solutions themselves.

AE (Security course, pilot 02): *… the learning is more experiential and have the "surprise" element where the learners have to think more critically to solve the problem.*

Hence, the activities, if designed at the right level of difficulty, based on the learner profile, can be useful for learners to leverage for deep learning.

- **Scope and Difficulty of Content**

Primarily, we are looking at the nature of the content both in terms of the scope and difficulty levels. Pitching the content at the right level of difficulty relative to the learners' competency is always a fine balance, especially when the PF methodology is applied to a difficult topic, as shown in this learner's (COJT course, pilot 01) feedback.

> *… (I) think this topic in itself is rather challenging - OJT … this COJT in something very, very new, we don't even know what it is about so it all boils down to the topic. I think it is a good way, but I do not think it is suitable for ALL (topics) … At least you need more time to cover the purpose, basics and especially the theory-based learning.*

Getting buy-in from learners is another important task that AEs may have to grapple with when implementing PF methodology. The same learner mentioned the importance of understanding the purpose of the lesson and the activities.

> *You need more purpose, at least for me it is needed. Because I still don't get it- what's relevant…. Basically, it's up to you, at the end of the day to go pick up what you failed at….*

Once the content is too challenging, learners may not have the tenacity nor patience to continue with the activity in the PF-infused lesson.

Learner (Curriculum Mapping course, pilot 01): *It was challenging. I mean, it's like forcing myself to get into it, but many times … I'm looking at the things for very, very long, couldn't connect (the dots) … struggling.*

How the learners grapple with the content and undertake the tasks given are key considerations for AEs during the lesson design phase. Scoping the content correctly was something that this AE improved on for the second application of the PF methodology.

AE (Security course, pilot 02): *A narrower scope in the new activity helps the learners manage better in term of workload, and better prepare them for the subsequent larger scale (project).*

Once we are clear what the parameters (AE, Learners and Content) look like, we can proceed to design the activities in the Generation and Exploration phase or Phase 1.

5b. Phase 1: Generation and Exploration

In phase 1, learners are expected to generate and explore the solutions for the scenarios or issues they face during the activity. To begin, AEs need to manage learner expectations and set up a psychologically safe space for learners to explore and generate solutions.

- **Managing Learner Expectations and Building Psychological Safety**[4]

Most learners would be new to the PF approach, so in managing their expectations, prior to conducting the activities, AEs should build the psychological safety for learners to fail and then to learn.

AE (Coaching course, pilot 02): *… the AE themselves needs to embrace that in this method, it's slightly more challenging for the AE … managing the learners' expectations, (and) building that psychological safety to allow for I-don't-know stage and the discovery stage, because that is not easy to potentially manage with certain groups of individuals.*

This approach requires learners to trust in the AE and accept the lack of information while undertaking the activities. After all, there is an element of risk for the learners due to their lack of preparation with this learning approach.

Learner (Presentation course, pilot 01): *… wow, I got a shock, out of sudden just ask me … I am not well-prepared, you know. So, if I have this - I've never had this type of experience, so once you have gained this experience, the next time you do, you're well-prepared. You're mentally prepared.*

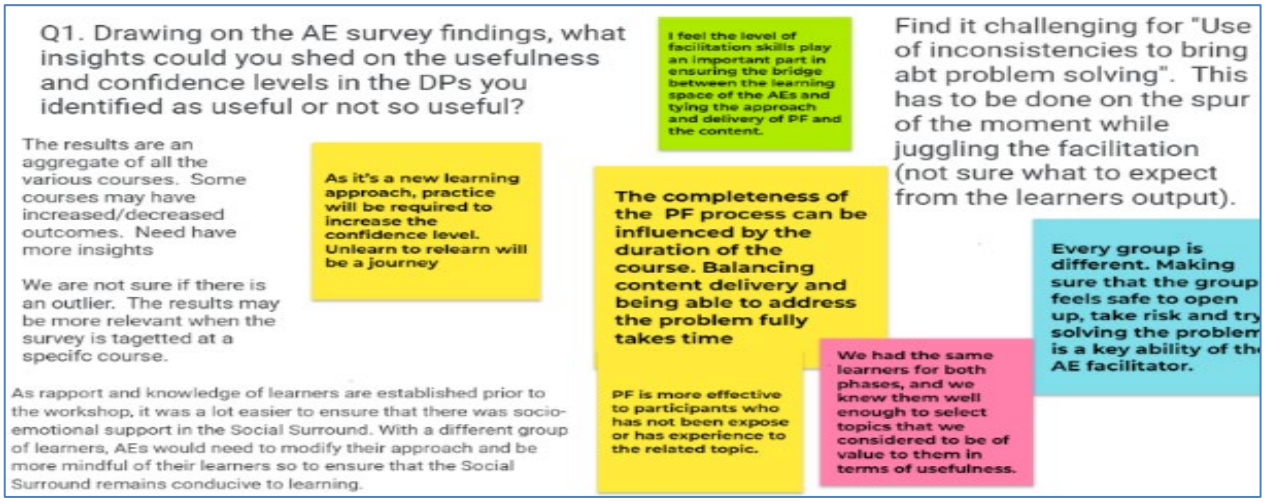
To alleviate the learners' discomfort, the instructions given by the AE should be clear. Be mindful that some learners may resist the PF approach, as they are more familiar with the traditional "teach and practise" sequence, leading to learners to question the instructions and the activities themselves.

In a dialogue session with the AEs at the close of the project, they highlighted the importance of having strong facilitation skills (see Figure 5.1), among other factors, as critical. Possessing deep facilitation skill on the part of the AE ensures the level of "struggle" by the learners is appropriate.

Learner (Early Childhood course, pilot 01): *… the affirmation… attitude. You can't think on the spot, you can't have an answer, then you are a bad student. It's not that. It's to validate why is there this situation whereby you don't know. The very important thing is that they acknowledge the struggle. Makes me feel good about myself. Also, it's not a bad thing to struggle.*

[4] Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, *44*(2), 350-383. https://www.proquest.com/scholarly-journals/psychological-safety-learning-behavior-work-teams/docview/203964176/se-2

Figure 5.1. Jamboard Entries by AEs on insights to the design principles in PF



While the learner in the above-mentioned case liked the "struggle" or the "vulnerability or embarrassment", some learners did not appreciate the challenge of working through the issues, especially when they did not understand the steps required to resolve the issues.

> Learner (Coaching course, pilot 02): *there's the… a bit of vulnerability or embarrassment when we fail and picking up ourselves from that is a very interesting process also … that was something … quite memorable for me.*

Here, having the facilitator and peers to support these learners in the process of "struggling" and "falling" makes a huge psychological difference to the learners.

There was a particular lesson that the participants did not feel safe enough to share or articulate their thoughts, partly due to their (older) age and possible language issues. As a result, the exploration and solution generation activities did not gain traction, and the outcome was relatively low-quality responses from the learners.

- **Facilitating Collaboration Among Peers**

When the adult educator did not provide the theory (or the right way of carrying out an activity, e.g. coaching), the learners turned to their peers for mutual support and feedback. This source of information and support becomes important as the learners construct their new knowledge off their own base of experience.

> Learner (Coaching course, pilot 01): *We bounced ideas off our group mates so it was not the traditional way of knowledge impartation – learning through discussions and realizing point or points from them.*

> Learner (Early Childhood course, pilot 01): *The (AE) …. gives us the opportunity to open up, to receive other's views in that sense. So, to me, I feel that there is more intimacy between myself and discovering about my new friends …, to me it's a good experience … I learn so much from others. The ideas (are) much better than just from my own because they have so much richness in their experience, so I learned a lot from everyone today.*

Peer learning is encouraged as distributed knowing is a rich pool of resources for learners to understand the application of the concepts in various contexts and diverse workplaces that the learners operate in.

- **Sufficient Duration**

Seemingly sensible to say but the lesson duration has to be sufficient to allow learners the time space for generation of ideas and consolidation of learning. In the first pilot run, some AEs found themselves out of time, resulting in some learning as not properly consolidated, leaving learners confused and unreconciled to the topic. Hence, leaving sufficient time and effort needs to be put in place to build psychological safety among the learners as this AE commented.

> AE (COJT course, pilot 01): *… at least you need more time to cover the purpose, basics and especially the theory-based learning.*

The issue of providing time for deep learning to take place is critical as reflected in this comment.

> *… to do justice to the whole process, you do need to give that that bit of time and PF requires time. PF is a process that … forces us to slow down and focus on the learner and focus on emphasizing the impact of that learning and giving that sort of respectful space for the learner to engage. I'm all for it. That's why I say, I'm all for it, because that is how I believe teaching should be.* (AE, Early Childhood, pilot 02)

Sufficient time to generate solutions and representations will facilitate the learners being able to compare and contrast these solutions for learning.

- **Providing Discrepancy in Activities for Compare and Contrast**

AEs, when designing the lesson, should ensure that the activities are sufficiently varied to facilitate the learners' comparing and contrasting the process and outcomes. This learner remarked,

> *It's a bit, maybe to me, it's too stagnant. I know it's three rounds of activities but to me, I feel it's the same thing again. So maybe (we) can listen to other things, maybe videos or anything. That's what I am hoping.* (Learner, COJT course, pilot 02)

If the outputs from the various activities in phase 1 are too similar, learners (as with the one mentioned above) would feel that they are repeating the activity without much purpose. Piloting the activities with a small group of learners to ascertain the difficulty level, the quality and diversity of the outputs (e.g. video clips of the presentations across the different scenarios) could be useful as a preliminary means of evaluating the lesson design.

5c. Phase 2: Consolidation and Knowledge Assembly

Phase 2 consists of several processes involving consolidation and knowledge assembly. Essentially, these processes are about reinforcing learning, providing guidance, debriefing and helping learners to assimilate understanding to form key knowledge (in other words, for learners to join the dots).

- **Reinforcing Learning**

There is a risk that learners do not land on the actual theory (i.e. the supposedly right answer) and leave the lesson with a misguided conclusion of what the method or theory should be. One reason

is that a large part of the lesson is spent on exploring the space (e.g. different coaching scenarios) and learners may retain the experience without fully grasping the eventual theory due to time constraints or poor consolidation skills.

> Learner (Coaching course, pilot 01): *…the initial session was a little bit lost or slow, but I think when explanations were given, it builds upon layers in a subsequent video, it got a little clearer from then on.*

As the comment from the learner indicates, clarity comes only after some elaboration of the initial experience, and this is subject to the consolidation being carried out in a clear and systematic manner. The learning needs to be reinforced with concrete examples, including another round of application, so that learners have the experience to practise according to the intended construct.

- **Consolidating Critical Features**

This AE (Assessment Mapping, pilot 02) reflected a similar struggle with finding the right balance between providing guidance and allowing learners to explore among themselves.

> *… challenges still exist, particularly in striking the right balance between providing guidance and fostering independent learning. We hope to further minimise AEs' role, especially when it comes to consolidation of critical features to avoid unnecessary teacher-talk.*

Concurrent with the reinforcement of learning is the task of assembling critical features of the theory. The facilitator must direct the lesson towards the learning outcomes by layering on the learning through explanations and questions each time without diluting the experience for the learners. Hence, contextualising the learning and maintaining an appropriate pace of learning based on the learner's profile is important.

5d. Evaluation: Learning and Performance Outcomes

In most lessons, the evaluation of learning is designed to align with the learning outcomes which are typically measurable and observable. Constructive alignment as espoused by Biggs (2003) requires the components in curriculum design – intended outcomes, assessment tasks, teaching methods – to be aligned to one another and rightly so if we want the learners to achieve the specific performance outcomes. However, with PF, there are intangible and often atypical outcomes that are developed as a result of the learning interactions and engagements in the lesson.

- **Peer Learning and Metacognition**

Learning from peers is one very strong outcome from the PF approach that the team and the AEs observed. There was greater ownership among the learners to drive the learning.

a. Peer Learning Interactions

> AE (Assessment Mapping, pilot 02): *The high fidelity to PF DPs significantly increased the interactions among learners. Collaborative discussions and peer learning were more prevalent during PF activities compared to workshops/ discussions without PF elements. Learners demonstrated a greater sense of ownership and responsibility for their learning.*

b. Metacognition: Perspective-Taking & Critical Reflection

Learner (Early Childhood course, pilot 02): … *today's session did bring, allow new perspectives, new ideas in terms of how I can facilitate my sessions … in a more meaningful way, of course it's relevant, and for them to remember so it sticks with them, and it allows them to apply in their learning … The questions, or also the engagements where we would involve in a lot of reflection ourselves. I think the greatest effect was doing something prior to the session.*

Specifically, AEs can consider evaluation outcomes comprising learning engagement, deeper learning, thinking skills, and future-oriented capabilities. Listed below are other learning outcomes from the PF lessons that could be developed:

- **Stronger Learner Engagement**

An evident benefit to PF lessons is the stronger learner engagement observed.

Learner (First Aid course, pilot 01): *it definitely engages the participants a lot more since they can see like the direct impact. You learn the skills and you can change that situation…so you can evaluate that. Before you are clueless, you are panicking, right? But then now when you learn the skills, you're like, oh I can do this, then we can apply it… so you definitely like makes it like, you have a before and after that you can review.*

- **Deeper Learning**

To some learners, the PF experience yielded a deeper and better learning experience due to the activity-based approach.

Learner (Assessment Mapping course, pilot 02): *I still think this method is better … it's the process that gets you to really rationalize and understand why you are doing this.*

The importance of letting the learners work through the issues on their own is shown here where these opportunities provided safe spaces for trial and error. The assumption is that with hands-on application, the learning is holistic and drives deeper learning for the learners.

The resulting focus on learning and the eventual application of the learning where learning becomes personal and relevant to work was an important finding. With an immersive experience, some learners commented that the learning becomes personal, increasing the ownership of the content.

Learner (Coaching course, pilot 02): *I felt like I was thrown into the deep end and I really no direction of what I wanted… what was expected as a coach. So, in that sense, it was interesting … I just make the learning points for myself … it is more personal because I know what I have tried …*

- **Higher Order Thinking Skills**

Another benefit of PF lessons is the development of thinking skills, especially those involving problem solving, and application to novel situations. Here, the AEs (Assessment Mapping, pilot 02) mentioned,

The use of PF in the lesson resulted in higher levels of curiosity, critical thinking, and problem-solving skills when engaging with the PF activities. Learners were actively seeking

feedback and engaged in active discussion throughout the workshop to improve their understanding and application of the concepts.

Evidence supporting (deep learning) … includes the participants' ability to apply concepts in novel situations. One example would be how they used their proposed solution to the assessment assigned to them and applied it to the other assessments to check for validity and reliability.

Another example would be the questions and responses during compare-contrast and consolidation, where they were able to articulate their reasoning and decision-making processes, highlighting their ability to analyse a complex problem and evaluate possible solutions successfully.

Often, these higher order thinking skills are not fully measured when typical assessment rubrics are used, but the outcomes become obvious when the learners are asked about their experience with resolving the problems and issues.

- **Future-Oriented Capabilities**

Presentation of novel situations to the learners forces them to resolve these unfamiliar situations by seeking atypical solutions, thereby setting up learners to develop their creative problem-solving skills, to be more prepared for the future.

AE (Assessment Mapping, pilot 02): *The incorporation of an authentic task encouraged participants to explore upcoming educational trends and address challenges in their professional development. The need to pitch assessments effectively for a brand-new syllabus was an intuitive hook for learners...to apply the concepts learnt in the planning (for the future) …*

Similarly, this perspective was echoed by a learner (Tech-enabled Learning, pilot 01):

I'm not giving you a solution … and is for you to recommend this solution… it allows us more room to be creative and think about how we go about (it)

In summary, when implementing PF lessons, you are guided by a list of considerations gleaned from past experiences of the AEs over the two pilot sessions.

These considerations can frame your approach especially when reviewing over the four areas mentioned at the start of this section:

a. Aligning the Parameters: AE, Learner, and Content
b. Phase 1: Generation and Exploration
c. Phase 2: Consolidation and Knowledge Assembly
d. Evaluation: Learning and Performance Outcomes

Once again, begin by reflecting on your own professional beliefs to determine if these beliefs are aligned with the underlying PF philosophy. It helps tremendously if so, then the rest of the process is simply capability development, experimenting and tweaking your design as it goes.

Conclusion

In conclusion, the maxim, the road to success is often littered with failure, is especially true when we are working on something new and unfamiliar. As AEs, we are mindful that making learning effective for our learners is the primary reason for our attempt at using PF as a pedagogical approach to facilitate deeper learning. There may be some design and implementation challenges and through them, we grow as a result of the experience.

Productive Failure makes a lot of sense from the educational perspective (being a problem-solving first approach) and psychologically, because learners acquire competencies that go beyond their current needs to meet future work requirements where creative solutioning as part of their suite of competencies may be the norm rather than the exception.

Have a go, try it and fail! Then try till you succeed. Have faith that you will eventually!

My great concern is not whether you have failed, but whether you are content with your failure.

Abraham Lincoln

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Annexure

Annex A: Resources: Lesson Plan Template

Context: (e.g. Organisation/Sector/Purpose of Training)
Intended Learning Outcomes:
Threshold/Difficult Concept:
Issue/Challenge/Problem to be solved:
Potential Errors:
Task to drive cognitive dissonance:
Learner Profile (e.g. experience, cognitive, emotive and sociality levels):

Time / Duration (min)	Lesson Plan (Activities)	How are the DPs for Activities designed & delivered to achieve the purpose of the Activities? How are these related to the 4As*? Which learning principles have been infused?	How are the DPs of Participant Structure activated in the activities? How are these related to the 4As? Which learning principles have been infused?	How are the DPs in Social Surround used to sustain the activity and participant structure? How are these related to the 4As? Which learning principles have been infused?	What are the intended outcomes in using PF? State perspectives of the learner and AE.	Comments / Resource
Phase 1:						
Generation & Exploration						
Phase 2:						
Consolidation & Knowledge Assembly						

*4As - Activation (of prior knowledge); Awareness (of knowledge gap); Affect (psychological state); Assembly (of learning)

Annex B: Past PF Lesson Plans

1) Coaching 101

Learning Outcomes: At the end of the course, learners will be able to:

1. Recognize the threshold of their own learning readiness by describing the 4-stages to Learning
   - Tension between the anxiety and learning zones
2. Outline the 4 key phases within the overview of the coaching model
   - Contracting – building rapport/outcome frames
   - Creating – wheels and scales/logical levels/asking questions/active listening
   - Concluding – timeline
   - Celebrating – stories
3. Demonstrate the coaching conversation process by displaying the following characteristics:
   - Solutions-focused
   - Systemic
   - Client-centric
   - Action-oriented

Threshold/Difficult Concept: Coaching Principles in the 4 key phases of the coaching model

Potential Errors:

- "Coaches" may prescribe expected behaviours to "coachees" instead of "coachees" being guided through to take ownership of their commitments

Task to drive cognitive dissonance:

- Role-playing the coaching conversation, with varied knowledge on the coaching performance as a Reporting Officer

Learner Profile (e.g. experience, cognitive, emotive and sociality levels):

- All staff
- Preferred Target Group – Supervisors and Managers who have direct reports (Reporting Officers)

Lesson Plan

No. of Pax: 12 (4 groups of triads, i.e. Groups 1 – 4, 3 persons per group)
Duration: 3 hours / **Venue**: Room large enough to facilitate voice recordings for 4 groups

Mechanisms of PF (4As):

- Activation (of prior knowledge):
- Awareness (of knowledge gap):
- Affect (psychological state):
- Assembly (of learning):

Time/Duration	Activity	PF Considerations	Comments / Resource
5 min 10 min 5 min	Facilitator to frame the lesson at the start to establish psychological safety and assimilate learners into the flow of the learning session **<u>Round 1: Intra Group – Scenario A</u>** 1. Participants will get in triads to perform a Role-Play Scenario A ▪ Coach (C) ▪ Coachee (CC) ▪ Observer (O) **Scenario A:** RO (C) has observed that Staff (CC) has been arriving to work late and makes frequent requests to leave work earlier than official hours. The motivation level of the staff is evidently low and contributes minimally to the team on the same shift. The Reporting Officer (C) is to have a conversation with the Staff (CC) to deliberate on his/her professional conduct. 2. At the end of the role play, the Observer (O) will ask (C) how he/she feels. (CC) will also ask how he/she felt about the coaching conversation with (C). 3. (O) then shares his/her points of observation on (C)'s techniques 4. As a group, the group will debrief on what they think is the solution in carrying out the coaching conversation in Scenario A – distilling coaching principles	▪ **Activity** – Phase 1: Generation i. Create intuitive hooks with an effective draw ii. Engage students in design iii. Admit multiple representations & solutions iv. Use variant-invariant features to bring about failure in problem-solving v. Keep computational load as low as possible ▪ **Participation** – Phase 1: Generation i. Enable collaboration in mixed ability groups ii. Support students to collaborate through an appropriate macro script ▪ **Social Surround** – Phase 1: Generation i. Create a safe space to generate & explore ideas	▪ **Activation (of prior knowledge)** Participants may/may not have had prior coaching experience Scenario A ▪ **Awareness (of knowledge gap)** Groups are encouraged to craft out as many solutions to resolving the issue as possible

Time/Duration	Activity	PF Considerations	Comments / Resource
10 min 5 min 10 min 5 min 15 min	**<u>Round 2: Inter Groups – Scenario B</u>** 1. All participants will remain in their triads to perform a Role-Play Scenario B ▪ Participants will now swap their roles (i.e. (C) from Round 1 will now play (CC), (CC) → (O), (O) → (C)) 2. Participants are required to voice record their role-play session for the next part of the activity. (O) will assist in the recording. **Scenario B:** Team members have been complaining about their teammate (CC) of not following through on the proper work procedures and is occasionally hard to be found, especially when more hands-on-deck is required (e.g. more than 1 patient in the same ward under his/her charge is seeking help). [Situation can be tweaked according to working environment/context] The Reporting Officer (C) is to have a conversation with the Staff (CC) to deliberate the matter at hand. 3. At the end of the role play, the Observer (O) will ask (C) how he/she feels. (CC) will also ask how he/she felt about the coaching conversation with (C). 4. (O) then shares his/her points of observation on (C)'s techniques 5. Groups will swap the voice recordings for their own learning & review to listen how the conversation was	▪ **Activity** – Phase 1: Generation i. Engage students in design ii. Admit multiple representations & solutions iii. Use variant-invariant features to bring about failure in problem-solving iv. Use contrasting cases ▪ **Activity** – Phase 2: Consolidation i. Compare & contrast students' ideas to distil critical features ▪ **Participation** – Phase 1: Generation i. Create a safe space to explore the affordances & constraints of student-generated ideas ▪ **Activity** – Phase 2: Consolidation i. Direct student attention to notice these critical features ii. Assemble the critical features into the canonical form ▪ **Participation** – Phase 1: Generation	▪ **Affect (psy state)** Facilitator briefs participants on the purpose of the voice recording and instils boundaries of activity to ensure psychological safety Different styles of coaching should be evident from the comparative voice recordings Groups are encouraged to craft out more solutions encompassing the coaching principles

Time/Duration	Activity	PF Considerations	Comments / Resource
	carried out by another Coach. (i.e. Groups 1 & 2 will swap their recordings; Groups 3 & 4 will swap theirs) 6. Each group will debrief on what they had just listened to from the other group's exercise and compare it against what was done in their own group. Groups will refine the coaching principles that they had distilled from Round 1 7. Groups will go around to share their points on what they think are essential coaching principles (aligned to learning outcomes). 8. The facilitator will prod and probe these points through facilitative questioning to push learners' thinking – to further refine the coaching principles.	i. Push student thinking through the disciplinary function ▪ **Participation** – Phase 2: Consolidation i. Have students explain their ideas ii. Paraphrase student explanations ▪ **Social Surround** – Phase 1: Generation i. Have students explain their ideas ii. Paraphrase student explanations ▪ **Social Surround** – Phase 2: Consolidation i. Create a safe space to explore the affordances & constraints of student-generated ideas	
10 min 5 min	**<u>Round 3: Open Group – Scenario C</u>** 1. All participants will remain in their triads to perform a Role-Play Scenario C ▪ Participants will now swap their roles (i.e. (C) from Round 2 will now play (CC), (CC) → (O), (O) → (C)) 2. One selected group will start to role-play the same scenario in front of the entire class **Scenario C:** The Reporting Officer (C) observes a confrontation along the corridor in the office space, where one of his/her high		

Time/Duration	Activity	PF Considerations	Comments / Resource
10 min 25 min (15 min role-play + 10 min debrief per group) [50 min in total for 2 groups' demonstrations in Round 3]	performing junior staff (CC) was accused by a senior staff regarding some data that was reported inaccurately, which turned out to be untrue/a misunderstanding. It was later shared with you that there had been other occasions of such reprimanding, over other matters, and that the junior staff has been upset and embarrassed about it for some time. [Situation can be tweaked according to working environment/context] The Reporting Officer (C) is to have a conversation with the Junior Staff (CC) to deliberate the matter at hand. 3. At the end of the role play, the Observer (O) will ask (C) how he/she feels. (CC) will also ask how he/she felt about the coaching conversation with (C). 4. (O) then shares his/her points of observation on (C)'s techniques 5. The facilitator then opens the discussion up to the rest of the class, seeking their feedback and points of observation from the performing group's role play, pulling these points from the practice and linking them to the coaching principles to be covered and explained. 6. Another selected group will now take their turn to perform the role-play in front of the entire class. Debrief and feedback is repeated for this group. 7. If time permits, this is repeated for Groups 3 and 4.	▪ **Activity** – Phase 2: Consolidation i. Direct student attention to notice these critical features ii. Assemble the critical features into the canonical form ▪ **Participation** – Phase 2: Consolidation i. Draw attention to the critical features and their assembly into the canonical form ▪ **Social Surround** – Phase 2: Consolidation i. Create a safe space to explore the affordances & constraints of student-generated ideas ii. Focus on idea interrogation towards idea improvement	

Time/Duration	Activity	PF Considerations	Comments / Resource
45 min	**<u>Introduction of Learning Outcomes</u>** 1. The facilitator will start the session by sharing the purpose of the practice, linking Productive Failure to ease the tension between the anxiety and learning zones 2. The facilitator then introduces the 4 key phases within the overview of the coaching model ▪ Contracting – building rapport/outcome frames ▪ Creating – wheels and scales/logical levels/asking questions/active listening ▪ Concluding – timeline ▪ Celebrating – stories 3. Concrete examples on how they can be applied into the 3 Scenarios are shared with the learners via the **sharing of video example of coaching in action**. Video will be paused at appropriate segments for facilitator to highlight and emphasize on the 4 key phases above. 4. The facilitator will also showcase the characteristics involved in the coaching conversation process from the video example: ▪ Solutions-focused ▪ Systemic ▪ Client-centric ▪ Action-oriented	▪ **Activity** – Phase 2: Consolidation i. Direct student attention to notice these critical features ▪ **Participation** – Phase 2: Consolidation i. Draw attention to the critical features and their assembly into the canonical form	▪ **Assembly (of learning)** Video examples of coaching in action (x2)

Time/Duration	Activity	PF Considerations	Comments / Resource
10 min 10 min	**<u>Final Round: Role Play with Embedded Coaching Principles</u>** 1. All participants will return to their triads to perform a Role-Play either Scenarios A, B or C. Participants will choose their role for a final practice, applying the coaching principles into practice. 2. Learning is consolidated for learners as they are brought back to the objectives. Coaching tools (template to use for Coaching sessions) are introduced to learners to encapsulate the learning points in a visual format.	▪ **Activity** – Phase 2: Consolidation i. Assemble the critical features into the canonical form ▪ **Participation** – Phase 2: Consolidation i. Draw attention to the critical features and their assembly into the canonical form ▪ **Social Surround** – Phase 2: Consolidation i. Focus on idea interrogation towards idea improvement	

2) Conducting COJT for Site Auditors

Context:

The learners are auditors from the QEHS Department where their daily job is to go to various project sites and conduct site audits based on the standard benchmark and client's requirement. However, this batch has just been recruited to support a new project and they will have less than two years of experience in their role. They are in their late 20s and early 40s.

Cognitive abilities: **high level of cognitive abilities**, which include critical thinking, problem-solving, analytical skills, and attention to detail.

Societal level: **low to moderate sociality level**. They are often working independently and do not need much collaboration with other colleagues to complete tasks and meet deadlines.

Emotive level: **The emotive level of a field auditor may vary** depending on the individual. However, they may need to possess a certain level of emotional intelligence, including the ability to remain calm and objective in stressful situations, as well as good communication and interpersonal skills to interact effectively with their other colleagues.

Intended Learning Outcomes:

On completion of this unit, course participants will have the knowledge and skills in preparing on-the-job training, and be able to apply them at the workplace. The training will focus on

- Introduction to OJT training and
- Prepare On-The-Job Training Blueprint

Threshold/ Difficult Concept:

One of the key difficulties in on-the-job blueprinting is identifying the critical tasks and processes that need to be documented and improved. This can be challenging because it requires a thorough understanding of the job, its objectives, and the various factors that impact its success.

Another difficulty with on-the-job blueprinting is ensuring that the documentation accurately reflects the job or task being performed. It can be easy to overlook important details or make assumptions that may not be accurate. This can result in incomplete or inaccurate documentation that may not be helpful in improving the job or task.

Issue/ Challenge/ Problem to be Solved:

It may be difficult to ensure that the documentation accurately reflects the job or task being performed such as missing out on the critical tasks and processes of a particular job.

Potential Errors:

This will lead to incomplete or inaccurate documentation that may not be helpful in improving the job or task. The OJT conducted will not be proper and hence the intended learning outcome will not be met effectively.

Task to Drive Cognitive Dissonance:

The focus should be on providing clear guidance, constructive feedback, and opportunities for practice and reflection. It will also be imperative to design the lesson to enable leaners to have the opportunity to have multiple attempts so that there is opportunity for them to draw attention to the critical features & assembly them into canonical form.

Trainer should make use of the instructions provided below together with those in the Trainer Guide to conduct training for this module.

Duration	Contents/Activity	Methodology	Resources
9.00am – 9.10am (10min)	**Welcoming Activity** • Self-introduction of trainer • Ice-breaker activity Ground rules for the training		

Duration	Contents/Activity	Methodology	Resources
9.10am-9.15am (5min)	**Overview of Course** • Explain course aim and course objectives • Describe briefly assessment requirements • Explain the objective of the training which is to "Prepare to facilitate OJT" (For Site Auditors). Learners will be giving a chance to apply their own 'method of briefing' before being taught the actual principles of OJT. • Have a conversation with the learners about why the learning design is conducted this way and not so much of direct telling (which will be done later). Assure them of the safe space they are in and for them to participate in the session in order to get maximum learning. In order to emphasise the safe surrounding, stop at this juncture to draw out experience from others of an actual failure and how to overcome this. Else can just share your personal experience on dealing with PF learning	Lecture PF	PS 2
LO: Prepare to Facilitate On-The-Job Training			
9.15am – 9.20am (5min)	**1.0 Learning Outcomes** • Describe the learning outcomes for Section 1 Create intuitive hooks with an affective draw by getting learners to share their prior experience when conducting OJT or briefing	Lecture	PS 4
9.20am – 9.35am (15min)	**1.1 Introduction** Highlight that for OJT to be affective, there are several considerations that trainers may take into account. These considerations can include the goals and objectives of the training, the target audience, the materials and resources needed, the length of the training session, the assessment methods, and the feedback mechanisms. These considerations can be useful when uncovering first principles in conducting OJT as they help to ensure that the training is effective and meets the needs of the learners	Lecture	PS 5-6

Duration	Contents/Activity	Methodology	Resources
9.35am – 10.00am (25min)	**1st PF Attempt** Break the learners into groups of 2 (spread those with experience around) Each group will be assigned a topic and need to prepare for briefing using their own method. They will have to imagine that they will need to conduct OJT to the 50 worksites throughout this year and to develop a formal OJT course which requires a documented course syllabus, and the outcome requires a documented record of successful completion. 1st picture: Office Common Area Cleaning Procedures 2nd picture: Office Space Cleaning Procedures 3rd picture: Retail F&B Premises Cleaning Procedures At the end of the 15 min, each group will take turn to share their COJT briefing using their own “method of briefing”. Assigned other groups to be observer and each given a task to either give a warm or cool feedback. The feedback on the briefing can be further push by: **(a) Pushing the boundary (description, safety considerations, resources)** What are some of the methods used by the trainers? After hearing the other’s, how would you make changes to your method? Can we build up further on this? Note: During this stage, facilitator should facilitate to ensure learners are able to participate actively to draw the critical features (observe if learners are asking questions about the activities, comfortable in sharing and contributing ideas).	PF- enabled collaboration in mixed ability groups PF- support learners to collaborate through an appropriate macro script PF- push student thinking through the disciplinary facilitation PF-interrogate them on their ideas further	PS 9

Duration	Contents/Activity	Methodology	Resources
10.00am - 10.25am (25min)	**2nd PF Attempt** Break the learners into groups of 2 (ensure different groupings based on the contrast of solutions) Each group will be assigned a **different topic** and need to prepare for briefing using their own 'method'. They will have to imagine that they will need to conduct OJT to the 50 worksites throughout this year and to develop a formal OJT course which requires a documented course syllabus, and the outcome requires a documented record of successful completion. 1st picture: Office Common Area Cleaning Procedures 2nd picture: Office Space Cleaning Procedures 3rd picture: Retail F&B Premises Cleaning Procedures At the end of the 15min, each group will take turn to share their COJT briefing using their own "method of briefing". Assigned other groups to be observer and each given a task to either give a warm or cool feedback. The feedback on the briefing can be further push by: **(b) Creating Counter-challenges – e.g. in a different context will this method or idea work? (Worksites, environment, clients, etc.)** What are some of the methods used by the trainers? After hearing the other's, how would you make changes to your method? Can we build up further on this? Note: During this stage, facilitator should facilitate to ensure learners are able to participate actively to draw the critical features (observe if learners are asking questions about the activities, comfortable in sharing and contributing ideas).	PF- enabled collaboration in mixed ability groups PF- support learners to collaborate through an appropriate macro script PF- push student thinking through the disciplinary Facilitation PF- interrogate them on their ideas further	PS 12

Duration	Contents/Activity	Methodology	Resources
10.25am – 10.50am (25min)	**3rd PF Attempt** Break the learners into groups of 2 (ensure different groupings based on the contrast of solutions) Each group will be assigned a **different topic** and need to prepare for briefing using their own "method". They will have to imagine that they will need to conduct OJT to the 50 worksites throughout this year and to develop a formal OJT course which requires a documented course syllabus, and the outcome requires a documented record of successful completion. 1st picture: Office Common Area Cleaning Procedures 2nd picture: Office Space Cleaning Procedures 3rd picture: Retail F&B Premises Cleaning Procedures At the end of the 15min, each group will take turn to share their COJT briefing using their own "method of briefing". Assigned other groups to be observer and each given a task to either give a warm or cool feedback. The feedback on the briefing can be further push by: **(c) Knowing how to use the knowledge and use in a different way.** What are some of the methods used by the trainers? After hearing the other's, how would you make changes to your method? Can we build up further on this?	PF- enabled collaboration in mixed ability groups PF- support learners to collaborate through an appropriate macro script. PF- push student thinking through the disciplinary facilitation PF- interrogate them on their ideas further.	PS 15
10.50am - 11.05am (15min)	**Consolidation and Knowledge Assembly** Using the outcome from PF 3rd attempt, facilitator should put learners' methods together like a jigsaw to fit to the OJT blueprint (build upon their ideas). This is to create an impact to learners that collectively their methods are used to form the actual blueprint.	PF- assemble the critical features into the canonical form	PS 17

Duration	Contents/Activity	Methodology	Resources
11.05am - 11.30am (25min)	**1.2 Interpreting Blueprint for On-The-Job Training** • Explain that to provide OJT, we always start with interpreting the OJT blueprint to understand training requirements • Explain the 5 OJT blueprint • Discuss and elicit inputs from the class on what an OJT blueprint is • Describe and explain what an OJT blueprint is using the PS Slides Direct learner attention to notice these critical features – look out for those components in "OJT Blueprint" framework and compare it against their own "method of briefing" and see if there is anything similar.	Lecture discussion PF- compare and contrast framework amongst the groups to distil critical features	PS 19-25
11.30am - 11.50am (20mins)	**Learning Activity** Leaners are to convert their "methods of briefing" briefing using the 5 Components of OJT Blueprint (template to be given out).		PS 26
11.50am - 12.30pm (40mins)	**Assessment** Leaners will be assigned a topic and need to prepare their OJT Blueprint of "Washroom Cleaning Procedures" to "cleaners". Follow by survey to at least two learners to get their view on: • Their knowledge of the preparing for OJT before and after the training • Whether such training is able to make them adapt to new scenarios and circumstances Whether such training is able to inculcate creativity in learners & openness for trainer to accept creative ideas (attention to the critical features for the learner's ability to "Prepare On-The-Job Training Blueprint")	PF- draw attention to the critical feature and their assembly into the canonical form.	PS 27

Duration	Contents/Activity	Methodology	Resources
12.30pm - 12.45pm	**Post Training Reflection & Feedback** Learners complete IAL survey and participants identified to be interviewed will meet the IAL Observer. Learners will do an online Google form on: 1. What do they learn? 2. How is it transferred? How will they apply it in future?		