

Leveraging the Power of Metacognition and Contextualized Agency for Workplace Learning

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Introduction

Decades of evidence have demonstrated that metacognition is one of the most powerful strategies for improving learning outcomes (Hattie, 2009; Yarnall et al., 2019). Moreover, and perhaps more importantly than just outcome achievement, metacognition plays a critical role in how learners know how to adapt, apply, use, and refine knowledge and skills. While all learners benefit from being taught mental management strategies, evidence consistently shows that lower-level students make the greatest gains (Grotzer & Perkins, 2000; White & Frederiksen, 1998; Zohar & Peled, 2008). Unfortunately, the teaching of metacognitive strategies is often thought of as a luxury, reserved for advanced students who have the time to focus on things other than basic content knowledge. This practice leaves more vulnerable students at a disadvantage, especially once they leave the structure of the classroom and are expected to manage their own learning in complex, dynamic real-world contexts such as the workplace.

While metacognition has been widely studied in K-12 and higher education settings, the use of metacognitive strategies in the workplace has received less attention. Moreover, metacognitive practices are often narrowly framed, such that learners focus solely on their cognitive state and not on the other contextual elements that might impact their learning. The present study takes a more expansive approach to reflection in workplace contexts, with an emphasis on the kinds of metacognitive prompts that can encourage individuals to leverage their learning forward and apply it in new situations.

Common reflection strategies tend to focus on looking backwards; learners consider something that they have experienced and reflect on and/or evaluate how it went. In the context of a work environment, individuals might reflect on scenarios such as their approach to a novel task, their performance in a meeting or presentation, or an interaction with a colleague. A recent study found that the practice of informally reflecting on one's daily activities in the workplace was correlated with greater use of strategies like monitoring and self-regulating one's learning (Kittel & Seufert, 2023). However, these informal reflections appeared to be largely superficial and were not linked with the "forethought" phase of self-regulated learning, which includes mental management strategies such as goal-setting and planning (Dignath & Büttner, 2008; Lavery, 2008; Zimmerman, 2002). In other words, workers did not

leverage their reflection to strategize about future behaviors or consider facets of their context that they might adjust – the kinds of thinking strategies that are central to an agentic stance towards learning.

Developmental perspectives have long argued that enacting one's agency and reflecting on the results is a critical component of how people learn about the world, starting in early childhood and progressing through the lifespan. In this view, agency is seen as an interactive, fluid, and transformative process that involves engaging with one's environmental contexts (Emirbayer & Mische, 1998; Gebre & Polman, 2020). Elsewhere (Cuzzolino et al., in press), we have argued that to be truly agentic, learners must be able to act upon and modify the cognitive, physical, social, and emotional contexts of their learning to support their best performance.

To illustrate this notion of contextualized agency, we use the metaphor of a “fast fish.” Years ago, scientists who were studying the biomechanics of a certain species of fish observed that the fish made use of the water around them to help them swim faster – specifically, the fish created vortices in the water and then pushed off those vortices to propel themselves forward. Much like fast fish who modify the water around them, agentic learners adjust their physical, emotional, social, and cognitive environments for peak performance. They are aware of the available resources in their physical, cognitive, social, and emotional contexts and are able to draw upon the relevant resources at any given time to support their work and learning (Grotzer et al., 2021).

Drawing on the concept of a “fast fish learner,” the present study explores the role of metacognitive prompts in helping young people who are entering the workforce exercise contextualized agency, such that they can actively manage and modify features of their contexts to support their best learning and work performance. Specifically, the purpose of this study is to investigate the impact of reflection exercises designed to support young people in a summer internship program. It focuses on prompts that invite interns to 1) reflect on how their physical, social, and cognitive contexts interact with their learning and performance, and 2) use these reflections to think strategically about how they can modify these contexts to improve their learning and performance in the future. The study is guided by the following research questions:

- 1) What themes emerge across interns' reflections when they are given metacognitive support for thinking about their experiences?
- 2) What differences can be observed between interns who are given more general metacognitive prompts and those who are given metacognitive prompts that emphasize managing and modifying features of one's context?
- 3) What changes can be detected in learners' reflections over the course of their internship?

Methods and Data Sources

We conducted a two-phase study within an existing summer internship program situated in a large multi-city consultancy firm. The program offers young adults from underrepresented or underprivileged backgrounds early career exposure for eight weeks, during which they are full-time employees. The study was highly opportunistic in the sense that the internship program expressed interest in implementing a reflection tool within the parameters of their existing structure, which was tightly designed and allowed for minimal alterations. This presented a unique opportunity to embed the tool within a well-established program but also resulted in limitations to the study design, as discussed further below.

This paper focuses on the first phase of the study and foreshadows emerging findings from the second phase. We first developed and piloted two sets of reflection tools in the summer of 2022. In this initial phase, 26 interns were randomly divided into two groups (13 in the control group and 13 in the “fast fish” intervention group). Interns in each group were provided with an online survey that asked them to consider a specific experience in their internship and reflect on it through open-ended prompts (see Appendix A). In the control version, the questions asked participants to recall and describe what happened and how they felt about it, evaluate how their thinking had changed, and consider whether they might use reflection tools in the future. The introductory text provided a brief explanation for what reflection is and why it is important.

In the “fast fish” version, the first half of the survey mirrored the control version, but the latter half asked participants to reflect on the interaction between the self and the context and to plan for how they could modify their own behavior and their contexts in the future. The explanation in the beginning

also provided further rationale for how reflection can help us identify changes that we can make to our behaviors and to the context around us to improve our learning and work performance. Interns completed the survey three times over the course of the program, with 19 interns completing all three reflections.

In addition to the reflection surveys, we designed a 20-question Likert-scale survey (see Appendix B) that asked the supervisors of participating interns to evaluate their intern's performance at the beginning and end of the program. This provided a means of assessing whether the supervisors observed any changes in their interns related to dimensions of contextualized agency over the course of the summer. However, only three supervisors completed the surveys at both time points. Due to these low rates of participation, we opted not to analyze the supervisor data in this phase of the study.

In light of promising emerging findings from this first phase of the study, the internship directors chose to implement the survey program-wide in the summer of 2023. However, in order to provide an equitable experience and make the intervention manageable in scope, program leaders opted to give the “fast fish” version of the survey to all interns and to incorporate the survey only twice throughout the summer (versus three times). As discussed further below, this design no longer offered the benefit of a control group but still enabled us to collect a large volume of data about how interns were making use of the survey tool. The supervisor checklist was also embedded into the program at the beginning and end of the summer, which led to much higher participation rates. In total, for this phase of the study, we received data from 115 interns and their corresponding supervisors (some of whom supervised multiple interns and completed surveys for each). All surveys were distributed by internship program staff, who then de-identified the responses and shared them with us in winter 2023. This analysis is ongoing, but we preview some early findings here and outline plans for future research in the Discussion section.

Results

Three researchers conducted a thematic analysis of the interns' reflections from the first phase of the study. We first independently identified emerging themes and then developed a codebook that was used to systematically code all the reflections. Four key findings emerged from this analysis:

Interns Used the Surveys to Reflect Substantively on Their Learning

All interns across the sample showed evidence that they were using the surveys to genuinely reflect on what they had learned from their experiences in the program. Participants acknowledged their emotional states, considered the social context and their relationships with colleagues, evaluated their prior actions and planned forward, considered the extent to which they felt a sense of agency in the internship or lack thereof, and identified instances of managing or modifying various aspects of their emotional, motivational, cognitive, social, and physical contexts.

Reflections on Cognitive and Emotional Context

Reflections on one's state of mind were especially prevalent across both conditions. As they reflected on incidents from their internships over the prior week, participants included rich descriptions of their emotions, motivation, and confidence, or lack thereof. For example:

I felt nervous entering a meeting with a project leader. I kept messing up on words, and I could myself sweating with anxiety. I thought that maybe I was not well prepared for the meeting. –

Intern 101S, Survey 3 (Control Group)

I definitely felt unmotivated and overwhelmed initially with the amount of things that I had to do and learn, especially since most of it was new, however I felt excited and grateful, that I am able to learn new experiences and develop new knowledge and skills. – Intern 104K, Survey 2 ("Fast Fish" Group)

Reflections on Social Context

Many interns also used the surveys as a space to reflect on the social context and their relationships with colleagues. They primarily reflected on positive elements, such as the support and encouragement that they received from supervisors and peers, though a handful also reflected on experiences of feeling unsupported. Many also reflected more generally on the social context in which

they were operating, primarily in the sense of feeling a need to impress others, or in a comparative sense of being aware of how they were performing relative to others on their team. For example:

I took a gap year recently, so academically, I'm not as advanced as my fellow interns, and I'm not as experienced with coding as well as them. Regardless, my team members in my project made me feel very welcome and always encouraged me to participate and seek help whenever I need it. Because of this, I had a great start towards my internship. – Intern 119D, Survey 1 (Control Group)

Reflections on Agency

Simply by asking participants to focus on describing and evaluating their own thoughts and actions, both versions of the survey invited interns to reflect on their agency as learners and workers. All interns across both conditions identified at least one instance in which they had experienced or demonstrated agency within their role in the program, such as taking the initiative to ask for help, seeking a networking opportunity, etc. For example:

Being that I had not worked in PowerPoint I was feeling overwhelmed and nervous. I expressed my issue and the team here at [company] was wonderful with connecting me with someone on the team to better help me and teach me the tools needed to get the presentation together. – Intern 127D, Survey 2 (Control Group)

Most of the interns also identified at least one instance in which they had experienced or demonstrated a lack of agency. Sometimes this was discussed as a sense of accepting a situation that they could not change, but other times they felt frustrated by their inability to act, either because of structural barriers or their own lack of confidence or effort. For example:

I feel very unmotivated right now because my steps come only after others do testing, which even though we have started I can't learn anything just yet. – Intern 102K, Survey 2 (“Fast Fish” Group)

Additionally, many interns were able to evaluate their prior actions (offering both praise and critiques) and to identify actions they would take in the future as a result of what they had learned. For example:

Part of the problem was that my task was in Excel, and I am not used to a PC. I am used to different programming languages that I assumed were more complex. I went in too confident. Asking for help was the best thing I did and I wish I had done it sooner. Knowing which questions to ask is more difficult and I need to figure out how to have more help initially in a project. –

Intern 116U, Survey 1 (“Fast Fish” Group)

While most interns focused on actions they would take within the context of their program, some also discussed their future career trajectory and how their learning experiences in the internship could help them moving forward.

Reflections on Feedback

A number of interns specifically reflected on the value of receiving feedback, describing a time when they had sought feedback from a supervisor, acted on feedback, or planned to ask for feedback in the future. For example:

When my supervisor gave me feedback about condensing several slides in to one about the actual work I was prepped and told him how that is just a step in the journey I made this summer and that the presentation was less about the project and more about me. He quickly adapted and then provided great feedback about transitioning from the work we did to my personal and professional growth. I was so nervous about confronting them and it was not a big deal at all!

- 116U, Survey 3 (“Fast Fish” Group”)

These findings indicate that the act of reflection, regardless of the specific prompts, provided learning opportunities for both groups. Participants appeared to be clear about the purposes of the survey tool, engaged sincerely with the exercise, and used the prompts as a space to reflect on what they had learned from their experiences in the internship program.

“Fast Fish” Reflection Prompts Encouraged Attention to Managing Contextual Factors

While both sets of interns discussed the impact of context on their learning, interns in the “fast fish” group were more likely to reflect on the specific ways in which they adjusted (or failed to adjust) aspects of their work environment to support their learning, and to think more expansively about the dimensions of context they might modify. Most interns in the sample described at least one way that they had managed their emotional, social, cognitive, or physical contexts, but interns in the “fast fish” group were much more likely than interns in the control group to do this more than once across the three surveys, and to consider multiple aspects of context. For example:

This past weekend I rearranged my apartment so that the office portion has better lighting and is farther from the windows where there is construction going on. I hope that this allows me to concentrate further and be distracted less. I also got a more comfortable chair. I have placed a whiteboard that has a schedule that I can easily see and be reminded when to stop and take a break or move to a different project. – Intern 116U, Survey 2 (“Fast Fish” Group)

The biggest takeaway was learning how to effectively communicate with individuals. While people might’ve been unresponsive when I sent messages within our group chat, I realized that if I messaged each of them individually and tried to be positive, they were a lot more receptive. I realized that by putting in some extra effort and cultivating an environment of support, people were much more willing to communicate with me regarding any confusions they had for the tasks at hand. – Intern 112U, Survey 3 (“Fast Fish” Group)

This difference between the two groups is perhaps unsurprising given that only the “fast fish” version of the survey explicitly asked participants to consider how they might manage their environment. However, one specific dimension of agency that varied significantly between the two groups was feedback-seeking behavior – of the eight interns who reflected on the value of receiving feedback, seven were in the intervention group. Notably, neither version of the survey included a question that explicitly referenced feedback. This indicates that something else about the design of the intervention survey, such as the question about how one might ask supervisors or other colleagues for support, was encouraging

interns to consider the ways in which they might make use of feedback to enhance their learning and performance.

Taken as a whole, these findings demonstrate that the nature of the metacognitive prompts can influence what interns notice and reflect upon. When the metacognitive prompts position them as learners with contextualized agency, interns can exercise that agency to consider how to modify their environments to support their learning and performance. However, when they are not prompted to attend to these aspects, they often overlook them, which results in the loss of valuable learning opportunities about the past to take the learning forward.

The Nature of Interns' Reflections Changed Over Time

Administering the survey three times allowed us to observe how interns' reflections changed throughout the program. One notable change was that, over time, an increasing number of interns mentioned management of social context in their reflections. Specifically, while most interns mentioned management of their internal state (e.g., emotions and cognition/thinking) in the first reflection, more interns discussed management of their external contexts, especially their social context, in the latter two reflections. Additionally, in the third survey, interns were more likely to reflect on times when they had failed to manage their context. One potential explanation for this is that, as interns progressed through their internship and got more familiar with the work they were doing, they became more aware of things that they could have done (or done better) to facilitate their work and performance.

“Fast Fish” Behaviors Require *Awareness* and *Understanding* of How Contextual Factors Interact with Learning

As described above, in the summer of 2023, the internship program administered the “fast fish” version of the reflection tool for all participants and implemented a corresponding supervisor survey. In winter 2023, the program shared the de-identified responses from consenting interns and supervisors, and we are currently in the process of analyzing the full dataset. To date, we have completed an initial thematic analysis of 20% of the intern data to examine how the responses compare to what was observed in the prior phase of the study.

Through this process, we have developed a revised conceptual framing (see Appendix C for a complete codebook) that distinguishes more clearly between three key phases of agency. Specifically, we see interns demonstrating *awareness*, *understanding*, and *management* to differing degrees. An intern that exhibits awareness provides a general acknowledgement that a certain contextual factor might be at play in a situation. Understanding goes a step further, such that the intern displays mechanism knowledge about how this factor might be impacting their learning and performance. Finally, management entails an intern actively taking steps to modify or adjust this dimension of their context in support of their learning and performance; it is this last phase that truly represents “fast fish” thinking. Interns’ responses highlight the fact that management cannot occur without understanding the interaction between learning and context, and understanding cannot occur without an initial awareness of the contextual factors that may be at play.

Discussion

While traditional approaches to metacognition often fall short, this study indicates that reflection exercises can be effective when they include 1) specific guiding questions, 2) sample responses that provide a clear model of what quality reflection looks like, and 3) an explanation or rationale for why reflection is useful for supporting learning and performance. More specifically, the differences between the two conditions reveal that prompts focused on contextualized agency are effective at directing the learner’s attention to features of their context that can be managed and modified to better support their learning and performance.

The design of this study also highlights both the puzzles and the promise of a “light touch” intervention. In the early stages of design, we found that internship programs were hesitant to collaborate in a research study because they did not feel they had the bandwidth to incorporate any “extra” activities into their programming. Thus, the reflection tool developed for this study was intentionally designed such that it would introduce minimal additional tasks into the existing internship program. To keep the intervention as streamlined as possible, the reflection survey served as both the intervention and the means of data collection – a design that naturally presents challenges in terms of what can be measured.

The resistance to implementing a more extensive intervention, and the challenges we faced with participant recruitment (especially at the supervisory level) point to the need for a cultural shift in workforce development to prioritize employee learning and embed effective reflection practices into the workflow. Despite these limitations, however, the findings indicate that even a minimal intervention can produce discernible differences. Given that workplace learning programs are often stretched quite thin in terms of time and resources, there is great value in being able to offer effective tools that can be embedded within the work that is already being done.

Moving forward, we plan to finish analyzing the full set of intern reflections from summer 2023, and to use the corresponding supervisor survey data to investigate the extent to which the “fast fish” behaviors that interns described in their reflections were observable to their managers. We also plan to refine these tools and make them widely available to workforce development practitioners and others involved in workplace learning. Beyond this study, future research should continue to investigate the specific features of metacognitive tools that lead to effective reflection in workplace contexts. More broadly, there is also a need for further research on the culture of learning at work and strategies to overcome the systemic barriers to implementing more substantial interventions in workplace learning contexts. This is especially important for individuals from vulnerable populations who may not have had the same educational access as more privileged individuals prior to entering the workforce. Resources that can help workers learn on the job, and reflect on their learning to support future performance, is a critical step toward creating more equitable opportunities in the workplace.

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Appendix A

Survey Language for Control and Intervention Versions

	Control Version	Intervention (Contextualized Agency) Version
Introductory Text	This reflection activity is designed to help you think about your experiences in your internship. Reflection can help us become more aware of our thoughts, feelings, actions, etc. For instance, imagine that you are reflecting on a team meeting. You might realize that you were so overwhelmed by all of the information being discussed that you forgot to ask an important question about a project you have been working on. Think about some things that happened in your internship this week, such as tasks that you completed, skills you are trying to learn, problems that came up, and conversations that you had with peers or supervisors, etc. Choose one to focus on that you think is interesting or puzzling in some way. Please do not share information that you think will be embarrassing or that would be damaging for you to share.	This reflection activity is designed to help you think about your experiences in your internship. Reflection can help us become aware of and manage our thoughts, feelings, actions, etc. It can also help us to identify changes that we can make to our behaviors and to the context around us to improve our learning and work performance. For instance, imagine that you are reflecting on a team meeting and realize that you were so overwhelmed by all of the information being discussed that you forgot to ask an important question about a project you have been working on. Recognizing this, you might choose to write down your questions in advance of the next team meeting so you don't forget to bring them up, or request separate one-on-one time with your supervisor to discuss questions that are specific to your work. Think about some things that happened in your internship this week, such as tasks that you completed, skills you are trying to learn, problems that came up, conversations that you had with peers or supervisors, etc. Choose one to focus on that you think is interesting or puzzling in some way. Please do not share information that you think will be embarrassing or that would be damaging for you to share.
Question 1	Consider the particular instance that you have chosen. What happened? Tell in a few sentences what happened or what was going on and who was involved. <i>For example: "I felt confused and anxious about an important work project this week. I had to read a big report and create a slideshow presentation about it for a team meeting. I've made presentations for school before and I am pretty good at that, but I had never created a slide deck for work before and I wasn't sure how to structure it or what information to include."</i>	
Question 2	Try to recall and describe how you thought and felt about what happened. For example, did you feel confident? or confused? Or unmotivated? or didn't know what came next? or prepared to take something on? or lead? Describe it as fully as possible to help you understand what was going on for you.	

	<i>For example: "I was overwhelmed by the task and wasn't sure how to get started. That made me anxious and so I just kept putting it off all week. Every time I thought about it, I got a little bit of a stomach ache. I know that I'm good at making slides look nice, so eventually, I started working on choosing themes and layouts for the slideshow. But because I was avoiding the rest of the task, I didn't have a deep understanding of the actual information that I was supposed to be summarizing in my presentation."</i>	
Question 3	How would you evaluate your thinking; feelings; actions; motivation; knowledge? In what ways did your actions work well? ...not work so well? <i>For example: "I'm glad that I finally got started by working on the visual design of the slides. But procrastinating on the substance of the presentation wasn't a good idea – I didn't leave myself enough time to finish the task properly. I ended up having to rush to complete it in the hours before I was scheduled to present, and my supervisor wasn't available to answer my questions because it was so last-minute."</i>	
Question 4	Now that you have had the opportunity to reflect, has your thinking or feeling about this instance stayed the same, or has it changed at all? If it has changed, in what ways?	Is there anything that you did to <i>manage</i> your thinking; feelings; actions; motivation; knowledge? How did that go? What else might you have done? <i>For example: "Toward the end of the week, I did devote longer stretches of time to the project and tried to really dig into the work. I started to get a sense of what was being asked of me, and I felt better at those moments. But then I found myself getting distracted and pulled toward other tasks that felt easier to complete, instead of staying with this project even though it was difficult."</i>
Question 5	Could you see yourself using a reflection exercise like this at work in the future? If so, how would you use it? If not, why not?	Consider the environment including your mentor/supervisor/others in the workplace and their connection to this instance. What are ways that support from them might be helpful? What are ways that you can communicate your needs for support? <i>For example: "I can try asking my supervisor to give me some interim deadlines or check-in points. This will encourage me to get started sooner and catch any places where I am feeling stuck while I still have time to ask for help. I can then post a timeline to the wall next to my computer so that I am reminded of the different aspects of the project and each of the due dates."</i>
Question 6	Is there anything else you would like to add?	What did you learn that helps you <i>plan</i> for the next time a similar situation arises? What advice do you have for yourself for next

		time? What can you ask for from others to help you to do a good job? <i>For example: "Next time I have a big work assignment like this, I'll get started sooner so that I have time to break the project into chunks and get help along the way. I can also pay attention to my body and how I'm feeling. This will help me recognize if I am worried about a project, and I can stop and figure out what's making me feel that way. Finally, I know that fresh air and movement can help when I'm feeling anxious. If I'm having a hard time with something I'm working on, I can invite a team member to take a walk with me and brainstorm together."</i>
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Appendix B

Supervisor Checklist

Note: The supervisor checklist was administered twice during the internship program, in weeks 2 and 8. The text was the same across both checklists except for the final question in the second version, which asked supervisors to assess their intern's improvement over the course of the internship program. For each item, supervisors were asked to provide a rating on a scale of 1 (low) to 4 (high).

Please rate the following statements:

- How would you rate this intern's overall performance?
- How would you rate this intern's performance in the beginning of the internship?
- How would you rate this intern's performance by the end of the internship?

At this point in time, how would you rate their...

- a. level of self-awareness? (For ex. learning to be aware of emotions, abilities, skills, challenges)
- b. level of job awareness? (For ex: learning to realize what the job tasks entail, seems aware of the possible outcomes of decisions, etc.)
- c. level of awareness of the social contexts of the job? (For ex: seems aware of and attends to the social dynamics, reporting relationships, etc.)
- d. communication skills? (For ex: ability to express themselves, ask questions, accept and give directions)
- e. attitude towards internship? (For ex: presents positively, seems engaged and present, seems interested in learning)
- f. level of proactivity related to their own learning and work needs? (For ex: actively considers their capacity to do a task, their available time, skills, whether they have the necessary resources, aware of their own level of focus and whether they need an attention break before starting a new task, etc.)
- g. level of proactivity related to understanding the task and getting it done? (For ex: notices what needs to be done, sizes up the task to figure out what resources it requires, figures out approaches for tackling tasks, completes tasks, etc.)
- h. level of proactivity in taking on new challenges? (For ex: looks for appropriate opportunities to try new things, etc.)
- i. level of proactivity related to actively managing situations in the work environment? (For ex: asks questions of clarification, realizes possible points of miscommunication, notices when an issue might be developing, attending to social and emotional factors)
- j. engagement and interaction with the supervisor? (For ex: takes responsibility for checking in, anticipates questions that supervisors may have, responsive when the supervisor checks in with them, listens with attention)
- k. engagement and interaction with others on the job? (For ex: attends to the social dynamics related to getting jobs done well, contributes to and leverages team assets for work performance, takes on leadership when/if appropriate)
- l. comfort level and likelihood that they will ask for help when they need it? (For ex: admits when they don't understand something or need help thinking through what to do, uses the people around them as resources to support their ability to do their best work)
- m. taking on additional work? (For ex: does more than the minimum, etc.)

Please rate the following statements:

- To what extent do they make appropriate changes to make their social/emotional work environment better support their performance? (For ex: ask someone who is chatty to wait until break, ask for feedback from others in ways that they are best able to hear it/use it, etc.)
- To what extent do they make appropriate changes to make their physical work environment better support their performance? (For ex: puts sticky notes up as reminders, chooses a workspace away from distractions (including people), asks to adjust the location of a resource that they need regular access to, etc.)
- To what extent do they seem to be a good learner? (For ex: uses strategies to solve problems, downloads complex information onto a white board to help them to analyze it, uses reflection to think about a task before jumping right in, etc.)
- How would you rate this intern's improvement from the beginning to the end of the internship?

Appendix C

Codebook for “Fast Fish” Themes

Awareness of Context

Code	Definition	Example (If Present in Coded Data)
Aware of available support and feedback opportunities	The participant identifies persons and resources that can facilitate their work and learning	(118C_1) Thankfully, an analyst, that I've been paired with for my internship, messaged me after the meeting and asked me when I'd be free to go over the meeting with his notes and breakdown what was discussed.
Aware of relational aspects of work	The participant identifies the relational factors that may affect their decisions and actions in the workplace (e.g., contribution to the team; don't want to bother others)	(122S_1) My supervisor always provides help with no hesitation. he never seems annoyed at the fact that im asking or that im not understanding something. that allows me to be come comfortable when asking questions and now put too much pressure on myself
Aware of emotional context/state	The participant identifies their feelings and emotions and the sources of these feelings and emotions	(124S_3) I felt confident because they gave me projects that were under my capabilities based on the work I have been doing for the past couple of weeks. So I got to work on them immediately.
Aware of motivational context/ state	The participant identifies their motivations (or lack thereof) and the sources of their motivations	(115K_1) I felt very motivated to take on new tasks. I wanted to complete my work, so that I could socialize with my peers.
Aware of cognitive context (knowledge or gaps in knowledge, assumptions/ beliefs/ biases, etc.)	The participant identifies their cognitive structure, including knowledge or knowledge gaps, assumptions, mindsets, perspectives, and so on	(116U_1) As for the other task I am trying to figure out an approach. I think I have to ask more questions and some more insight on management perspective.
Aware of environmental context	The participant identifies factors in their physical context that may facilitate or hinder their work and	(107K_3) With the internship being remote it made it easy to slack off or take your time with certain assignments

(physical workspace, sources of distraction, etc.)	learning	
Aware of embodied context (health, energy, etc.)	The participant identifies awareness to factors that might influence (positively or negatively) their health and energy levels during work and learning	(I12U_2) I also tried to make small talk as often as I could, although that felt draining sometimes.

Understanding of Context

Code	Definition	Example (If Present in Coded Data)
Understanding of available support and feedback opportunities	The participant notices which persons and resources could facilitate their work and learning and understands how to engage with those people and resources.	(I131-A) “throughout our coach wasn’t available to answer our questions as he was too busy to help us.” (197-B) “my boss makes an effort to assist me whenever he can. Additionally, he offers me advice”
Understanding of relational aspects of work	The participant notices the relational factors that may affect their decisions and actions in the workplace (e.g., contribution to the team; don’t want to bother others) and understands how to interact with them.	
Understanding of emotional context/state	The participant notices how their feelings and emotions are impacting their other contexts (social, relational, emotional, motivational and cognitive) and understands how to navigate this.	(I131-A) “Finally, I know that social interaction can help me when I’m feeling overwhelmed so when there is some downtime I can just relax and talk to my teammates”
Understanding of motivational context/state	The participant notices which sources can lead to increasing or decreasing their motivations (or lack thereof) and understands their impact.	

Understanding of cognitive context (knowledge or gaps in knowledge, assumptions/ beliefs/ biases, etc.)	The participant notices how their cognitive structure (including knowledge or knowledge gaps, assumptions, mindsets, perspectives) is influencing their work and learning and understands why .	(I131-A) “I’ve made slide decks ... but I had never created a slide deck for a pitch or consultation competition ... and I wasn’t sure how to go about it and what info to present.”
Understanding of environmental context (physical workspace, sources of distraction, etc.)	The participant notices how factors in their physical context may facilitate or hinder their work and learning, and understand how they can navigate this .	
Understanding of embodied context (health, energy, etc.)	The participant notices how certain factors are influencing (positively or negatively) their health and energy levels during work and learning, and understands next steps that can be taken .	

Management of/Modification to Context

Code	Definition	Example (If Present in Coded Data)
Seeking support and feedback	The participant actively seeks feedback or support for work	(124S_3) I asked for clarifications along the way as well which helped me on how to approach the project well.
Managing relational aspects in work	The participant actively manages relationship with people in the workplace, such as supervisors or co-workers	(119D_3) I wanted the team to feel the passion I had for the topic that I was presenting. I was really focused on being comfortable to present it orally and looking out for my wording.
Managing/modifying emotional context/state	The participant actively manages their emotional state, either through explicit behaviors or different interpretations.	(116U_1) I was frustrated and feeling incapable and I spoke about it to a friend. She suggested a coffee break. After some coffee and chatting it was easier to get back to work refreshed.

Managing/modifying motivational context/state	The participant takes actions/ efforts to manage or regain their motivations in their learning and work.	(104K_1) However I was able to pick myself up and gained back the motivation to learn new knowledge and develop my expertise in it.
Managing/modifying cognitive context (knowledge or gaps in knowledge, assumptions/ beliefs/ biases, etc.)	The participant actively makes changes to their thinking, such as seeking to resolve a gap in their understanding, challenging an assumption, and adopting a different mindset, to facilitate their work and learning	(104K_2) I was able to make a firm decision that I would be able to overcome this difficulty by putting in my best efforts and seeing the positive and good side of this experience instead of dwelling in the negativity.
Managing/modifying environmental context (physical workspace, sources of distraction, etc.)	The participant actively changes their physical environment to facilitate their work and learning	(116U_2) This past weekend I rearranged my apartment so that the office portion has better lighting and is farther from the windows where there is construction going on. I hope that this allows me to concentrate further and be distracted less. I also got a more comfortable chair.
Managing/modifying embodied context (health, energy, etc.)	The participant takes actions/efforts to manage their health or energy levels to promote their work and learning	(104K_2) I made sure to take short breaks in between, as well as move around in my room, so that I will not get drained of my energy by doing one thing. This helped me to maintain the same energy throughout the day.

Evaluation of (the Management of) Contexts

Codes	Definition	Example (If Present in Coded Data)
Evaluate contexts	The participant evaluates the impact of their emotional, motivational, social, cognitive, environmental, and embodied context on their work.	(125K_1) I now realize that my frustration got the best of me and caused me to procrastinate the assignment.
Evaluate management of context	The participant evaluates their actions to manage/modify their contexts.	(118C_2) I think making everyone aware of my availability and asking for additional tasks was the best move for me as I showcases my willingness to work and take on new tasks.

Evaluate the absence of management of context	The participant evaluates their lack of efforts or actions to manage/modify their contexts.	(104K_3) I was really oversteering myself as an intern and should instead asked for help and guidance
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Planning to Manage/Modify Context

Codes	Definition	Example (If Present in Coded Data)
Plan to seek support and feedback	The participant plans to seek more support and feedback from their social context to facilitate their work and learning	(104K_2) I will always ask for the guidance and advice related to the task, the internship, and my career in general as well.
Plan to manage relational aspects of work	The participant plans to put more effort into managing relationships with people in the workplace to facilitate their work and learning	(112U_3) The next time a similar situation arises, I will take a two step approach: 1) at the very beginning, establish a communication stream that works for everybody, whether that's weekly huddles or simply action item lists within the group chat. It's important to start off by understanding everybody's work habits to create a community of understanding. 2) If I am in the situation where I take a more active leadership role, I would set up individual meeting times with teammates to motivate them and make sure we're all on the same page.
Plan to manage/modify emotional context/state	The participant plans to put efforts into managing their emotional state, either through explicit behaviors or different interpretations	(110U_2) I will also try to be more open to communication when I feel overwhelmed or anxious.
Plan to manage/modify motivational context/state	The participant plans to manage or regain their motivations in their learning and work	(104K_2) I definitely will stop procrastinating, and at the same time set priorities and a planner for the activities/tasks that I want to do during my internship/workplace.

Plan to manage/modify cognitive context (knowledge or gaps in knowledge, assumptions/ beliefs/ biases, etc.)	The participant plans to put efforts into managing their thinking to facilitate their work and learning	(102K_1) next time i will not go into something and see how they compare. i will simply allow myself to start fresh
Plan to manage/modify environmental context (physical workspace, sources of distraction, etc.)	The participant plans to modify their physical environment to support their work and learning	(115K_1) In the future, I think that I would take maybe 2 work from home days and go in office three times per week.
Plan to manage/modify embodied context (health, energy, etc.)	The participant plans to manage their health or energy levels to promote their work and learning	