



# Voices from the Tower: A Narrative Inquiry into the English Language Learning Strategies of Indonesian Air Traffic Controllers

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**Abstract.** This study explores the English Language Learning Strategies (LLS) perceived and utilized by Air Traffic Controllers (ATCs) at the Makassar Air Traffic Service Center (MATSC). In the high-stake environment of aviation, where clear communication is significant, understanding how controllers maintain and improve their English proficiency is critical. Adopting a qualitative narrative inquiry approach, this research conducted semi-structured interviews to investigate the learning experiences of ATCs. The findings reveal a group of highly autonomous and responsible learners who perceive English as a malleable skill, not an innate talent. They employ a dual-approach to learning, blending informal, technology-driven strategies such as learning through digital media, with foundational, structured techniques such as memorization. A significant finding is the “Social Strategy Paradox,” wherein direct conversation is commonly uttered as the most effective strategy yet is the most underutilized due to a lack of opportunity. Furthermore, a “Planning Gap” exists between the controllers’ high capacity for self-monitoring and their inconsistent application of proactive, goal-oriented planning. This study concludes that while MATSC controllers possess a strong foundation for self-regulated learning, their progress is constrained by a gap between strategic awareness and consistent implementation. The findings offer critical implications for designing targeted training policies that can bridge this gap and improve aviation safety.

**Keywords:** Language Learning Strategies (LLS), Air Traffic Controller (ATC), English for Specific Purposes (ESP), Narrative Inquiry, Self-Regulated Learning, Aviation English.

## 1 Introduction

English proficiency in the aviation sector, often termed “Aviation English,” is a cornerstone of global aviation safety. It falls under the academic discipline of English for Specific Purposes (ESP), which focuses on the specialized language requirements of a particular professional context [1]. Unlike general English, aviation English is characterized by a specific lexicon, standard phraseology, and an uncompromising need for clarity to prevent miscommunication. Consequently, the strategies that professionals use to learn and maintain this skill are of critical importance.

Rebecca Oxford's framework of Language Learning Strategies (LLS) provides a robust model for understanding these processes. Oxford categorizes strategies into direct (memory, cognitive, compensation) and indirect (metacognitive, affective, social) types. This framework helps to map not only what learners do to process the language but also how they manage their own learning journey.

Building on this, the concept of Self-Regulated Learning (SRL) is central to understanding the modern professional learner. SRL refers to the degree to which individuals are metacognitively, motivationally, and behaviourally active participants in their own learning process [2]. An individual's mindset, specifically, the belief that ability is malleable (a "growth mindset") is a strong predictor of their capacity for SRL [3]. While much LLS research has been quantitative, there is a recognized need for more qualitative, context-specific studies that explore the narrative experiences of learners in unique environments [4]. This study aims to fill that gap by exploring the self-perceived strategies of Indonesian air traffic controllers.

## 2 Literature Review

The mandate from the International Civil Aviation Organization (ICAO) for standardized English proficiency is a fundamental of global air safety, situating "Aviation English" as a critical domain within English for Specific Purposes (ESP). Unlike general English, the language of aviation is defined by a highly specialized lexicon, strict adherence to standard phraseology, and an uncompromising demand for clarity to mitigate the risks of miscommunication in a high-stakes environment [1, 5]. The effectiveness of this communication depends not only on institutional training but also on the individual professional's ability to continuously learn and maintain their skills throughout their career.

To understand this individual process, Rebecca Oxford's framework of language learning strategies (LLS) provides a comprehensive model. LLS are the specific, conscious actions learners take to enhance their own learning, categorized into direct strategies for processing the language (memory, cognitive, compensation) and indirect strategies for managing the learning process (metacognitive, affective, social) [6]. This framework moves the focus from what is taught to how it is learned, emphasizing the learner's active role.

This active role is the central concept of self-regulated learning (SRL), which describes the degree to which learners are metacognitively, motivationally, and behaviourally proactive participants in their own learning [2]. Successful SRL is not merely about using strategies, but about coordinating them through planning, monitoring, and reflection. A powerful predictor of a learner's capacity for SRL is their mindset. Research has established a strong link between a "growth mindset", the belief that one's abilities can be developed through dedication and effort, and higher levels of learner autonomy, persistence, and strategic engagement [3, 7].

While the field of LLS is well-established, a significant portion of the research has been quantitative, often relying on surveys to identify broad trends in strategy use across general academic populations. Recent systematic reviews have highlighted an

urgent need for more qualitative, context-specific research that explores the “why” and “how” behind strategic choices through the lived, narrative experiences of learners in unique, high-stakes professional environments [4]. This study answers that call by employing a narrative inquiry to provide a deep, contextualized understanding of the language learning strategies implemented by Indonesian air traffic controllers, a significantly under-researched area whose proficiency is directly linked to operational safety.

### 3 Research Method

This study employed a qualitative narrative inquiry methodology to gain a deep and rich understanding of the experiences of Air Traffic Controllers at the Makassar Air Traffic Service Center (MATSC). This approach, which focuses on exploring personal stories and the context behind individual actions, is particularly well-suited for investigating the complexities of professional learning [8].

Makassar Air Traffic Service Center employs 198 air traffic controllers from various length of service. The study involved 20 air traffic controllers, approximately 10% of the population, who were selected through purposive sampling to ensure a diverse representation of experience and proficiency levels. They were categorized into four distinct groups (struggling level 4, stable level 4, aspiring level 5, and established level 5), with five participants in each, representing varying levels of operational experience and seniority within the organization.

**Table 1.** Participant group composition.

| Group Category          | Description                                                         | Number of Participants (n) |
|-------------------------|---------------------------------------------------------------------|----------------------------|
| STR/Struggling Level 4  | Controllers holding level 4 with the experience of re-check/level 3 | 5                          |
| STA/Stable Level 4      | Controllers stable in Level 4                                       | 5                          |
| ASP/Aspiring Level 5    | Controllers who newly gain level 5                                  | 5                          |
| EST/Established Level 5 | Controllers who maintain level 5                                    | 5                          |

Data were collected through in-depth, semi-structured interviews with each controller. The interview protocol, structured to elicit narratives about their learning journeys, focused on their perceptions and utilization of English learning strategies and the key elements of self-regulation (S2R). All interviews were audio-recorded to ensure accuracy.

Following the interviews, the recordings were transcribed by utilizing a software TurboScribe AI. The recordings were transcribed using a clean verbatim approach to remove filler and repetitive words to gain a better understanding. The transcribed data was then subjected to a rigorous, inductive thematic analysis. This process involved multiple readings of the transcripts to identify recurring patterns, core beliefs, and

shared experiences related to the controllers' English language learning strategies. Initial codes were generated from the data, which were then collated into the potential themes and sub-themes presented in the findings. Ethical considerations were maintained throughout the process, with all participants providing informed consent and assured of the anonymity and confidentiality of their responses.

## 4 Result and Discussion

Across all participant groups, the data consistently revealed that the MATSC controllers possess a strong psychological foundation for successful learning. This foundation is built upon two pillars, a high degree of learner autonomy and a deeply ingrained growth mindset [9]. The S2R data provided empirical confirmation, with controllers from all groups almost unanimously agreeing with statements such as, "I feel responsible for my learning process" and "I am sure that my success depends very much on myself". This powerful sense of personal responsibility and internal locus of control is a foundation of learner autonomy and a critical prerequisite for effective self-regulated learning [2].

This sense of autonomy is directly powered by a near-universal "growth mindset," the belief that ability is malleable through effort [7]. Participants consistently rejected the notion of English proficiency as a fixed talent, instead framing it as a skill to be developed through hard work. This was validated in the S2R data, where participants strongly agreed with statements like, "I believe that English skills and abilities can be improved with diligent study". This mindset provides the psychological resilience necessary to persevere in a demanding learning context and aligns with research showing a strong link between such beliefs and learning achievement [3]. This shared foundation is the organization's greatest asset, demonstrating that the workforce is psychologically primed for continuous improvement.

The analysis of the interview data reveals a complex and nuanced picture of how MATSC controllers perceive and utilize English learning strategies. Four major themes emerged, they are: (1) The professional mindset: A foundation of autonomy and pragmatism, (2) Strategy utilization: A dual-approach of consumption and creation, (3) The social imperative and its paradox, and (4) The self-regulation gap between awareness and action.

### 4.1 The Professional Mindset: A Foundation of Autonomy and Pragmatism

The most profound and foundational finding of this inquiry is the shared psychological framework that underpins the controllers' entire approach to language learning. This is not merely a collection of opinions, but a deeply ingrained professional mindset that serves as the foundation for all their strategic choices and learning activities. This mindset is built on three interconnected pillars, they are: a deeply held belief in English as a malleable skill (a growth mindset), a powerful culture of personal responsibility (learner autonomy), and a razor-sharp, pragmatic focus on functional communication (an ESP-driven ethos).

**The Growth Mindset: English as a Malleable Skill.** The narrative data reveals that the MATSC controllers operate from a position of profound psychological resilience, rooted in a “growth mindset”. Participants unanimously and forcefully rejected the notion that English proficiency is a fixed, innate talent. Instead, they articulated a powerful and consistent belief that it is a skill that can be systematically developed, cultivated, and improved through dedicated effort and strategic practice. This was not only inferred from their narratives but explicitly confirmed in the S2R data, where participants responded with “strongly agree” to statements such as, “I believe that English skills and abilities can be improved with diligent study,” and “I am sure that my success can be achieved with hard work”.

This mindset is a critical finding, as the academic literature establishes a direct correlation between a growth mindset and higher learner autonomy, persistence, and resilience [10]. This belief system is not an abstract concept for the controllers, it is a practical tool that enables them to persevere through the significant challenges inherent in their work. It allowed them to navigate the initial “shock of immersion” into the hyper-specialized world of technical aviation language, framing the daunting task of learning thousands of new vocabulary items not as an insurmountable barrier, but as a manageable, step-by-step process. This mindset fundamentally reframes the nature of difficulty. For these professionals, encountering a complex clearance, an unfamiliar accent, or a non-standard phraseology is not a reflection of personal limitation but an integral and expected part of the learning process and also an opportunity to adapt, learn, and improve. This psychological orientation is the most critical asset in a profession where confidence and the ability to recover from minor errors are paramount.

**Learner Autonomy: A Culture of Personal Responsibility.** The controllers’ growth mindset serves as the fuel for a powerful sense of ownership over their professional development, manifesting as a high degree of learner autonomy. This culture of personal responsibility was a dominant narrative thread throughout the interviews. When asked directly about who bears the responsibility for maintaining English proficiency, one participant’s unequivocal statement, “I think for me personally it’s my own responsibility,” captured the universal sentiment. This was not a reluctant admission but a statement of professional identity. The S2R data provided empirical validation for this narrative, with controllers consistently agreeing with statements of internal attribution, such as, “I am sure that my success depends very much on myself”. This high degree of perceived autonomy is a sign of successful self-regulated learners, who position themselves as the primary agents of their own progress rather than as passive recipients of institutional training [11]. This internal locus of control has a great implication for their strategic choices. It explains why so many have proactively sought out their own learning resources, from mobile applications to YouTube content creators, without waiting for a formal curriculum. It demonstrates an understanding that the company’s role is to facilitate, but the individual’s role is to drive. This proactive stance is essential for the continuous, lifelong learning required in a dynamic field like aviation.

**Pragmatism: The “Clarity Over Complexity” Ethos.** The controllers’ perception of proficiency is sharply and pragmatically defined by the non-negotiable demands of

their safety-critical profession. Their ultimate goal is not academic perfection or linguistic elegance but operational effectiveness. They consistently defined “good English” not by sophisticated grammar, an expansive vocabulary, or a native-like accent, but by the ability to communicate a message unambiguously to prevent any possibility of miscommunication [12]. One participant articulated this by stating that good English means “he/she understands the vocabulary even if it’s not standard, he/she can grasp the meaning of what the pilot is saying”. This ethos of “clarity over complexity” is a classic and essential feature of an English for Specific Purposes (ESP) context. This pragmatic focus shapes their entire learning approach, allowing them to prioritize functional communication strategies over those aimed at achieving abstract fluency. For example, they value compensation strategies like asking for clarification or using a translation tool and social strategies like asking a senior colleague for help because these are effective, real time tools for ensuring understanding. This professional pragmatism explains why perfect grammar is seen as secondary to clear pronunciation and correct phraseology. In the world of air traffic control, a grammatically flawed but clearly understood instruction is infinitely superior to a grammatically perfect but ambiguous one. This focus on function over form allows them to manage their learning efforts, concentrating on the skills and knowledge such as the specialized vocabulary identified by Drayton & Coxhead (2022) that have a direct impact on safety and efficiency.

## 4.2 Strategy Utilization: A Dual-Approach of Consumption and Creation

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**Informal Digital Consumption: The Default Mode of Modern Learning.** The most prevalent and consistently utilized set of strategies involves the consumption of English through accessible digital media. This finding provides a powerful, real-world illustration of the rise of Informal Digital Learning of English (IDLE), a phenomenon recognized in recent literature as a dominant force in modern language acquisition, occurring largely outside of formal classrooms [13]. Participants extensively and enthusiastically reported using a trinity of digital resources like YouTube, movies, and social media, as their primary, everyday tools for learning. This represents their widespread, self-directed use of Oxford’s cognitive strategies, specifically those related to practicing and receiving messages in a low-stakes, technologically-mediated manner [14].

The appeal of this approach is multifaceted. Firstly, it is highly accessible and convenient, integrating seamlessly into their daily lives. As one controller noted, learning can happen incidentally while browsing YouTube or relaxing with a film. Secondly, it

is highly motivating because it is interest-driven, they can choose content that they find genuinely engaging, from aviation documentaries to blockbuster movies. This aligns with theories of intrinsic motivation, where learning is more effective when tied to personal interest. Several participants described a deliberate sub-strategy of watching movies with English subtitles, which serves as a powerful tool to connect the auditory form of a word with its written representation, strengthening both listening and reading skills simultaneously.

This approach is fundamentally opportunistic, they learn new vocabulary from a film's dialogue, pick up colloquialisms and authentic speech patterns from a YouTuber, or clarify pronunciation by listening to native speakers in news clips. However, the very strengths of this strategy, its informal, unstructured, and consumption-based nature, are also its most significant weaknesses in the context of a high stakes profession. While this method is excellent for building a broad passive vocabulary and maintaining a comfortable level of immersion in the language, its major limitation is that it is often non-interactive and focuses almost exclusively on receptive skills, listening and reading. It does little to develop the crucial productive skills like speaking and writing that are essential for the real time, high pressure communicative demands of air traffic control. This creates a potential for a "receptive-productive lag," where a controller may understand a great deal but struggles to articulate a clear, concise, and grammatically sound instruction under pressure. The reliance on this mode of learning can create an illusion of comprehensive progress, while the vital skill of spontaneous verbal production remains underdeveloped.

**Structured Foundational Techniques: The Engine of Professional Competence.** In contrast to the informal consumption model, the controllers revert to highly structured, traditional, and effortful memory strategies when faced with specific, high stakes learning demands. This is not their default or preferred mode of learning, but a necessary and deliberately employed tool for building the foundation of their professional linguistic competence. The most vivid and universally shared narrative that triggers this strategic shift is the "shock of immersion" they experienced during their initial ATC training. As one participant recalled, the transition was challenging because "all the vocabulary was new, it was definitely different from what I learned in general schooling".

**Table 2.** The dual-approach to English learning strategies.

|             | Informal Digital Consumption                                      | Structured Foundational Techniques                              |
|-------------|-------------------------------------------------------------------|-----------------------------------------------------------------|
| Description | Broad exposure through accessible, interest-driven digital media. | Targeted, effortful techniques for specific, high-stakes needs. |
| Activities  | Watching YouTube, movies, social media.                           | Memorization, rote repetition, creating glossaries.             |

|                |                                       |                                                     |
|----------------|---------------------------------------|-----------------------------------------------------|
| Primary Skills | Receptive (Listening, Reading).       | Productive (Building core professional vocabulary). |
| Nature         | Passive, opportunistic, unstructured. | Active, deliberate, structured.                     |

Confronted with a dense and entirely new technical lexicon, they were forced by necessity to memorize the phonetic alphabet, standard phraseology, and the vast, specialized vocabulary that is unique to aviation. This aligns perfectly with the research in English for Specific Purposes, which has identified and codified this specialized vocabulary as a distinct linguistic domain [1]. Participants described processes of rote repetition, creating personal glossaries in notebooks, and using flashcard-like techniques to master essential terminology. One controller detailed a disciplined daily routine of memorizing “at least 3 new vocab words,” demonstrating a conscious and structured approach to vocabulary acquisition. This demonstrates their ability to strategically shift from broad, informal learning to deep, targeted learning when the professional context demands it. This structured approach is less frequent in their day-to-day routine but forms the critical, non-negotiable foundation of their ability to operate safely. It is the engine that builds their core professional vocabulary, while the informal consumption method serves to maintain and expand it. The interplay between these two approaches reveals a sophisticated understanding of language learning. One cannot simply “consume” their way to professional competence in a specialized field, it requires periods of intense, structured, and deliberate creation of a new mental lexicon.

4.3 The Social Imperative and Its Paradox

While digital consumption is the most frequent and accessible learning strategy for the MATSC controllers, it is unequivocally not what they perceive as the most effective. A dominant, powerful, and emotionally resonant theme emerging from the narratives is the immense value placed on social strategies, creating the central tension of their entire learning experience. There is a universal, deeply held conviction that the single most effective method for achieving genuine communicative competence is direct, interactive conversation. The recurring phrase “speaking partner” became a central motif in the interviews, representing not just a method, but an almost visceral need for the dynamic, real-time engagement that only human interaction can provide. This finding provides strong, context-specific empirical support for a large body of academic literature highlighting the profound benefits of cooperative, interactive, and socially mediated learning for developing communicative competence [15]. The controllers’ narratives go beyond a simple preference, they articulate a sophisticated understanding of why this strategy is superior. They described speaking practice not just as a mechanical tool for improving fluency, but as a multifaceted process for building confidence, testing comprehension in real-time, receiving immediate corrective feedback, and, most critically, learning to navigate the unpredictable nature of non-standard communication, a skill that passive consumption can never teach.

Within the workplace, this social imperative manifests as a form of informal, collaborative inquiry. Controllers actively learn by employing one of Oxford's key social sub-strategies, "cooperating with others". They ask questions of senior colleagues about complex procedures, they clarify terminology with supervisors, and they sometimes even seek clarification from pilots after a transmission. This form of on-the-job, socially situated learning is highly effective because of its immediate relevance. However, it is also inherently reactive and limited, it is a tool for solving immediate problems, not for the proactive and systematic **development** of broader language skills.

It is the tension between this deeply held belief in the power of social interaction and the reality of their daily practice that gives rise to what can be termed the "social strategy paradox". While lauded as the most potent and desirable learning method, structured social interaction is also reported as the most difficult strategy to implement consistently. The primary reason cited is a chronic and frustrating lack of available and willing speaking partners. This reveals a critical and problematic disconnect between their most valued strategy and their most utilized one.

The consequences of this paradox are significant and far-reaching, directly undermining their professional goal of "clarity over complexity". It forces the controllers into a heavier reliance on individual, often passive, learning methods that are demonstrably suboptimal for developing the very productive speaking skills that their profession demands and that they themselves most want to improve. This fosters the "receptive-productive lag" discussed earlier, where their ability to understand (receptive skill) outstrips their ability to articulate (productive skill). In a safety critical environment, this is a dangerous discrepancy. Confidence in one's ability to understand a transmission is only half the battle, equal or **greater** confidence is required to respond with a clear, concise, and unambiguous instruction, especially when a situation is escalating or deviating from the normal situation. By being starved of regular, low-stakes opportunities to practice this productive skill, controllers may find their confidence wavering when it is needed most. The paradox, therefore, does not just represent a frustrated learning preference, it represents the single greatest unmet need in their learning ecosystem and a significant barrier to achieving the highest levels of communicative competence and operational safety.

#### 4.4 The Self-Regulation Gap: High Monitoring, Varied Planning

The data from the S2R interviews provides a sharp, empirical lens through which to analyze the controllers' use of metacognitive strategies, which are essential for coordinating the learning process. This finding aligns with systematic reviews that identify metacognitive strategies as a crucial differentiator in successful language learning [16, 17]. The controllers' metacognitive skills exhibit a distinct split between a high capacity for passive awareness and a much more varied application of proactive action. This chasm between awareness and action forms a critical "Self-Regulation Gap" that significantly impacts the efficiency and consistency of their long-term language development.

**High Self-Monitoring: A Universal Strength.** The controllers exhibit a high and consistent degree of self-awareness, which serves as the foundation of their metacognitive capabilities. In the S2R interviews, there was near-unanimous agreement with the statement, “I can monitor myself in carrying out English learning activities”. One controller (STR1) elaborated on this, stating, “Yes, I can monitor myself daily regarding my use of English”. This capacity for self-monitoring is a significant and universal strength across the participant group and represents the foundational component of any self-regulated learning cycle. It indicates that they are engaged, reflective learners who are actively thinking about their own learning processes. They are conscious of the vocabulary they absorb from media, aware of their hesitations in speech, and cognizant of their performance on the job. This confirms that the primary issue is not a lack of awareness or a failure to reflect, but a significant challenge in translating that valuable awareness into consistent, structured action. They possess the “check engine light” for their learning, but they vary greatly in how they respond when it turns on. This is a crucial distinction, as it suggests that any intervention should focus not on building awareness from scratch, but on providing frameworks to act upon the awareness that already exists.

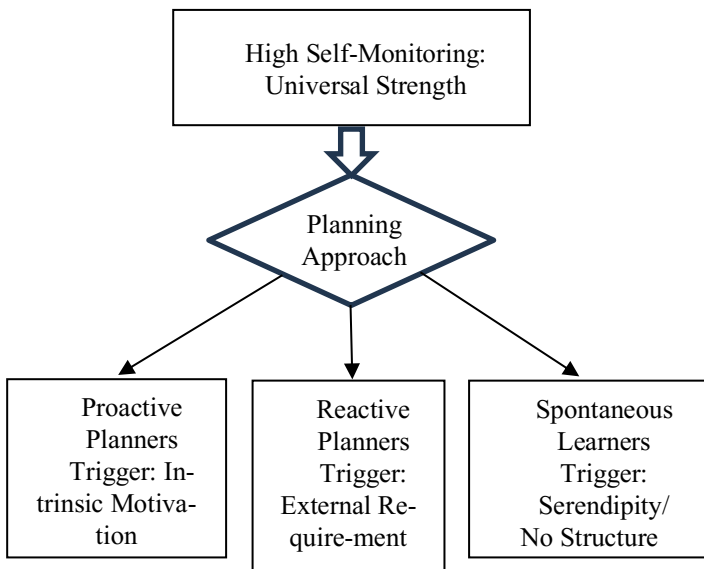
**The “Planning Gap”: The Chasm Between Awareness and Action.** Despite this high level of awareness, the S2R data reveals a significant variation in proactive, goal-oriented planning, the second key component of metacognition. This creates a “planning gap,” a chasm between knowing one should improve and taking structured steps to do so. When asked if they set schedules and targets for their learning, the responses diverged into three clear and distinct archetypes, revealing different triggers and philosophies for action, they are proactive planners, reactive planners, and spontaneous learners.

The proactive planners group is a small but important group represents the ideal of the self-regulated learner. They engage in rigorous, self-initiated planning that is driven by powerful internal factors like passion and professional pride. Their motivation is intrinsic. They set their own schedules for speaking practice, seek out conversation partners, and define personal learning targets that go beyond mere institutional requirements. They are the embodiment of the highly autonomous learners described in the literature [2], who see learning not as a task to be completed, but as an ongoing process of professional self-improvement.

The reactive planners group represents a much larger cohort of controllers. They are capable of planning and do so, but their actions are primarily triggered by external requirements. The narrative of one controller (STR1) perfectly encapsulates this mindset, he sets a schedule and target specifically “because there are provisions for Level 4”. This is a clear and widespread example of compliance-driven planning. The motivation is extrinsic. While this approach can be effective for meeting specific, short term institutional goals, it is a significant weakness for fostering long term, sustainable habits. It creates a dependency on external pressure, meaning that in the absence of an upcoming test or a mandatory requirement, structured learning is likely to cease. This frames learning as a series of obstacles to be cleared rather than a continuous journey of mastery.

The spontaneous learners group is the final group consists of a significant number of participants who expressed hesitation or outright disagreement with the practice of setting a formal schedule. They prefer their informal, opportunistic methods, relying on daily encounters with English through media to drive their learning. Their approach is entirely unstructured and relies on serendipity rather than strategy. While this method can be enjoyable and maintain a baseline of exposure, it is the least efficient for targeted skill development. It lacks direction and makes it nearly impossible to address specific weaknesses or systematically build towards a higher level of proficiency.

This reliance on external triggers or pure spontaneity, rather than a consistent internal habit of planning, is a critical finding. It suggests a form of reactive self-regulation rather than a proactive one for the majority of the participants. This means that while they possess the foundational awareness for self-regulated learning (SRL), many have not yet fully developed the proactive planning and goal-setting skills that characterize highly autonomous learners [2]. The direct consequence of this “planning gap” is a “cram-and-coast” cycle, where intense periods of focused study before an exam are followed by long periods of unstructured, passive learning. This is a highly inefficient model for long term skill development and can lead to a frustrating proficiency plateau, where controllers feel they are not making meaningful progress despite their constant exposure to the language.



**Fig. 1.** The flowchart of self-regulation gap.

## 5 Conclusion

This narrative inquiry provides a rich, qualitative account of the English language learning strategies of Air Traffic Controllers at MATSC. The study concludes that these controllers are highly motivated, autonomous, and resourceful learners, whose efforts are built upon a robust “growth mindset” and a strong sense of personal responsibility. They pragmatically blend modern, informal digital learning with traditional, structured techniques to meet the demands of their profession.

However, the effectiveness of their self-directed learning is constrained by two critical gaps. First, the “social strategy paradox” shows that their most valued strategy, the direct conversation, is their least accessible, forcing them into a heavy reliance on more passive, individual learning methods. Second, and perhaps more fundamentally, the “self-regulation gap” reveals a crucial disconnect between their universal capacity for self-monitoring and their inconsistent application of proactive planning. The majority of controllers fall into archetypes of “Reactive Planners,” driven by external compliance, or “Spontaneous Learners,” who lack structure altogether. This leads to inefficient “cram-and-coast” learning cycles and prevents the translation of their high awareness into consistent, targeted action.

The implications of these findings are significant for aviation training policy. Simply providing resources is insufficient. To unlock the full potential of these highly motivated professionals, institutions must design systems that bridge these two gaps. For the social paradox, this means instituting structured and reliable opportunities for social interaction, such as mandated English-speaking time in briefings. To close the self-regulation gap, policy must evolve to foster proactive habits, not just reactive compliance. This involves a cultural shift, moving away from a system that only addresses failure towards one that incentivizes first-time success and rewards proactive, continuous learning. Offering flexible, high-quality training options and framing all development rigorously can help transform the institutional environment into one that cultivates the proactive planning skills that are characteristic of truly self-regulated learners.

This study makes an original contribution by providing a deeply contextualized, narrative-driven analysis that answers the call for more qualitative LLS research [4]. It connects the grand theories of self-regulated learning to the specific, high-stakes reality of the air traffic controller, offering a blueprint for evidence-based pedagogical and policy improvements. Future research could build upon these findings through longitudinal studies to track the evolution of these strategies over a controller’s career or through intervention studies that measure the impact of a controller’s career or through intervention studies that measure the impact of the policy suggestions outlined above.

## 6 Limitation and Recommendations

This study provides a deep, contextualized account of the LLS of Indonesian ATCs, but its limitations must be acknowledged. As a qualitative narrative inquiry conducted at a single site (MATSC), the findings offer depth rather than breadth, and their generalizability to other aviation contexts may be limited. Furthermore, the data is based on

the self-reported perceptions of the participants, which, while central to this methodology, reflects their subjective experiences rather than an objective measure of strategy use.

Despite these limitations, the findings offer clear, actionable recommendations for policy and future research. To transition from a passive system that relies on individual initiative to one that actively cultivates the proactive habits of its most successful members.

For aviation training policy, this research offers recommendations: (1) Bridge the social strategy paradox. The institution must create structured, psychologically safe opportunities for social practice. A simple but powerful policy would be to mandate that the first 15 minutes of every shift briefing be conducted in English. This normalizes practice, lowers the fear of judgment, and provides the consistent, low-stakes interaction that controllers crave. (2) Close the self-regulation gap by incentivizing proactive success. The current policy framework, which inadvertently rewards failure, should be reformed. To foster a culture of proactive learning rather than reactive compliance, the company should, firstly, introduce incentives for passing, which means to offer tangible recognition for passing the IELP test on the first attempt, such as a professional development bonus or priority for desirable training opportunities. This shifts the institutional focus from remediating failure to rewarding success. Secondly, to offer flexible training options by providing a menu of high-quality training choices (e.g., intensive local courses, sponsored online programs) so that professional development is seen as a valuable opportunity, not just a remedial requirement. And lastly, to frame all training rigorously by ensuring any remedial training is intensive and demanding, reinforcing its seriousness and dispelling any perception of it being a “vacation”.

For future research, this research can be a foundation to conduct: (1) Longitudinal studies to track the evolution of controllers’ strategies throughout their careers, (2) Intervention studies to quantitatively measure the impact of the policy changes recommended here, and (3) Comparative studies at other air traffic service centers to test the broader applicability of these findings.

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