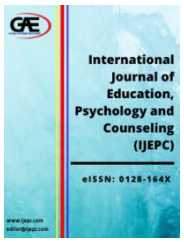
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# HELPING FOUNDATION IN MEDICAL SCIENCES STUDENTS THRIVE IN TERTIARY EDUCATION: A CONCEPTUAL FRAMEWORK FOR DEVELOPING SELF-REGULATED LEARNERS

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**Abstract:**

The transition from teacher-directed secondary education to tertiary study requires students to assume greater responsibility for planning, monitoring and evaluating learning. Foundation in Medical Sciences students may enter with limited preparation for regulating high-volume, conceptually integrated study. Existing self-regulated learning models explain how learners plan, perform and reflect, while transition, scaffolding and co-regulation studies identify useful supports. However, this literature does not provide a context-specific, readiness-sensitive sequence for transferring regulatory responsibility from lecturers to foundation students. Using Torraco's integrative literature review method, this conceptual article reviews, critiques and synthesises representative literature across self-regulated learning, tertiary transition and health-professions education. An integrative review is appropriate because the framework requires theoretical and empirical evidence from complementary traditions to be combined into a new conceptual model. The synthesis identifies four recurrent problems: independence is often assumed rather than taught; knowledge of study strategies does not ensure adaptive use; excessive control and premature withdrawal of support are both counterproductive; and self-report alone provides an incomplete account of regulation. In response, the article proposes the Guided-to-Autonomous Learning Transition for Self-Regulated Learning (GALT-SRL) framework. Its five recursive stages are assessing readiness, model, guided practice, fade support, and

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transfer and reflect. Unlike Zimmerman's learner-centred cycle or scaffolding and co-regulation approaches considered separately, GALT-SRL aligns lecturer actions, student regulatory processes and readiness evidence to govern the staged transfer of responsibility. Six propositions address strategy development, self-efficacy and monitoring, readiness-contingent fading, autonomy-supportive structure, feedback and peer co-regulation, and academic adjustment and learning outcomes. Because the framework has not been empirically tested, it provides a basis for supporting and evaluating students' development as increasingly self-regulated learners.

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**Keywords:**

Educational Scaffolding, Foundation Education, Learner Autonomy, Medical Sciences, Self-Regulated Learning, Tertiary Transition

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## Introduction

The move from secondary school to tertiary education changes more than subject difficulty. It changes the distribution of responsibility for learning. In tightly directed school environments, teachers may select resources, sequence tasks, monitor completion and signal what is likely to be examined. Tertiary programmes still require purposeful teaching, but students are expected to organise substantial learning beyond contact hours, diagnose gaps in understanding, select suitable strategies and seek help before difficulties become unmanageable. Vosniadou (2020) argues that many learners enter higher education without sufficient capacity to plan, monitor and evaluate complex independent learning. Consequently, difficulty during transition should not automatically be interpreted as laziness, weak character or resistance to responsibility.

The challenge is consequential rather than merely transitional. A meta-analysis of 237 studies involving 44,668 students found that adjustment to college is multidimensional and predicts both academic performance and retention (Credé & Niehorster, 2012). At the system level, OECD (2025) reported that 43% of bachelor's entrants across participating education systems completed a tertiary qualification within the expected programme duration, increasing to 59% one year later and 70% three years later. At the expected completion point, 20% had left tertiary education without completing. These completion figures do not establish that adjustment difficulties cause withdrawal, which may also reflect financial circumstances, programme fit, employment and personal responsibilities. They nevertheless demonstrate the importance of the early transition and the alignment between students' preparation, expectations and programme demands.

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The transition can be especially demanding in medical and health-professions education, where students must manage unfamiliar curricula, assessment practices and substantial volumes of conceptually connected knowledge. Among 198 first-year medical, dental and pharmacy students, personal-emotional adjustment received the lowest mean score among the four adjustment domains measured, and adjustment was more challenging for international, mature-aged and female students (Malau-Aduli et al., 2021). In Indonesia, Wahid et al. (2025) used a mixed-method design with 36 first-year medical students and identified the curriculum, unfamiliar learning methods, workload, subject content, assessment and learning activities as academic adjustment challenges. Although the small, single institution sample limits generalisation, the study directly illustrates the academic changes encountered at entry to tertiary level medical education.

Adjustment also extends beyond academic performance. Drawing on 11 student focus-group discussions across two Indonesian medical institutions and 10 lecturer interviews, Zhuhra et al. (2022) identified three interrelated domains: academic, social and personal-emotional adjustment. Prior educational experience, psychological readiness, social support, learning systems, technology and well-being influenced the process. One central challenge is the shift from externally directed secondary education to greater learner autonomy. Students who previously relied on teachers for explanations, schedules, monitoring and examination preparation may not immediately possess the metacognitive and behavioural capabilities required for independent university learning. Vosniadou (2020) therefore argues that higher education should explicitly teach and scaffold self-regulated learning rather than assume that entering students already know how to plan, monitor, evaluate and adapt their learning.

The issue is concerning in Foundation in Medical Sciences programmes. These programmes compress biology, chemistry, physics, mathematics and introductory health-science knowledge into a demanding preparatory curriculum. Students must retain factual material, connect mechanisms across topics and apply knowledge to unfamiliar problems. Evidence from health-professions education supports distributed practice and retrieval practice over massed study and passive restudy in many settings (Carpenter et al., 2022; Trumble et al., 2024). Yet effective methods may feel more difficult and less fluent than rereading, which can lead novice learners to misjudge what has been learned (Bjork et al., 2013). Thus, a student can invest considerable time while using strategies that provide weak information about durable learning.

Self-regulated learning (SRL) offers a strong foundation for addressing this transition. SRL refers to the active processes through which learners set goals, select and enact strategies, monitor cognition and motivation, evaluate outcomes and adapt subsequent action (Panadero, 2017; Pintrich, 2000; Zimmerman, 2002). It is neither a fixed trait nor synonymous with studying alone. Regulation is situated within tasks and social environments; lecturers, peers, assessments and digital systems can support or obstruct it (Hadwin et al., 2022). In medical education, systematic and scoping reviews associate SRL with cognitive, affective and behavioural outcomes and emphasize the influence of context, feedback and learner agency (Ballouk et al., 2022; Cho et al., 2017; Zheng & Sun, 2025).

A recurring educational error is to equate independence with the removal of support. Students cannot reliably perform processes that have remained invisible or unpractised. Conversely, continuous lecturer control may prevent students from developing agency because planning and monitoring remain externally located. The design problem is therefore one of calibrated

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transfer: what support should be offered, when should it be reduced, and what evidence should determine whether fading is appropriate? Recent reviews of first-year interventions point to workshops, tutoring, virtual tools and continuous, context-sensitive designs, but they also show substantial heterogeneity in intervention content and measurement (Simón-Grábalos et al., 2025).

Despite substantial scholarship on self-regulated learning, secondary-to-tertiary transition, scaffolding and co-regulation, an important gap remains. Learner-centred SRL models explain the processes students regulate, but they do not specify a readiness-sensitive pedagogical sequence through which Foundation in Medical Sciences lecturers can transfer those processes to students. Transition studies document adjustment difficulties, while scaffolding and co-regulation research explains temporary support; neither literature, on its own, integrates lecturer actions, student regulatory work and evidence-based fading within the compressed, high-volume foundation medical-sciences context. This article addresses that gap through an integrative review and conceptual synthesis. Its purpose is to develop a practical and testable framework for moving students from predominantly lecturer-regulated learning toward increasingly self-regulated learning without equating autonomy with abandonment.
The review asks:

(1) What mechanisms explain teacher dependence during secondary-to-tertiary transition;
(2) What forms of support develop rather than replace SRL; and
(3) How can these mechanisms be organised into a practical, testable framework for a foundation programme?

The resulting Guided-to-Autonomous Learning Transition for Self-Regulated Learning (GALT-SRL) framework contributes a structured, readiness-sensitive mechanism for transferring responsibility from lecturer guidance to student regulation and provides a basis for future empirical evaluation.

## Methodology

### *Torraco's Integrative Literature Review*

An integrative literature review was selected because development of GALT-SRL requires concepts and evidence that are dispersed across SRL, tertiary-transition and health-professions education research. Torraco's (2005, 2016) method is designed to review, critique and synthesise diverse theoretical and empirical literature in order to generate a new framework or perspective. It is therefore appropriate for this article: no single evidence base explains both the learner's regulatory cycle and the pedagogical process through which responsibility can be transferred without premature withdrawal of support.

Although the review was purposive rather than exhaustive, methodological transparency was maintained through five linked activities: problem formulation, iterative searching, relevance and quality appraisal, concept-centred coding, and comparative synthesis and model building. These activities follow Torraco's emphasis on review, critique and synthesis and are consistent with broader guidance for rigorous integrative reviews (Snyder, 2019; Whittemore & Knafl, 2005). Figure 1 summarises the process.

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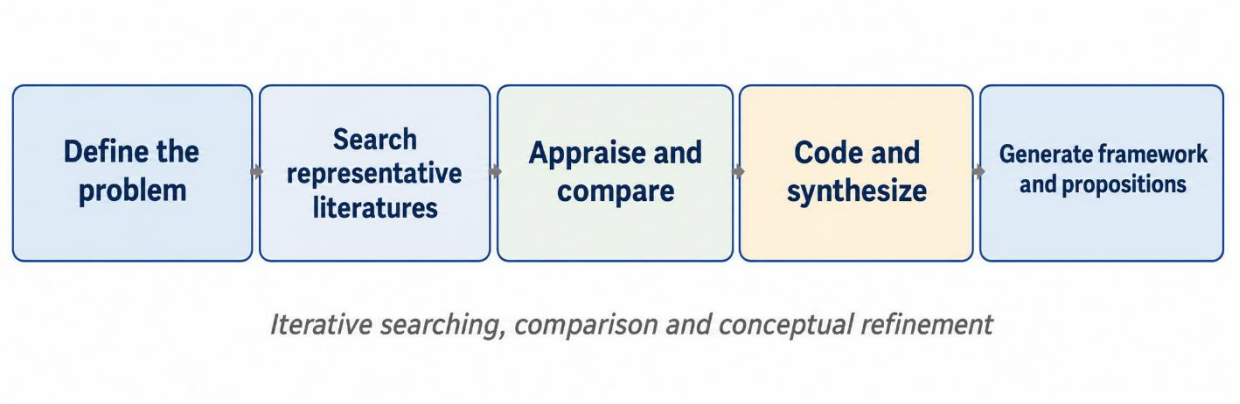



**Figure 1: Integrative Review And Conceptual Synthesis Process**
*Source: Developed by the authors from Torraco (2005, 2016), Snyder (2019), and Whittemore & Knafl (2005).*

### *Search Strategy and Selection Logic*

Searches were conducted iteratively through July 2026 using Scopus, Web of Science, ERIC and PubMed as the principal databases, with Google Scholar used for citation chasing and locating publisher versions. Search strings combined terms for self-regulated or self-directed learning with foundation, pre-university, first-year, transition, medical education, health-professions education, scaffolding, feedback, autonomy support, co-regulation and study strategies. Seminal sources before 2015 were retained when they defined the theoretical or methodological foundation. Recent peer-reviewed reviews and empirical studies were prioritised for claims about contemporary interventions and health-professions education.

Sources were included when they contributed directly to at least one synthesis question: the nature of SRL; the transition into higher education; mechanisms of scaffolded transfer; motivation and autonomy; feedback or co-regulation; effective study behaviour; or health-professions application. Purely promotional materials, untraceable publications and sources making claims without identifiable methods were excluded. Quality was judged through relevance, methodological clarity, publication in a credible scholarly outlet and consistency between claims and evidence. Because the purpose was conceptual integration rather than estimation of a pooled effect, heterogeneous sources were compared by concept rather than combined statistically. Table 1 records the review protocol so that later researchers can reproduce or extend the search.

**Table 1: Integrative Review Protocol**

| Component | Operational decision |
|---|---|
| Purpose | Explain the transition from lecturer regulation to SRL and generate a context-sensitive framework for Foundation in Medical Sciences. |
| Core databases | Scopus, Web of Science, ERIC and PubMed; Google Scholar for citation chaining and publisher versions. |
| Date coverage | Primarily 2015-July 2026; earlier seminal theory and methodology retained when indispensable. |

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| Component | Operational decision |
|---|---|
| Indicative concepts | Self-regulated learning; self-directed learning; first-year or foundation transition; medical or health-professions education; scaffolding and fading; autonomy support; feedback; co-regulation; retrieval and spacing. |
| Inclusion logic | Peer-reviewed theoretical, empirical and review literature that explained mechanisms, implementation or outcomes relevant to the review questions. |
| Exclusion logic | Unverifiable sources, promotional commentary, sources without sufficient methodological or conceptual relevance, and duplicates. |
| Analysis | Concept matrix, constant comparison, identification of convergence/tension, critique of assumptions, and framework/proposition development. |
| Boundary | Representative integrative review; not a PRISMA systematic review or meta-analysis and does not claim exhaustive coverage. |

*Source: Authors' review design based on Torraco (2005, 2016).*

### *Analysis and Synthesis*

The selected literature was organised in a concept matrix containing context, design, theoretical lens, regulatory phase, type of support, outcome and limitation. Analysis proceeded by constant comparison. First, concepts were grouped into explanatory strands. Second, agreements and tensions were identified; for example, autonomy requires learner agency, yet novices also benefit from explicit structure. Third, the review examined what each literature left unresolved. SRL models richly describe learner processes but are less prescriptive about institutional sequencing, whereas scaffolding explains calibrated assistance but does not itself specify the full regulatory cycle. Finally, the strands were recombined into stages, mechanisms, readiness evidence and propositions. This theory-building move is central to Torraco's method: the contribution lies not in summarising studies one by one but in developing a more useful account of the problem.

## Literature Review and Integrative Findings

### *Teacher Dependence Is a Transitional Condition, not a Stable Deficit*

The literature does not support a simple deficit explanation in which dependent students merely lack motivation. Secondary and tertiary environments distribute regulation differently. Students may have learned to succeed through close teacher monitoring because that behaviour was adaptive in their prior context. When expectations change, their previous routines can persist even though the new environment requires greater planning, time management and self-evaluation. Vosniadou (2020) therefore treats SRL as a bridge between educational sectors, while Sáez-Delgado et al. (2023) show that regulatory trajectories already vary before university entry. The implication is diagnostic: lecturers should determine what students can regulate, under what conditions and for which tasks, rather than attaching a global label such as dependent learner.

A transition perspective also changes the lecturer's role. Support is not inherently 'spoon-feeding.' It becomes dependency-producing when the lecturer repeatedly performs regulatory work that students could increasingly perform themselves for example, choosing all goals,

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providing complete summaries, reminding students of every deadline or interpreting every assessment error. Helpful support makes these processes visible, gives students guided opportunities to practise them and gradually transfers control.

### *Self-Regulation Is Cyclical, Situated and Teachable*

Zimmerman's (2002) model organises SRL into forethought, performance and self-reflection. Forethought includes analysing the task, setting goals, planning and activating motivational beliefs. Performance includes strategy use, attention, environmental management, help-seeking and self-monitoring. Reflection includes judging performance, explaining outcomes and adapting future action. Panadero's (2017) review of major SRL models shows broad agreement that regulation includes cognitive, metacognitive, motivational, behavioural and contextual dimensions, despite differences in terminology.

The cycle prevents a narrow focus on time management. A student who creates a timetable but cannot test understanding, regulate frustration or interpret errors is not yet regulating learning effectively. It also explains why advice alone is insufficient. Knowing that retrieval practice is effective is declarative knowledge; selecting it for a particular anatomy topic, sustaining it, interpreting errors and changing the next session are regulatory performances. Meta-analytic evidence indicates that SRL training can improve university students' strategies, motivation and academic performance, with feedback and design characteristics influencing outcomes (Theobald, 2021). Recent reviews similarly argue for visible, continuous approaches addressing multiple regulatory dimensions rather than one-off orientation talks (Luo & Zhou, 2024; Russell et al., 2022; Simón-Grábalos et al., 2025).

### *Structure and Autonomy Must Be Combined*

Self-determination theory provides the motivational explanation for transferring responsibility. Students are more likely to internalise learning goals when environments support autonomy, competence and relatedness (Guay, 2022; Ryan & Deci, 2020). Autonomy support means acknowledging perspective, providing meaningful rationales and enabling appropriate choice; it does not mean leaving novices without structure. Competence requires optimally challenging tasks, clear expectations and feedback that shows how improvement is possible. Relatedness matters because help-seeking and peer collaboration are more likely when students experience psychological safety and instructional care. Reeve (2009) further shows why educators may adopt controlling practices and how teaching can become more autonomy-supportive.

This combination resolves an apparent contradiction. Highly controlling teaching can secure short-term compliance while weakening ownership. Unstructured independence can produce confusion and threaten competence. A productive transition uses autonomy-supportive structure: the lecturer clarifies standards and models strategies, while progressively giving students meaningful decisions over goals, resources, timing and evaluation. The transfer is evidence-sensitive rather than calendar-driven.

### *Feedback and Co-Regulation Externalise Processes Before They Are Internalised*

Formative assessment can reveal the gap between current and desired performance, but feedback develops SRL only when students interpret and use it. Nicol & Macfarlane Dick

(2006) argued that feedback should empower learners to regulate; more recent work finds that lecturers may recognise SRL as important yet concentrate feedback on task correction rather than self-regulatory processes (Van Der Linden et al., 2023). Feedback such as 'revise this section' keeps the lecturer as diagnostician. Feedback that asks the student to explain the error, identify the failed strategy and plan the next retrieval attempt shifts regulatory work toward the learner.

Peers can temporarily share this work. Co-regulation occurs when another person supports planning, monitoring or reflection; socially shared regulation occurs when a group jointly regulates a collective task (Hadwin et al., 2018). These processes are not alternatives to autonomy. They provide transitional participation through which learners encounter strategies, language and standards that can later be internalised. However, group work requires individual accountability, because a dominant peer can otherwise become another external regulator.

### *Effective Strategy Use Requires Accurate Monitoring*

Foundation medical-science students need strategies that support durable and transferable knowledge. Large reviews identify distributed practice and retrieval practice as robust approaches, while highlighting learners' tendency to underuse them because ease and familiarity can be mistaken for learning (Carpenter et al., 2022; Dunlosky et al., 2013). In health professions education, Trumble et al. (2024) found benefits in 43 of 63 experiments, while also noting heterogeneity and the need to report time on task. The educational implication is not to prescribe one technique for every task. Rather, students need a repertoire retrieval, spacing, elaboration, worked example study, problem solving and concept integration and the metacognitive capacity to judge which strategy fits the learning objective.

Learning diaries can make the cycle visible across time. Zarei Hajiabadi et al. (2023) found that diary interventions combining explicit SRL instruction and/or feedback generally influenced more regulatory processes than diaries alone. A diary should therefore be a decision tool, not an administrative log. Short prompts can ask what the student intended to learn, what evidence demonstrated learning, what interfered and what will change next.

### *Medical and Health-Professions Education Requires Contextualised SRL*

Health-professions reviews show that regulation changes across tasks and environments. Cho et al. (2017) found that clinical learning can alter SRL because opportunities, patient care and supervision shape what can be planned and controlled. Ballouk et al. (2022) similarly emphasised how medical students adapt learning behaviours in blended environments. Ricotta et al. (2022) cautioned that self-directed learning in medical education should be precisely defined rather than used as a general label for independent work. Gupta et al. (2024) further connected SRL, self-directed learning and learner agency in dental education, highlighting interactions among intrapersonal, behavioural and contextual dimensions.

The foundation phase precedes clinical complexity but carries its own context which is high content volume, frequent assessment and students' developing professional identities. A framework must therefore embed regulation inside authentic foundation tasks. Students should learn planning through an upcoming cellular biology block, monitoring through chemistry problems and reflection through examination error analysis, not only through generic study

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skills workshops. A 2025 meta-analysis covering 61 medical-education studies found a positive association between SRL strategies and learning outcomes, although effects varied by outcome and training stage (Zheng & Sun, 2025). This variation reinforces the need for context-sensitive design and multi-source measurement.

**Table 2: Critical Synthesis Of The Literature**

| Synthesis strand | Convergent evidence | Unresolved issue addressed by GALT-SRL |
|---|---|---|
| Transition | Incoming students may lack practice in planning, monitoring and evaluation; prior dependence can be contextually learned (Vosniadou, 2020). | How responsibility should be transferred after entry rather than merely demanded. |
| SRL cycle | Regulation involves forethought, performance and reflection across cognitive, motivational and behavioural processes (Panadero, 2017; Zimmerman, 2002). | How lecturers can make each process visible and progressively student-owned. |
| Motivation | Autonomy, competence and relatedness support internalisation and engagement (Guay, 2022; Ryan & Deci, 2020). | How to combine structure with meaningful choice instead of treating them as opposites. |
| Feedback and social regulation | Feedback and co-regulation can support monitoring and adaptation (Hadwin et al., 2018; Van Der Linden et al., 2023). | How external regulation becomes a bridge rather than a permanent substitute. |
| Learning strategies | Retrieval and spacing generally support durable learning, but strategy choice and monitoring remain necessary (Carpenter et al., 2022; Trumble et al., 2024). | How strategy instruction is embedded in real foundation tasks and evaluated through evidence. |
| Health-professions context | SRL is associated with learning outcomes and shaped by learning environments (Ballouk et al., 2022; Zheng & Sun, 2025). | How a pre-degree foundation programme can prepare students for later learner agency. |

*Source: Authors' synthesis.*

### *The GALT-SRL Conceptual Framework*

The synthesis produced the Guided-to-Autonomous Learning Transition for Self-Regulated Learning framework (GALT-SRL). GALT-SRL joins a learner cycle to a pedagogical transfer cycle. Zimmerman's model specifies what students learn to regulate; scaffolding and fading explain how temporary assistance is adjusted; self-determination theory specifies the motivational quality of that assistance; and co-regulation explains how regulation can be socially supported before it becomes increasingly self-initiated. GALT-SRL adds to these approaches by aligning, at each stage, lecturer action, student regulatory work and observable readiness evidence that determines whether support should be maintained, reduced or

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intensified. The framework comprises five recursive stages: assess readiness, model, guided practice, fade support, and transfer and reflect (Figure 2).

The stages are not a rigid linear programme. Students can regulate one task independently while requiring support for another. Monitoring can trigger renewed modelling or guided practice. "Autonomous" therefore means increasingly capable of initiating and adapting regulation, not permanently free from lecturers, peers or resources. Adaptive help-seeking is itself an SRL strategy.

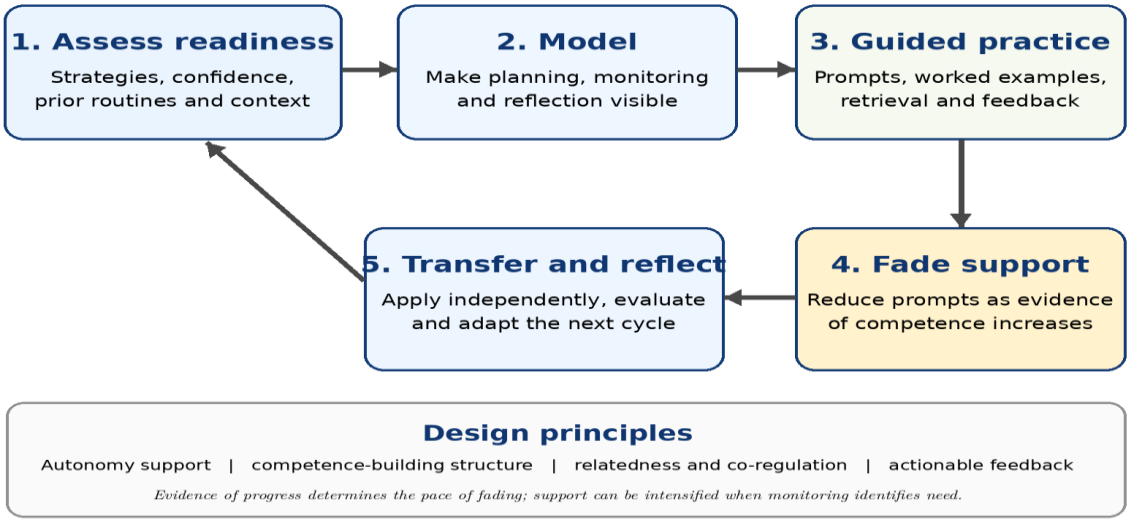



**Figure 2: Guided-to-Autonomous Learning Transition for Self-Regulated Learning (GALT-SRL)**

*Source: Authors' conceptual synthesis.*

### *Stage 1: Assess Readiness*

Stage 1: Assessment of readiness establishes a developmental profile rather than a deficit label. Lecturers examine how students plan, select strategies, monitor understanding, regulate motivation, manage resources and seek help. Evidence may include a validated SRL instrument, a short think-aloud task, a learning diary, a performance prediction followed by a quiz, and discussion of previous study routines. Discrepancies are particularly informative. For example, a student who predicts mastery after rereading but performs poorly on retrieval questions may require support with monitoring accuracy. In contrast, a student who understands effective strategies but does not apply them may need environmental or motivational support. The resulting readiness profile identifies the regulatory processes that should be made visible through lecturer modelling in Stage 2.

### Stage 2: Model

In Stage 2: Model, by using the readiness profile, lecturers model the regulatory processes that students have not yet developed sufficiently. Think-aloud demonstrations can show students how to interpret a learning outcome, estimate task demands, select appropriate strategies, recognise uncertainty, verify an explanation and decide what to revisit. Modelling should include mistakes and revisions so that students understand regulation as an adaptive process

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rather than effortless expert performance. For example, a Foundation in Medical Sciences lecturer might demonstrate how to learn the cardiac cycle by integrating a diagram, causal explanation, retrieval prompts and application questions. Once these normally invisible learning decisions have been made observable, students begin applying them with structured support in Stage 3.

**Stage 3: Guided Practice**

During Stage 3: Guided Practise, students subsequently enact the complete regulatory cycle through guided practice involving prompts, worked examples, structured study plans, low-stakes quizzes, peer explanations and formative feedback. Scaffolds should direct attention to learning decisions without making those decisions on the students' behalf. For example, a template may require students to state a goal, select an appropriate strategy and identify evidence of successful learning without prescribing the exact goal or strategy. Weekly learning diaries can connect forethought, performance and reflection. Feedback should address both scientific understanding and regulatory quality, including whether goals are sufficiently specific, monitoring evidence is diagnostic and subsequent actions respond appropriately to identified errors. As students demonstrate increasingly consistent and effective regulation across several tasks, selected scaffolds can be progressively reduced in Stage 4.

**Stage 4: Fade Support**

In Stage 4: Fade Support, support is faded when evidence from guided practice indicates that students can perform particular regulatory processes with less assistance. Complete templates become partial prompts and eventually self-generated plans; lecturer-created retrieval questions are supplemented and later partially replaced by student-generated questions; and fixed study-group roles gradually become student-managed. Fading should be contingent on demonstrated readiness rather than applied uniformly according to a fixed timetable. Support may be maintained or intensified when learning diaries, assessment attempts or consultations reveal persistent miscalibration or ineffective strategy use. This responsive approach prevents both prolonged dependence and premature withdrawal. When students can regulate familiar learning tasks with fewer external prompts, they progress to independent application and reflection in Stage 5.

**Stage 5: Transfer and Reflect**

In the final stage, Stage 5: Transfer and Reflect, students apply regulatory processes to a new topic, assessment format or interdisciplinary problem with minimal prompting. They justify their goals and selected strategies, compare predicted performance with actual outcomes, analyse errors and determine appropriate adaptations for future learning. Successful transfer provides stronger evidence of self-regulation than compliance with a familiar template because students must initiate and adapt the process in a new context. A capstone learning portfolio may contain study plans, selected learning artefacts, quiz evidence, responses to feedback and a concise account of how the student's approach has changed. Reflection on this evidence produces an updated readiness profile, which returns students to Stage 1 for the next learning cycle. Thus, GALT-SRL operates as a continuous and recursive process in which assessment, modelling, practice, fading, transfer and reflection progressively strengthen student autonomy.

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**Table 3: Proposed Operationalisation Of GALT-SRL In A 12-Week Foundation Semester**

| Stage and timing | Lecturer actions | Student regulatory work | Evidence for progression |
|---|---|---|---|
| Assess readiness Weeks 1-2 | Elicit prior routines; assess strategy knowledge, calibration and help-seeking; identify contextual barriers. | Describe routines; predict performance; attempt diagnostic tasks; identify strengths and needs. | Triangulated readiness profile rather than one self-report score. |
| Model Weeks 2-3 | Use think alouds to show goal setting, strategy selection, monitoring and error analysis in real science topics. | Observe, question, compare expert decisions with prior habits and reconstruct a modelled plan. | Student can explain why a strategy fits a goal and what evidence would show learning. |
| Guided practice Weeks 3-7 | Provide partial structures, low-stakes retrieval, process feedback, diary prompts and peer-regulation routines. | Plan, retrieve, explain, monitor, seek help and respond to feedback using prompts. | Improved calibration, strategy enactment and quality of reflection across several tasks. |
| Fade support Weeks 7-10 | Remove prompts selectively; offer choices; coach students whose evidence indicates continuing need. | Generate questions and plans; manage time and peer support; initiate help-seeking. | Consistent regulation with fewer external reminders and defensible adaptation after errors. |
| Transfer and reflect Weeks 10-12 | Set a novel integrative task; evaluate process and outcome; support forward planning. | Regulate a new task, justify decisions, compare prediction with performance and plan the next cycle. | Independent transfer plus a portfolio showing decisions, evidence and adaptations. |

*Note: Timing is illustrative; progression should be based on evidence of readiness, not week number alone.*

## Conceptual Propositions

The framework yields six propositions concerning strategy development, motivational and metacognitive mechanisms, readiness-contingent fading, autonomy-supportive structure, feedback and peer co-regulation, and academic adjustment and learning outcomes. Together, they explain how responsibility may move from lecturer guidance to student regulation. They are claims for future testing, not findings of the present review.

**P1:** Explicit modelling and guided practice will strengthen students' SRL more than communicating an expectation to study independently without strategy instruction.

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**P2:** The relationship between scaffolding and independent strategy enactment will be mediated by academic self-efficacy and monitoring accuracy.
**P3:** Contingent fading based on readiness evidence will produce stronger transfer than either sustained high lecturer control or uniform withdrawal according to a fixed timetable.
**P4:** Autonomy-supportive structure will predict greater internalisation, engagement and adaptive help-seeking than controlling structure with comparable academic requirements.
**P5:** Process-focused feedback and peer co-regulation will strengthen the relationship between guided practice and subsequent self-regulation.
**P6:** Growth in SRL will be associated with better academic adjustment and learning outcomes, but the magnitude will vary by task, prior readiness and learning context.

## Discussion

### *Theoretical Contribution*

GALT-SRL's novelty lies in converting established theory into a readiness-governed transfer architecture for Foundation in Medical Sciences. Zimmerman's cyclical model explains forethought, performance and self-reflection from the learner's perspective, but it does not prescribe how lecturers should sequence and fade support during entry to tertiary study. Existing scaffolding and co-regulation approaches explain temporary assistance, but they do not consistently link each support to a specific regulatory process, observable progression evidence and a decision to maintain, reduce or intensify support. GALT-SRL connects these levels. Modelling and co-regulation externalise regulatory decisions; guided enactment and feedback develop competence and monitoring; readiness-contingent fading transfers initiation and control; and reflection informs the next cycle. The framework therefore separates support from control and independence from abandonment while making the transfer of responsibility operational and testable.

The framework also treats dependence as relational. A learner appears dependent partly because environments make some actions possible and others unnecessary. If lecturers always provide complete notes and repeated reminders, students have little reason to practise resource selection or planning. If all support disappears, struggling students may respond with avoidance rather than agency. The educational target is therefore adaptive regulation across person, task and environment, consistent with contextual accounts of SRL (Hadwin et al., 2022).

Finally, the framework positions motivation inside regulation rather than as a preliminary trait. Students' willingness to assume responsibility is shaped by whether tasks feel meaningful, achievable and socially supported. This integration of SRL and self-determination theory avoids interventions that teach techniques while ignoring why students would sustain them.

### *Practical Implications for Foundation Programmes*

First, learning-to-learn provision should be embedded in disciplinary teaching. A generic orientation can introduce the vocabulary, but transfer is more likely when planning, monitoring and reflection are practised in biology, chemistry and physics tasks. Course teams should identify where each SRL phase appears in the curriculum and avoid assuming that another lecturer has taught it.

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Second, assessment design should create information for regulation. Low-stakes cumulative retrieval, prediction-before-test prompts, examination wrappers and structured error analysis can help students compare confidence with performance. Grades alone provide insufficient guidance. Feedback should include an action and require uptake, for example, revising an explanation, creating a new question or changing the next study plan.

Third, faculty development is necessary. Lecturers need a shared distinction between productive scaffolding and regulation that substitutes for the learner. Programme level consistency matters, if one module demands planning while another supplies every decision, students receive conflicting signals. Staff should agree on core prompts, fading criteria and referral pathways for students whose difficulties involve wellbeing, language, finance or other barriers beyond study strategy.

Fourth, technology should support decisions rather than automate them away. Learning management dashboards, reminders and question banks can offer useful evidence, but students should still interpret patterns and choose responses. Automated prompts can be faded, and analytics should be discussed with students rather than used only for surveillance.

Fifth, differentiated support is essential. Universal design can provide baseline modelling and low-stakes practice, while small-group coaching or advising supports students with persistent miscalibration, avoidance or time-management difficulty. Differentiation prevents the false choice between designing for the most independent and over-directing the entire cohort.

Sixth, the framework may be adapted and tested in other foundation or bridging programmes that support students' transition from secondary to tertiary education. Comparative research across disciplines and institutions would clarify which elements are transferable and which require contextual modification.

### *Evaluation Agenda*

A future study could use a mixed-method, quasi-experimental or stepped implementation design across foundation cohorts. Measurement should avoid treating a single questionnaire as proof of SRL. Self-report can capture beliefs and perceived strategy use but is vulnerable to recall and desirability bias. A stronger design triangulates questionnaire scores with trace or artefact evidence, calibration, interviews and academic outcomes. Table 4 proposes an evaluation matrix.

**Table 4: Suggested Evaluation Matrix For Future Empirical Testing**

| Construct | Possible measure | Timing | Interpretive caution |
|---|---|---|---|
| SRL knowledge and beliefs | Validated SRL scale plus strategy-scenario test | Baseline, mid-semester, end | Self-report does not establish actual enactment. |
| Monitoring accuracy | Difference between predicted confidence and quiz performance | Repeated across modules | Calibration can vary by topic and assessment format. |

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| Construct | Possible measure | Timing | Interpretive caution |
|---|---|---|---|
| Strategy enactment | Learning diaries, portfolios, question-generation artefacts and selected digital traces | Weekly or sampled | Platform activity is not equivalent to cognitive engagement. |
| Motivation and agency | Academic self-efficacy, autonomy/competence/relatedness and help-seeking indicators | Baseline and repeated | Changes may reflect workload or wellbeing as well as the intervention. |
| Academic adjustment | Engagement, attendance, belonging, stress and continuation | Repeated and end of semester | Institutional and personal contexts should be modelled. |
| Learning outcomes | Low-stakes retrieval, module assessments and delayed retention/transfer tasks | Throughout and delayed | Control prior attainment, time on task and assessment difficulty. |
| Implementation | Fidelity logs, lecturer interviews, student focus groups and scaffold-use records | During and after | Document adaptations; fidelity should not mean inflexibility. |

Source: Authors' synthesis from Hadwin et al. (2022), Zarei Hajiabadi et al. (2023), and Simón-Grábalos et al. (2025).

## Limitations

This conceptual integrative review has four limitations. First, representative coverage permits theoretical breadth but does not support claims of exhaustive retrieval or pooled effectiveness. Second, much SRL evidence comes from university or health-professions populations rather than Foundation in Medical Sciences students specifically; the framework therefore requires contextual validation. Third, publication and language biases may have limited the perspectives synthesised. Fourth, the stages and propositions have not been empirically tested as an integrated model. Their plausibility rests on synthesis of component literatures. Accordingly, the article presents GALT-SRL as a testable conceptual framework rather than as an empirically established intervention.

Future work should document local and international students' prior learning environments, test the acceptability and feasibility of the framework, examine differential effects by readiness and background, and evaluate whether gains transfer into later medical or health-science study. Longitudinal research is especially important because short-term compliance with study routines may not become durable self-regulation.

## Conclusion

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Foundation in Medical Sciences students do not become independent because lecturers stop helping them. They become increasingly self-regulated when the processes of effective learning are made visible, practised with calibrated support, evaluated through meaningful evidence and progressively transferred to the learner. The literature indicates that planning, monitoring, motivation, strategy use, feedback and context interact; no isolated study skills session can carry the full transition.

GALT-SRL translates this evidence into five recursive stages: assess readiness, model, guided practice, fade support, and transfer and reflect. Its central contribution is the structured transfer of regulatory responsibility from lecturer guidance to student autonomy. At each stage, support is linked to a student process and to evidence that informs whether assistance should be sustained, reduced or intensified. The framework therefore provides a basis for supporting students to become increasingly self-regulated without treating autonomy as the absence of teaching. Because GALT-SRL remains conceptual, empirical research is needed to determine for whom, under what conditions and through which components it supports adjustment and learning in tertiary education.

| | |
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