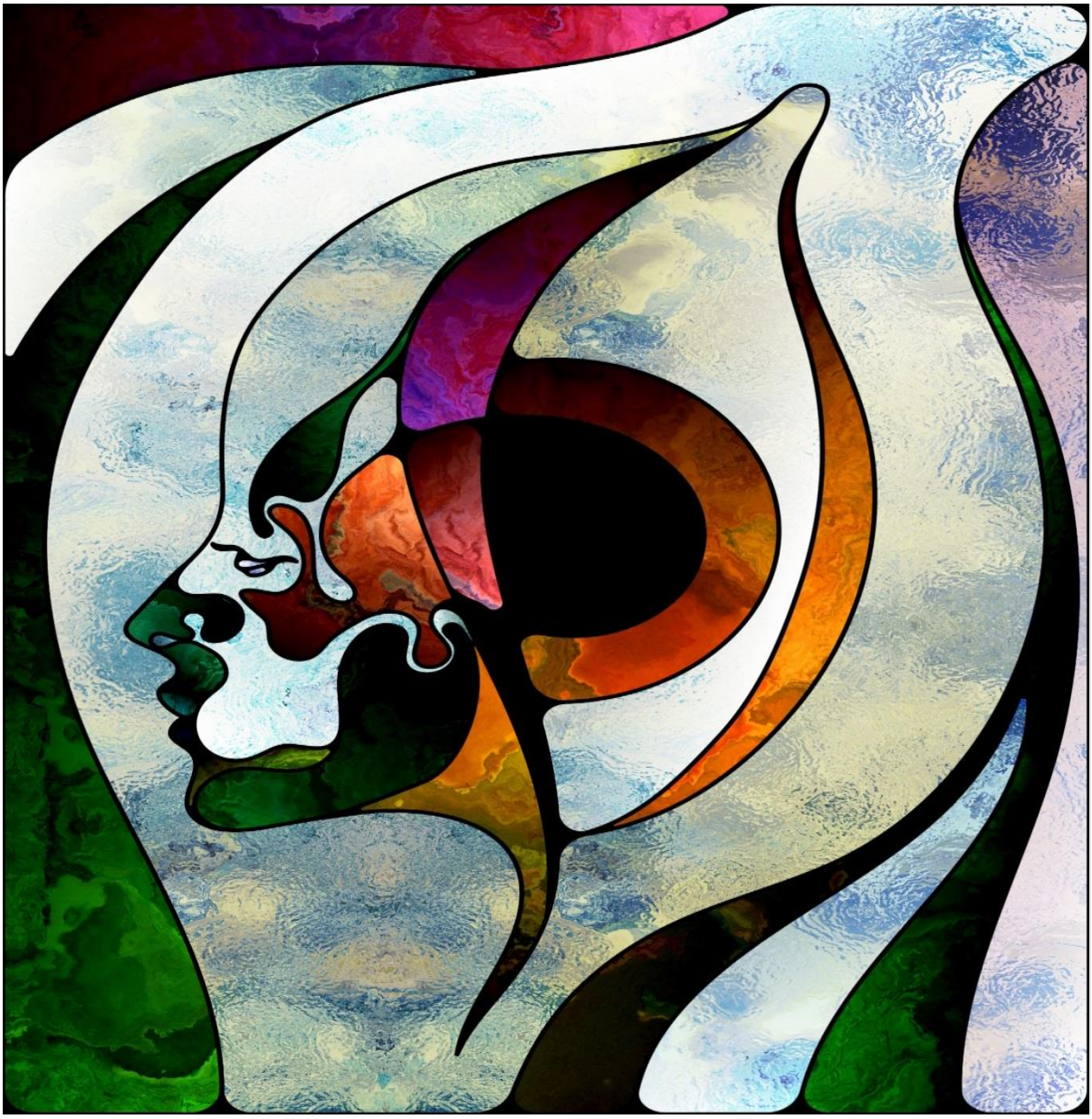
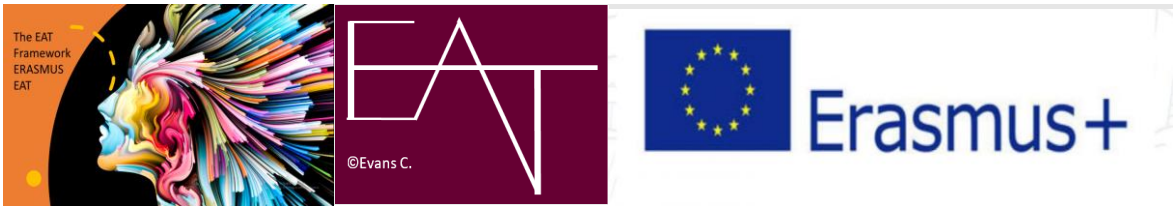
A Self-Regulatory Approach to Assessment in Higher Education





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Contents

Executive Summary

Students' self-regulatory capacity impacts how well they do in higher education and their future careers. However, the complexity of self-regulation and the many constructs related to it, makes translation of research into practice complex (Jansen et al., 2019).

The quality of assessment practices in higher education internationally, and especially from an inclusion perspective, needs improvement. Student completion rates within higher education vary considerably from 59% in Norway to 81% in the UK, figures for Spain, Portugal and Kosovo are approx. 80%, 65% and 64% respectively (ALLED report, 2016; Vossensteyn et al., 2015; Williams, 2017). Supporting students' self-regulation capacity is important in supporting students to manage their learning trajectories successfully as part of sustainable assessment practice.

From an inclusive perspective many students are left behind and marginalised in the education system for lacking the basic skills and strategies that are required to navigate and make best use of the learning resources available to them within higher education institutions (HEIs) (Dunlosky et al., 2013). Attending to students' self-regulatory capacity can address attainment gaps and especially for the most disadvantaged students (Evans et al., 2019; Peeters et al., 2016).

In evaluating the quality of approaches deployed to support students' development of the self-regulatory skills that matter, we need to consider impacts on educators and students, and on institutions as a whole, bearing in mind the use of robust approaches to measurement (Evans et al., 2018; Ifenthaler, 2017).

This resource was developed to support **implementation of self-regulatory approaches to assessment.** It is underpinned by the Equity, Agency, Transparency (EAT) conceptual assessment framework which promotes an integrated and inclusive approach to assessment and feedback. The report aims to:

- Provide an **overview of what self-regulation comprises.**
- Highlight the **conditions required to promote self-regulated** learning (SRL).
- Identify what high level self-regulatory skills are.
- Provide a **coordinating framework** to support SRL development within assessment and feedback: **Self-Regulatory Skills in Assessment Framework** to support implementation of self-regulatory approaches in practice.
- Provide **case study summaries** of relevant SRL research in practice.

The **Self-Regulatory Skills in Assessment Framework (pp.44-50)** was developed with colleagues across partner institutions (University of Bristol, Cardiff University, Eurogeo (Belgium), Iliria College, University of Minho, University of Zaragoza) to support understanding and implementation of a self-regulatory approach to assessment across contexts.

In sum, this report brings together work from different theoretical and conceptual perspectives and across different disciplinary domains to demonstrate how an understanding of self-regulation can be used to enhance assessment and feedback practice as part of an integrated approach drawing

on the EAT conceptual assessment framework. **Assessment can be leveraged to support students' development of self-regulatory skills.**

Defining SRL

- Self-regulated learning (SRL) is a **learner's ability to regulate his/her learning in the pursuit of goals**.
- SRL can be looked at in different ways: to describe the **process** learners go through when they try to master a task; to consider **individual and contextual variables** impacting the effectiveness of the learning process, and more generally to describe specific patterns of regulation (orientations) that students may exhibit in their approaches to learning.
- SRL comprises a **broad umbrella of constructs** (Panadaro, 2017) that come together in many different ways to impact how individuals manage their learning contexts. Students may use combinations of strategies in many different ways to attain positive outcomes.
- **SRL is not an activity that learners pursue independently** (Larsen et al., 2017).
- While the emphasis of SRL is very much on metacognitive processes and knowing how we learn, self-regulation in reality is **not a rational process**, and this is especially true in our evaluations of the quality of our own work.

Importance of context

- SRL is very much **mediated by interaction with the environment** (Hadwin et al., 2017).
- **Context matters**. Individual learners **use SRL approaches variably across context and time**. Understanding of learner starting points, and the key self-regulatory skills required within a specific disciplinary context are important in promoting effective use of SRL.

SRL trajectories

- **Self-regulatory capacity can be developed.** However, some **individuals are more capable of SRL** flexibility than others (Kozhevnikov, et al. 2014). Learners vary in the extent to which they can activate metacognitive flexibility (the ability to adapt strategies to best meet the needs of different situations). Many learners are tied to the habitual use of ineffective strategies (DiFrancesco et al. 2016) but **the quality of the design and delivery of curriculum can make a significant difference to students' effective use of strategies.**
- **Practice, commitment, and motivation** are key to assist learners' development of SRL (see Cleary et al., 2006; Zimmerman & Kitsantas, 2002).
- SRL **requires high level metacognitive skills.** As noted by Schneider & Preckel (2017) students who do well academically are **discriminatory** in what and how they attend to learning. The key question is how we support learners to make good choices in their use of strategies and support them in implementing them effectively.
- If assessments do not require students' use of high level self-regulatory skills, they may see little reason to invest effort in developing them.
- Self-regulatory capability, and metacognitive awareness does not necessarily result in the use of self-regulatory strategies in learning given the **mediating effect of individual** (e.g., motivation) and **task characteristics** (e.g., the nature of assessment) (DiFrancesco et al., 2016; Dresel et al., 2015).

- There are **different pathways** within self-regulation. The way in which the learning environment is designed has a considerable impact on whether students self-regulate effectively or not. Assessment design and delivery can either trigger students to develop appropriate learning strategies to realise their learning goals, and/or promote students' development of less effective learning strategies. For example, to protect their sense of self (e.g., self-worth; self-efficacy), learners may seek to avoid situations that make them feel uncomfortable (e.g., not seeking feedback for fear of negative impact).

Individual differences

- **SRL patterns will vary** for different groups of students, and for the same student in different contexts, with varied impact on performance, requiring careful mapping of student learning trajectories to assess what makes a difference to how they perform.
- Depending on students' prior knowledge, experiences and capabilities, **different approaches to self-regulation may be required.**
- An SRL focus is often seen as a way to 'eliminate the impact of student characteristics such as socio-economic status and ethnic background on performance (Peeters et al., 2016). However, little is known about the competencies students need to realise self-regulation behaviours, and self-regulatory capability and metacognitive awareness do not necessarily result in the use of self-regulatory strategies in learning.
- Levels of **educator SRL knowledge** and **confidence in developing SRL strategies** impact assessment design.

> The issue is how best to promote SRL and adjust instructional strategies reflective of situational demands (Boekaerts & Corno, 2005; Dörrenbächer & Perels, 2016; Peeters et al., 2016). How can educators be best supported to achieve this?

Supporting the development of self-regulatory learning (SRL) capability involves:

- **Engagement is the golden thread** in supporting SRL. Students need opportunities to be co-constructors of their learning contexts if they are to take responsibility for their own learning. Addressing student and educator perceptions of student engagement in learning, and what quality engagement comprises is an important first step in realising SRL (see section 5.1).
- **Institutional commitment to providing the structures, policies, and processes to embed student engagement within the curriculum.**
- **Closing the significant research-practice gap** between what we know about effective SRL and what happens in practice. The underpinning conceptual framework informing this work is that of the EAT Framework (Evans, 2016, 2021) which brings together research on engagement, individual differences, self-regulation, and assessment practice with the aim of bridging this research practice gap.
- Identifying key principles underpinning effective assessment practice. These include ensuring that **sufficient challenge** is embedded in assessment design so that **assessments test the high**

level SRL skills that are valued (3.1). Clarifying those **high level SRL skills** required within specific contexts. (see section 4.3)

- Attending to **student beliefs about learning and their motivations** in developing learning environments that support student autonomy. This also requires more focused attention on supporting students in goal setting. (5.1)
- Exploring **students' patterns of learning at point of entry** and providing **early opportunities** for students to test their understanding. (5.2)
- Ensuring **transparency** of the learning process through the giving of explicit and focused guidance to allow focus on those things that matter most in learning. (5.3)
- Enhancing student access to learning by **making local cultures of learning explicit**. (5.3)
- Using **data effectively** to support the learning of all students.
- **Ensuring an integrated approach** that addresses metacognitive, cognitive, and affective dimensions of learning**.** (5.3, 5.4, 5.5)
- **Embedding SRL strategies within disciplinary contexts** and **progressively** developing them throughout a programme. (5.6)
- Ensuring **high quality training** for students and educators in the development of SRL strategies including evaluative skills regarding the efficacy of different approaches.

- Providing students with **repeated exposure** to observing, practicing, and applying self-regulatory skills across a variety of contexts (e.g., embedding self and peer assessment activities throughout a programme of study (5.9; 5.10).

Section 1: Self-Regulation and its Importance within Assessment

1.1 Introduction

A key aim of assessment and feedback practice in higher education is to **enhance students' abilities to accurately judge the quality of their own work** (Sadler, 1989; Sadler 2017). Being able to accurately judge one's own work is integral to developing self-regulatory capacity in order to manage one's own learning both now and in the future (Boud & Molloy, 2013; Tai. et al., 2018).

The fundamental question for all those involved in the assessment process is **how to design learning environments *with* students that promote their engagement with it**, in order to support the development of **high level** self-regulatory skills; the skills that matter (Evans, 2016).

> "The indispensable conditions for improvement are that a student comes to hold a **concept of quality roughly similar to that held by the teacher**, is able to **monitor continuously** the quality of what is being produced during the act of production itself, and **has a repertoire of alternative moves or strategies** from which to draw at any given point. In other words, students have to be able to **judge the quality of what they are producing** and be **able to regulate what they are doing during the doing of it**." (Sadler, 1989, p.121)

Self-regulated learning, as highlighted in Sadler's quote above, **encompasses many of the strongest predictors of achievement** (Dent & Koenka, 2016; DiFrancesco, Nietfeld & Cao, 2016; Schneider & Preckel, 2017; Zimmerman, 2008). It, therefore, makes sense that higher education assessment design should seek to maximize students' self-regulatory capacity given its connection with students' academic success (Dörrenbächer & Perels, 2016).

Self-regulating students do better, personally, academically and professionally, than those who do not, ***where* the tasks require it*** (Bembenutty, While, & Vélez, 2015; Dent & Koenka, 2016; Panadero, 2017). * However, if the nature of assessment does not require students to engage meaningfully in their learning, we cannot criticise them for not doing so, especially if they are applying self-regulatory strategies appropriately (i.e., deploying the appropriate effort and approaches to attain the goals they are seeking to achieve).

Higher education research in assessment and feedback has continuously acknowledged the importance of **engaging students in assessment practices to facilitate their learning** (Black & Wiliam, 1998: Boud & Molloy, 2013; Carless, 2013; Nicol & Macfarlane-Dick, 2006). Self-regulation in assessment is not new, its importance in supporting learning has been emphasized for the last twenty years. Translation of this approach into practice within higher education, however, has been slow.

Evans (2016 - 2022) in seeking to address this research-practice gap (Farley-Ripple et al., 2017) utilised the findings of her 2013 *Making Sense of Assessment Feedback in Higher Education* systematic review of the literature to develop a pragmatic assessment framework called EAT to support the development of self-regulatory assessment practices. One of the key premises of the framework is:

> **How students come to co-own their programs with lecturers and see themselves as active contributors to the assessment feedback process rather than seeing assessment as something that is done to them. (Evans, 2016, p. 2).**

Different Formats of EAT can be accessed using the hyperlinks below:

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 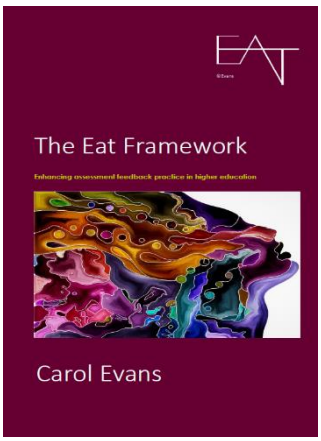
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 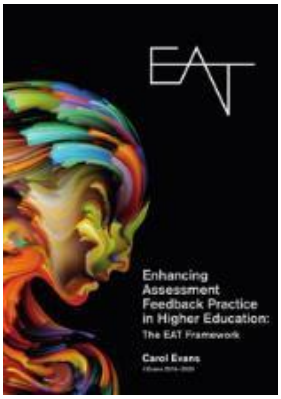
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 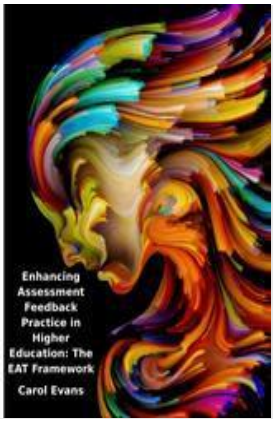
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 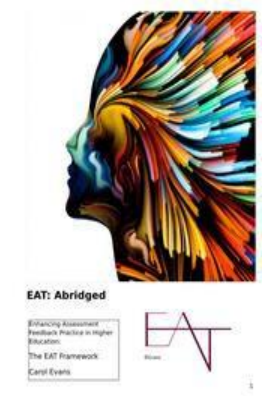
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EAT brings together work on individual differences in learning to encompass approaches to learning (McCune & Entwistle, 2011), cognitive styles (Kozhevnikov et al., 2014), self-regulation (Vermunt & Verloop, 1999), and agentic engagement (Reeve, 2013). In supporting implementation of effective assessment practice, the EAT Framework in exploring individual and organisational variables impacting practice asks practitioners to consider the extent to which "***different learning cultures enable or disable different learning possibilities for the people that come into contact with them***" (James & Biesta, 2007, p. 28 in James, 2014, p. 160).

EAT in focusing on Equity, Agency and Transparency promotes an inclusive approach to assessment and feedback practice. Underpinned by a critical pedagogy, it explores the interaction between the individual and the assessment context with the aim of reducing barriers to access, promoting engagement with assessment through the development of authentic practice, and empowering learners to take responsibility for their learning.

1.2 What is self-regulation?

Self-regulated learning (SRL) refers to a **learner's ability to regulate his/her learning in different contexts** (McMahon & Luca, 2001). SRL can be viewed as a construct, a process and an ability that can be developed (Al'Adawi, 2020). SRL may comprise state (approaches developed in response to a specific context) and trait elements (established patterns of working that are consistent across contexts).

> active, constructive process whereby students set **goals** for their learning and then attempt to **monitor, regulate, and control their cognition, motivation, and behaviour**, guided and constrained by their goals and the contextual features of their environment. (Dent & Koenka, 2016)

Note: The nature of goals and the characteristics of the environment and how it is perceived by the learner can both limit and expand self-regulatory learning potential.

In line with **social cognitive** perspectives (Bandura, 1986), self-regulated learning occurs as the reciprocal causation between three processes:

- **Personal processes** - perceptions of ability (e.g., academic self-efficacy) and self-motivation (e.g., goals);
- the **learning environment-** task demands and encouragement from teachers, organisation of learning environment, clarity of information etc.; and
- **Individual behaviours** (e.g., levels of engagement, quality of thinking, performance outcomes). There are many different models of self-regulation which have different emphases regarding the main drivers of self-regulation but there is a strong degree of consensus around the variables involved (see Panadero, 2017 for an overview).

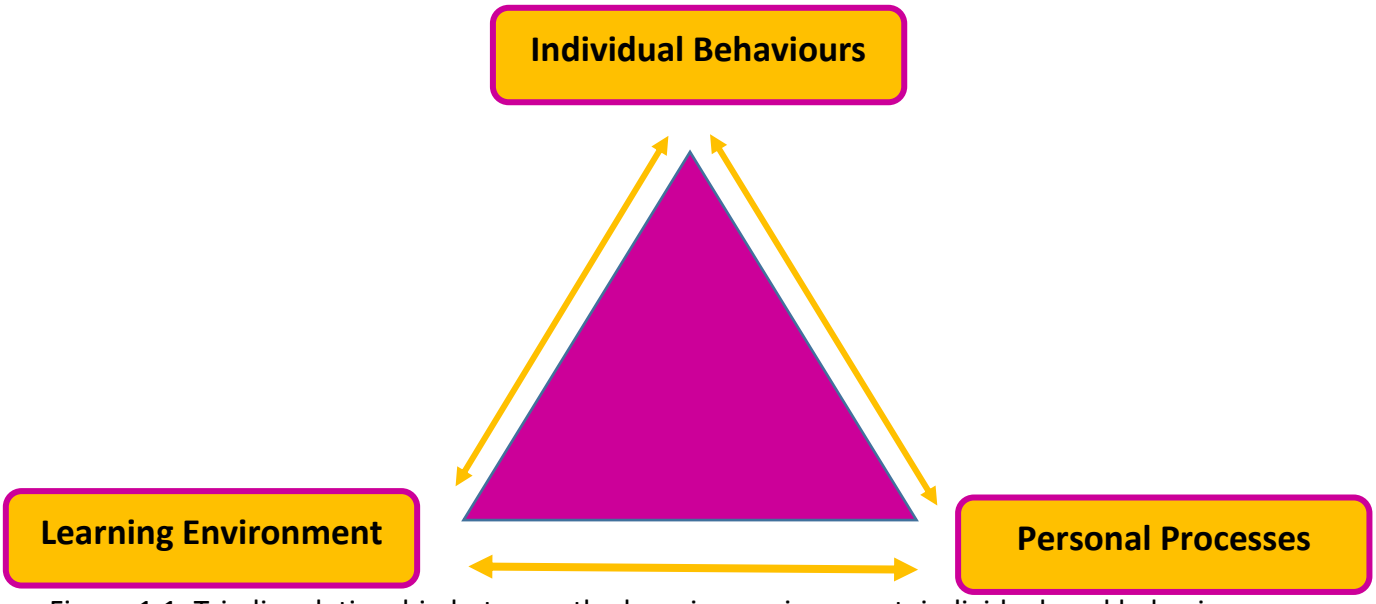


Figure 1.1: Triadic relationship between the learning environment, individual, and behaviours

The **context of learning** plays a significant part in impacting the self-regulatory pathways that students adopt. **Learning oriented approaches** may be triggered where individuals perceive the environment as supportive. Whereas in environments in which individuals feel uncomfortable, **learning averse/avoidance** self-regulatory approaches may be triggered to protect sense of self which may work against learning (e.g., not engaging, avoiding feedback, excessive preparation but paralysis in action etc.).

1.3 What are the metacognitive, cognitive and affective dimensions of self-regulation?

Self-regulation can be viewed as a **construct, a process, and an ability** that can be developed within a supporting and engaging learning environment, whereby learners positively select, structure and create advantageous learning environment to maximise learning (Al'Adawi, 2020, p. 37). Of central importance is:

> the extent to which learning environments enable students to be self-regulatory and whether students choose to adopt self-regulatory learning focused approaches.

Given the interaction of individual and contextual variables on learning processes, it is possible for learners to be able to self-regulate well in one context and not in another, and for that competence to vary over time.

Effective self-regulation is very much dependent on how well learners deploy **cognitive** (how one thinks), **affective** (how one feels), and **metacognitive** (understanding of how you learn) learning strategies in the achievement of goals (Zeidner et al., 2000).

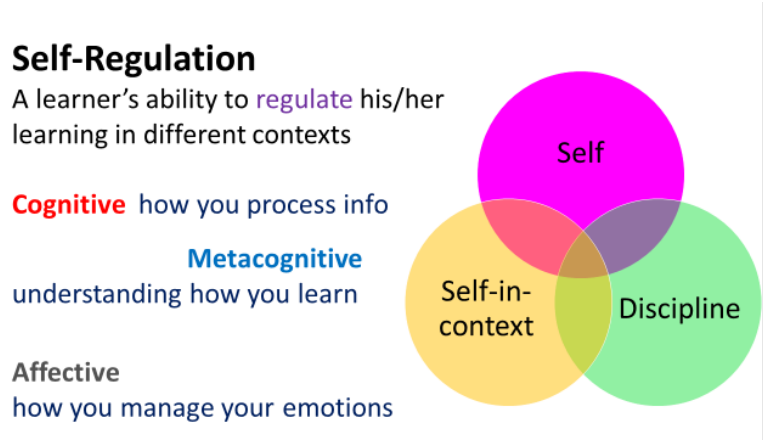


Figure 1.2: Metacognitive, cognitive, and affective dimensions of self-regulation

Effective self-regulation operates at a number of levels: (i) within any given learning context, a learner needs to manage themselves, their interaction with others, and the requirements of the discipline and wider context; (ii) in managing the requirements of the context, a learner needs to plan and execute a strategy to realise their goals AND protect their wellbeing; (iii) a learner needs to utilise metacognitive, cognitive, and affective strategies in an integrated way to support learning.

Importantly, **metacognitive, cognitive, and affective strategies work together** to impact learning, and influence how a learner manages their own learning within specific contexts. For an outline of specific skills in each of these three areas see Table 1.1 below derived from Vermunt & Verloop (1999).

Table 1.1 Metacognitive, Cognitive and Affective Dimensions of Self-Regulation (Evans, 2014, 2015 b) drawing on Vermunt & Verloop, 1999)

	Construct	Definition
Metacognitive		
1	Orienting and Planning	**Ability to accurately discern the important elements and requirements of a task** Plan of action clearly aligned to goals **Alignment of own goals** with institutional goals **Self-responsibility** for managing task **Prioritising activities to support goals** **Flexibility and Adaptability**
2	Monitoring/ Testing/ Diagnosing	**Accuracy of Monitoring** – progress occurring in intended direction **Good at Noticing**- sensitive to information to support decision-making **Testing and Diagnosing** – if and where any problems lie. **Seeking out appropriate high quality Support-** accurate assessment of skills/knowledge gaps and ability to plug the gaps **Actively giving, seeking, and acting on feedback**.
3	Adjusting	**Flexibility / Adaptability:** introducing changes to plans / asking for more support
4	Evaluating/ Reflecting	**Accuracy in Judging** the extent to which intended outcomes are achieved. **Reflexivity:** ability to step outside oneself and see things from alternative perspectives.
5	Agentic Engagement	**Ownership of Process:** management of agency and autonomy **Ability to manage environments to suit learning needs to maximise affordances**

Cognitive		
1	Relating/Structuring	**Looking for connections** **Bringing together different elements** (holistic thinking)
2	Analysing	**Breaking down information into steps** (serialist thinking)
3	Concretizing/Applying	**Trying to form concrete images from abstract information**- looking for relevance **Using knowledge in a new way** **Trying to solve problems** **Improvising**
4	Memorizing/Rehearsing	**Rehearsing material regularly so it can be reproduced**/becomes automatic
5.	Processing Critically	**Drawing own conclusions** rather than accepting what is said **Actively seeking meaning** **Evaluating sources**
6	Selecting	**Filtering** – distinguishing what is most important
Affective		
1	Motivating/Expecting	**Building up willingness to learn** **Setting realistic learning goals and targets** **Self-reward for meeting set goals** **Taking pleasure in achieving interim goals** **Setting expectations around success and failure**
2	Concentrating / Exerting Effort	**Attending in the moment** **Expending effort** **Sustaining concentration and effort (persistence)**
3	Attributing/ Judging Oneself	**Accuracy in attributing outcomes to causal factors** **Ability to manage own learning** **Awareness of levels of competence and general and task-specific self-efficacy** **Ability to have perspective**
4	Appraising	**Appraisal of task relevance** **Ability to change direction** **Future-time perspective**
5	Dealing with Emotions	**Generating, maintaining, and restoring positive feelings of well-being, self-confidence, and commitment** **Managing feedback** **Coping with negative emotions** **Reassuring oneself** **Managing stress** **Dealing with failure** including bounceback-ability
6	Network management	**Good at noticing situations and contexts** **Ability to navigate networks** and adapt to new situations/contexts and to read them accurately **Ability to prioritise networks** (prune and develop) **Ability to engage with and support others**

1.4 Self-regulation as a process

Self-regulation as a process typically involves a **recursive three or four stage cyclical process** involving: **forethought**, **performance and monitoring and control**, and **evaluation/self-reflection** engaging the preceding activities.

Forethought	Planning and goal setting including activation of perceptions and knowledge of the task, context, and the self in relationship to the task.
Performing the task	Utilising strategies to complete the task which includes ongoing monitoring of progress against goals and adjustment of strategies as required including maintaining effort and focus.
Evaluation	Reflection on the extent to which one's own goals have been met to inform further planning- involves reflection on the task, self, and context.

In all SRL phases combinations of metacognitive, cognitive, and affective strategies are required. Individuals may combine strategies in different ways to achieve similar and/or different outcomes. The order of, and distinctiveness of these phases of the self-regulation process are debateable, as in reality many of the activities occur simultaneously (Pintrich, 2004; Seufert, 2018).

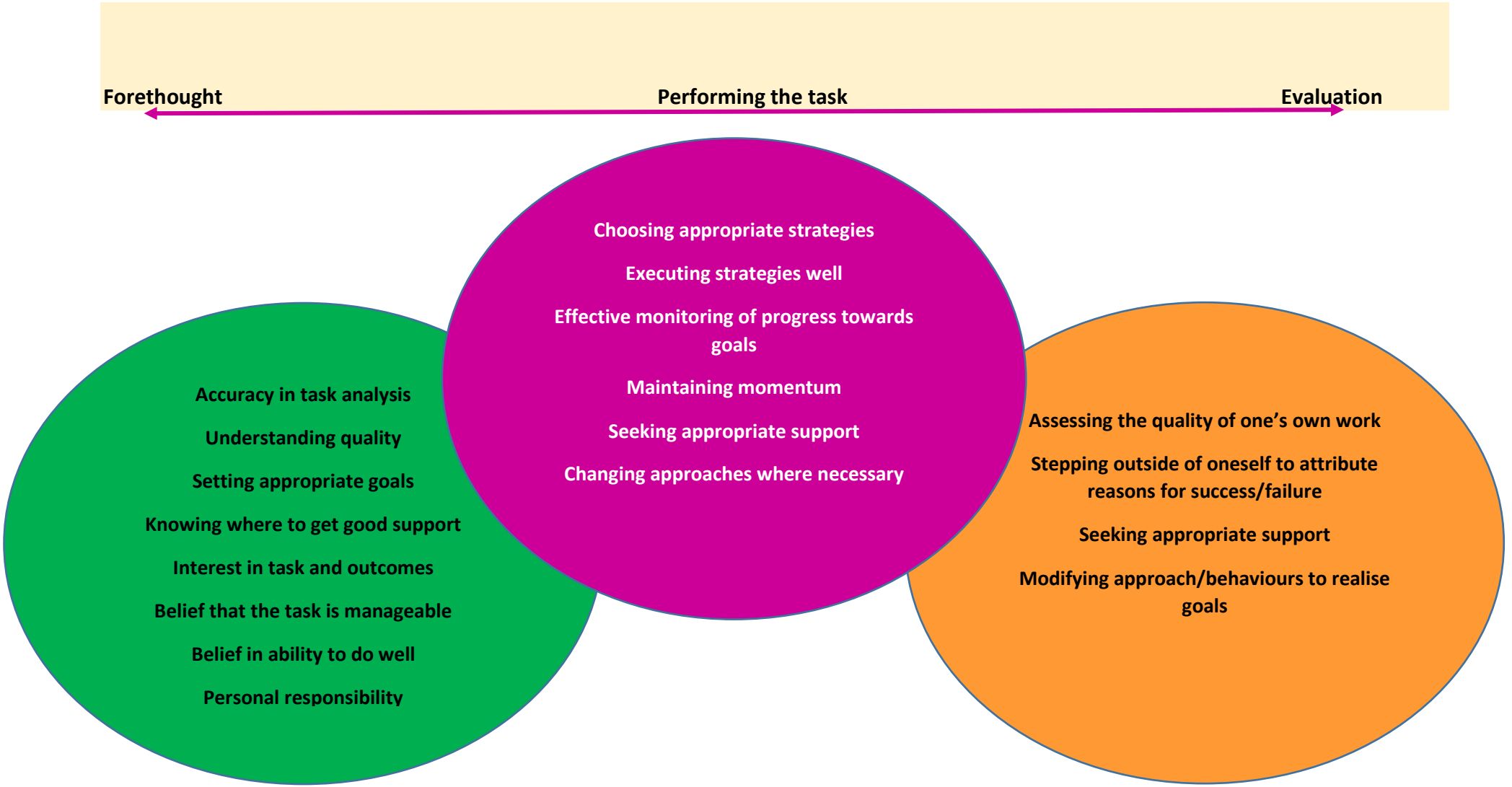


Figure 1.3: Interrelated SRL Phases in Assessment: What Matters

SRL involves top down and bottom up processes. At the person level, **how an individual interprets a task** impacts their approach to learning and is therefore seen as **'top down'**. In Efklides' (2011) model the person level is seen a representing the trait-like aspects of self-regulation. An individual's goals guide actions based "*on the interactions of the person's competences, self-concept in the task domain, motivation, and affect, vis-à-vis the perception of the task and its demands*" (Efklides, 2011, p. 12).

Once an individual has made a decision, activities are **bottom up** in that they are **directed towards achieving the task**. To realise the requirements of a task an individual may choose to deploy a range of metacognitive strategies, this work is seen as less conscious and person-oriented (it is more about the task). The focus on task is very much prevalent in **notions of flow** (immersion in an activity) (Csikszentmihalyi, 2008).

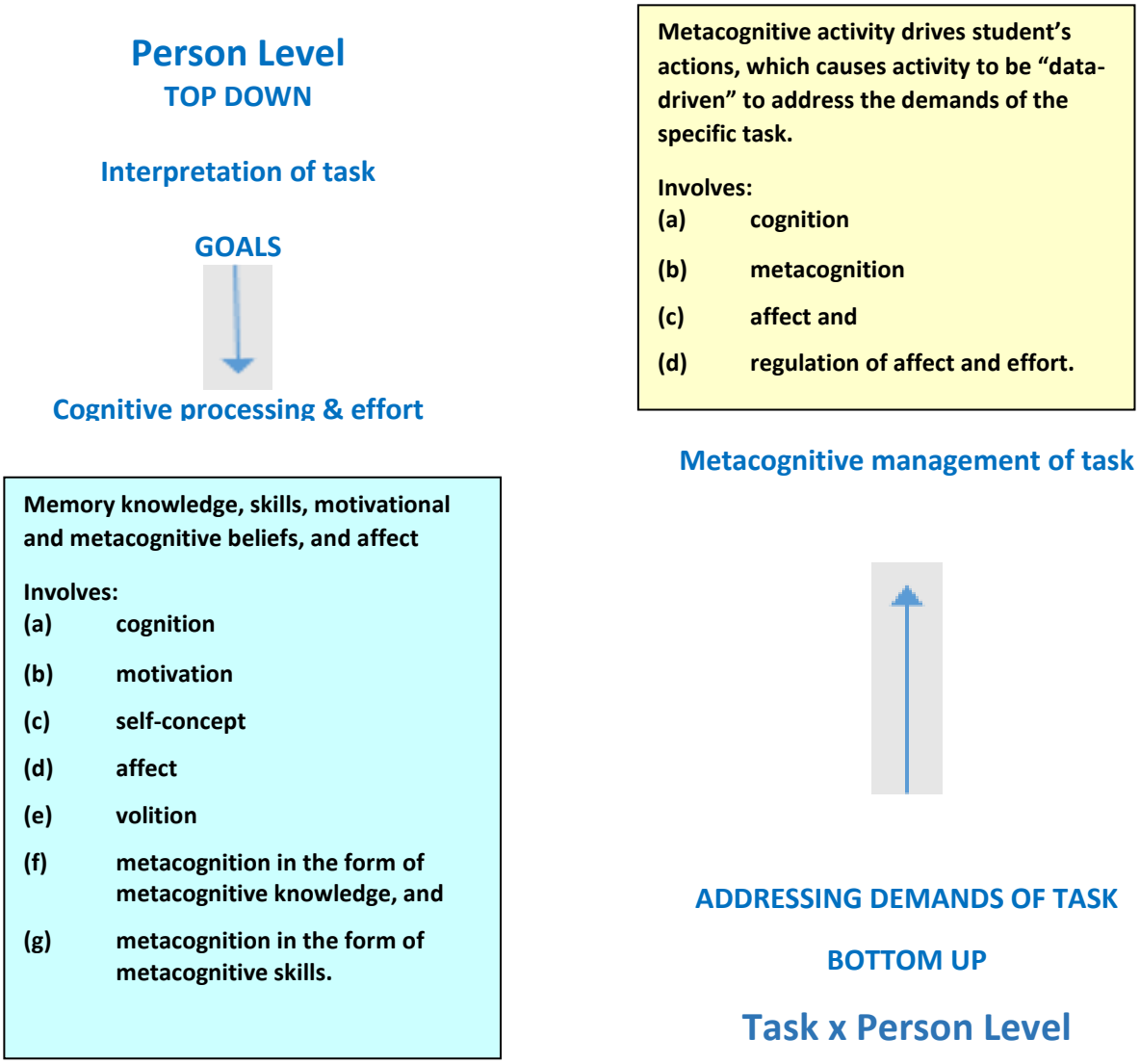


Figure 1.4: Top down and bottom up processes in self-regulation (Efklides, 2011, p. 10)

1.5 SRL as an individual and group process

SRL focuses on the l**earner's responsibility in managing his/her learning**:

> **processes whereby learners personally activate and sustain cognitions, affects, and behaviors that are systematically oriented toward the attainment of personal goals.** (Zimmerman & Schunk, 2011, p. 1)

SRL is **not an activity that learners necessarily pursue independently**, it is mediated by an individual's interaction with their environment (Larsen et al., 2017). Students' **conceptions of learning** impact their self-regulation behaviours. Yee (2016) found that first generation students perceived that being independent in learning meant relying on oneself, whereas middle class students were more likely to focus on how they got support from others in addition to being self-reliant.

The EAT Framework incorporates agentic engagement (Reeve, 2013) as an integral part of self-regulatory activity. In Evans (2021) interpretation, agentic engagement represents **students' abilities to manipulate the learning environment through actively engaging the support of others to help create a more conducive learning environment.**

Gaining support from knowledgeable others to address the gap between current performance and goals, is often referred to as the '**Zone of Proximal Development'** (ZPD) (Vygotsky, 1978).

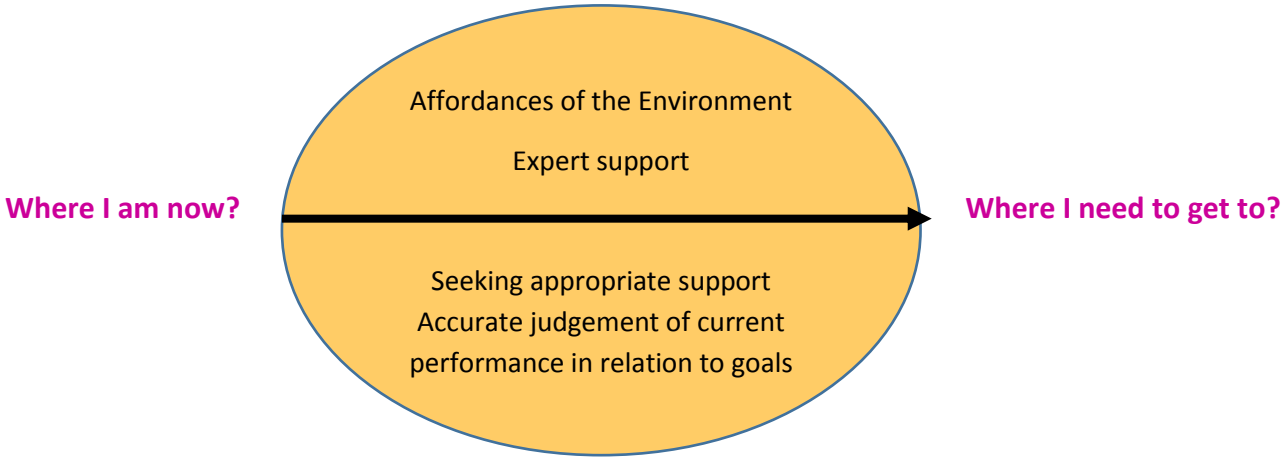


Figure 1.5 Vygotsky's (1978) Zone of Proximal Development.

The relational dynamic of self-regulation therefore includes being able to utilise one's own skills effectively and gain support from others in the realisation of one's learning goals. Building **effective networks of support** and **boundary crossing skills** (Wenger, 2000) are important metacognitive skills.

Metacognitive flexibility can be developed through crossing into 'unlike groups' / taking on new challenges that challenge individuals to think and act differently (e.g., disciplines, professional, cultural etc.) (Zhang, 2013). Therefore, in developing self-regulatory capacity it is not about the

number of groups one belongs to, it is the degree of challenge they present in enabling an individual to see and do things in different ways. Figure 1.6 from Rutherford (2019) provides a model of different types of networks that students engage with. The quality of academic networks and nature of activities that students engage in both within and outside of higher education impact students' development of key skills. How students use academic networks matters, and how they integrate personal and academic networks.

To assist understanding of the roles of different networks in impacting students' experiences of transition and learning, Rutherford (2019) distinguishes between students' **personal learning networks** (PLN) (who students work with), the **personal web-based tools (PWT)** they rely on, and their **personal learning environment** (PLE). The quality of these networks in supporting wellbeing, sense of belonging and academic proficiency is important. Directing students to high quality resources is essential in supporting their self-regulatory development. Considering how these different systems interact to support learning needs consideration.

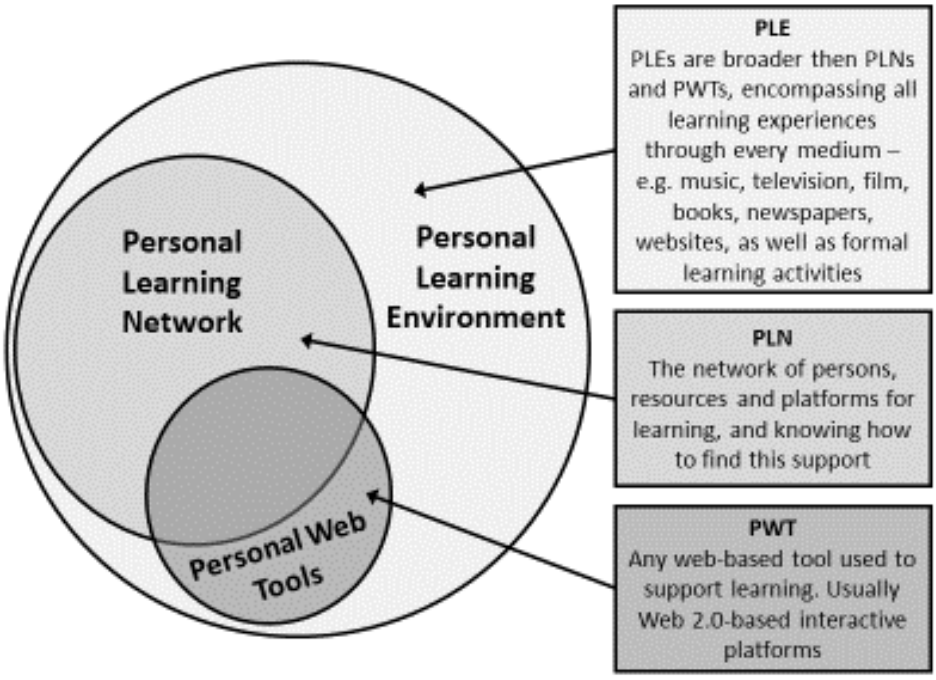


Figure 1.6 Networks Supporting Student Learning From Rutherford (2019)

Mapping the number and quality of student networks can be predictive of student achievement. Self-regulation is related to social and cultural capital development. A key question for academics is how we best support students to develop their networks. Simple things, such as providing students with links to key resources can make a significant difference to how well students do academically (Scott et al., 2014). Network development is also essential in supporting students' sense of belonging which impacts retention (Bliuc et al. 2011). From a self-regulatory perspective, it is

important to consider the role of different networks in supporting a learner, and whether students' sources of support are used in the most appropriate ways to facilitate their learning.

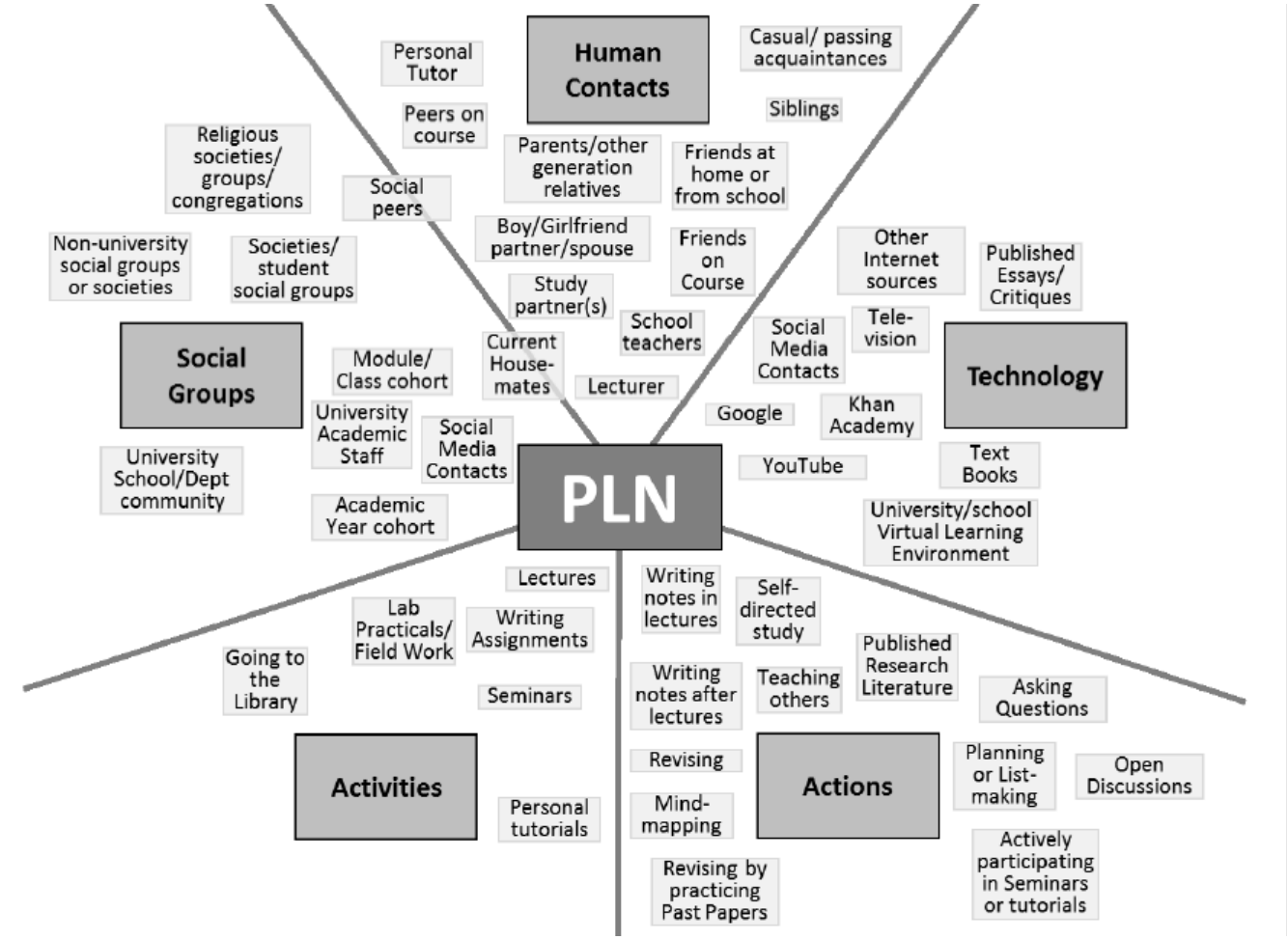


Figure 1.7 Personal Learning Networks (Rutherford, 2019)

Self-regulation (regulating oneself), **co-regulation** (supporting each other) and **socially shared regulation** (regulating together) often occur together. Self-regulation often involves elements of self- co- and shared regulation.

There are varied interpretations of what co- and shared-regulation comprise (see Hadwin and colleagues 2011, 2012; Panadero, 2017).

Co-regulation (CoRL) is often used to explain that is not only the individual but also social sources that influence an individual's development (Schoor et al., 2015). Co-regulation (CoRL) is considered by some to be a transitional process in the learner's appropriation of self-regulation strategies (see Panadero, 2017), and/or as a step towards group/shared regulation. This aligns with Deci and Ryan's (1994) understanding that there is a continuum of kinds of self-regulation, varying according to the degree of integration with one's sense of self, and the extent to which a goal is internalized. The strategy of clarifying, sharing, and understanding learning intentions and criteria for success deals with the process by which learners become clear about the goals they are pursuing.

For some co-regulation reflects the dominance of specific individual opinions on the learner from a teacher or more knowledgeable peer. Hadwin et al. (2017) in their description of co-regulation discuss the affordances and constraints of working with others in shaping students' self-regulation strategies. Schoor et al. (2015) commenting on Järvelä and Hadwin's (2013) work, highlight the different ways of working within a group task situation:

- Self-regulation involving regulation of oneself toward own goals for the group task
- Co-regulation support of and by others with regard to own and shared goals for the group task
- Shared regulation – socially shared regulation of the group task

It is, therefore, possible for an individual to work within a group in a self-regulated rather than in a shared regulated way if s/he is working towards one's own goals and not shared team goals.

Socially Shared regulation SSRL is seen as collective, co-constructed regulation by multiple participants (of equivalent status) who assure the progression of their shared activity. Group sharing of task perceptions and negotiation of goals and strategies which are deliberately developed and coordinated by the group.

1.6 Self-regulation models

There are many different models of self-regulation. These models have different emphases informed by their different theoretical underpinnings:

- Phenomenological (how an individual experiences learning)
- Social cognitive (how individuals acquire knowledge by observing and interacting with others)
- Volitional (around motivations based on values and expectations)
- Cognitive constructivist information processing models (how individuals make sense of, store, and process information –cognitive based).

Key models include the works of:

Boekaerts 1992a, 1992b, 1994, 1995, 1996a, 1996b, 1997, 1999, 2002, 2006; Borkowski et al., 2000; Efklides 2011; Hadwin, Jarvela & Miller, 2011; Pintrich 1989; Winne 1996, and Winne & Hadwin 1998,Winne 2001; Zimmerman, 1989, 2000, 2001, 2002, 2008, 2011.

See Al 'Adawi (2020); Panadero (2017); Puustinen & Pulkkinen (2001) for an overviews of these models.

In summarising key points of similarity and difference between the SRL models, Zimmerman (2001) identified four key areas of variation:

(i) whether the **key source of motivation for an individual is internal or external.** For example, in SRL approaches underpinned by constructivist thinking, emphasis is on the individual needing to resolve curiosity/cognitive conflict – the **need for cognition.** Whereas in socio-

cognitive based SRL approaches, emphasis is on the importance of managing **self-efficacy beliefs** (beliefs in ability to do well) in relation to attainment of goals.

(ii) **key processes learners go through while self-regulating**. For example, in cognitivist and information processing based models of SRL, key processes are focused on constructing schema, strategies or personal theories and managing the storage and transfer of information. In socio-cognitive based SRL models, emphasis is on managing sense of self (self-judgement/evaluation).

(iii) **expected social and physical effect on self-regulation** – emphasizes different strategies depending on the underpinning model of SRL (observation, modelling approaches, discovery learning).

(iv) **methods for acquiring SRL** (i.e., self-development, shared regulation, increasing capacity through repetition/automation to enhance working memory capacity; emotional regulation strategies).

Table 1.2: Self-Regulatory Frameworks

Authors	Underpinning theory (ies)	Key emphases	Measurement	Defining features
Pintrich 1989 See Pintrich 2004	**Social Cognitive** (Bandura, 1986) sources- Triadic Analysis of SRL Considers individuals to be agents of change who develop and adapt with the intention to influence their own functioning and goals while maintaining control over their outcomes & environment. Source of motivation – **Self-determination Theory** (Ryan & Deci, 2000; Deci & Ryan, 2012) **Self-control theory** (Carver & Scheier, 1998) **Control-value theory** (Pekrun et al., 2002, 2006, 2007 et al.) **Achievement goal theory** (Dwek, 1986; Seifert, 2004)	Goal oriented	MSLQ (Pintrich et al., 1993) Combines SRL and motivation	• Motivation is an important driver Emphasis on learners' attempts to control their own behaviours and regulate the learning context • Efficacy beliefs are a better predictor of learning outcomes than task value.
Zimmerman 1989, 2000, 2001, 2002, 2011 Zimmerman & Campillo 2003		Goal oriented	SRLIS (Zimmerman & Martinez Pons 1986, 1988) Academic Self-Regulation Scale (A-SRL) (Magno, 2010). Self-efficacy to self-regulate (Zimmerman, & Kitsantas, 2005, 2007). Self-efficacy & self-evaluation (Zimmerman et al., 2011)	• Motivation is an important driver. • Sees top down and bottom up processes as interactionist - cognitive processes bi directionally cause and are caused by behaviour and environment (see Panadero, 2017, p. 20).
Hadwin, Järvelä &	**Socio-cognitive** Identifies three modes of regulation in collaborative	Social and interactive		Co-regulation can be seen in a negative way as one member

Miller (2011, 2017a)	settings: **self-regulation (SRL), co-regulation (CoRL), and shared regulation (SSRL)**			taking the lead vs shared when jointly regulated?
Boekaerts 1992, 1995, 1996a, 1996b; Boekaerts & Cascaller (2006) Boekaerts & Corno (2005)	**Action control theory** (Kuhl, 1985; Kuhl & Beckmann, 1985) **Transitional stress theory** (Lazarus & Folkman, 1984) How an individual interprets the environment will impact pathways to SRL- 2 SRL pathways: (i) expand knowledge and skills (ii) preventing harm to self.	Goal oriented – importance of goal alignment with individual needs. Emphasis on emotions.	OMQ (Boekaerts, 1999) measures sensitivity to learn in concrete situations Confidence and doubt scale (Vermeer et al., 2001) Useful work on neural networks for SRL.	• Motivations important driver. • Greater emphasis on preparatory planning and goal setting stage of SRL • Top-down cognitive processes e.g., task goals triggered by values, needs, and goals) which work with bottom up behavioural processes e.g., emotions activate a wellbeing pathway to protect the self from harm e.g., avoidance to protect from damaging feedback (Dual Processing model)
Winne 1996, Winne & Hadwin 1998, 2001	**Information Processing** (Winne, 2001; Greene & Azevedo, 2007; Miller, 1956 **Cognitive load theory** (Sweller, Ayres, & Kalyuga, 2011); Sweller, 2011 **Discrepancy reduction theory** (Butler & Winne, 1995; Tulis, et al., 2016)	Cognitive & Metacognitively oriented (Flavell, 1976, 1979)	Trace methodology	• Metacognitive monitoring is the driver. • Key is how learners use criteria and standards to set goals, monitor and evaluate. • Less emphasis on emotions and motivations- students manage their own learning via monitoring and the use of, mainly, (meta)cognitive strategies
Borkowski et al., 2000	**Agenda-based regulation** (ABR) Ariel et al., 2009) Information Processing	Metacognitively oriented		• Motivation and affect are central. • Goals dictate cognitive processing and effort regulation. • Takes account of relationship between task and individual.
Efklides, 2011	**Metacognitive** and Active Model of Self-Regulated Learning (MASRL, Efklides, 2011) Effort expended depends on interactions of the person's competences, self-concept in the task domain, motivation, and affect, vis-à-vis the perception of the task and its demands" (Efklides, 2011, p12)	Metacognitively oriented with motivation and affective components	Metacognitive Experiences Questionnaire (Efklides, 2002) Explores judgements and feelings about cognitive processes	• Accuracy of self-monitoring key. • Clarifies the relationship among metacognition, motivation, and affect through interaction of top down and bottom up processes. Illustrates how learners perform when doing a task, the phase with the highest cognitive load where all the cognitive resources are leading the activity.

Useful data sources

Implications of SRL for EdTech Design	Khan-Galaria, M. 2017
Using Pintrichs' model in teacher instruction	Cetin, 2017
Self-efficacy, satisfaction, and academic Achievement	Domenech et al. 2017
Self-Control Theory	Molden et al. 2016
Control Value theory	Artino et al., 2012
Achievement Goals	Ikeda et al. 2021; Harwood & Thrower, 2020; Liu 2021

1.7 Measuring SRL

SRL can be measured in different ways (Winne, 2015; Winne & Perry, 2000). It can be measured as an **aptitude**, **as a process,** and through **'in the moment' measures'** (Al' Adawi, 2021). Asking students to reflect on the ways in which they manage their learning can impact their behaviours. Using the EAT Framework (Evans, 2016, 2020), students' perceptions of their engagement had significant impacts on student learning outcomes but not in all contexts (Evans et al., 2019).

Aptitude measures include **self-report questionnaires, structured interviews-using hypothetical scenarios, and educator judgements.** A key issue with questionnaires relates to **students' accurate perceptions of their abilities** and tendency to be compliant with the giving of what they perceive are wanted responses from an educator. However, as Kyndt et al. (2011) found, perceptions of SRL capacity may be more important than actual SRL in impacting outcomes. In addition, lack of standardization of the definition of concepts and of measurement instruments makes it difficult to compare results across studies.

One of the major challenges with testing the **validity of** SRL measures is the general absence of a control group where no intervention was made (a challenge exacerbated by many measures being active interventions in themselves). So, while measures – especially self-reported scales – may have validity as instruments, their efficacy as diagnostic or predictive tools, and/or as training or development aids, is still an open question.

The extent to which questionnaires translate to other contexts (e.g., from school to HE; from one cultural context to another) needs consideration (reliability and validity need to be checked). Questionnaires have **potential to be used over different time phases** (pre-during-post an intervention) to explore changes in students' perceptions and the impact of these on any outcome measures. They can also identify different trajectories for different groups of students.

Aptitude measures	Advantages	Disadvantages
Self-report questionnaires (e.g., Learning and Study Strategies Inventory (LASSI - Weinstein et al., 1987) and the Motivated Strategies for Learning Questionnaire (MSLQ - Pintrich et al. 1991).	• Relatively easy to administer. • Can gain rich sets of data. • Useful in providing directions for further investigation.	• Dependent on the learner being honest and frank about their approaches. • Require consistent interpretation of a Likert scale. • Students need to be aware of the subtleties of their actions, which in itself requires a degree of self-regulation to apply.
Structured Interviews (e.g., Self-Regulated Learning Interview Schedule – SRLIS by Zimmerman & Martinez-Pons, 1988).	• Gain insights into the learner's activities and thinking underpinning actions. • Gain deep verbal descriptions of the interviewee's perceptions.	• Require the interviewee to be frank. • Outcomes subjective rather than objective. • Difficult to administer in large groups and/or compare objectively between individuals.
Educator Judgements (e.g., Rating Student Self-Regulated Learning Outcomes' (RSSRL) scale (Zimmerman & Martinez-Pons, 1988).	• Objective to a degree • Based on behaviours rather than perceptions.	• Influenced by the educator's own perceptions and beliefs and levels of knowledge of the student(s) involved. • Judgements have a large element of subjectivity within them and are difficult to compare between teachers and groups. • Educator judgements are challenging in an HE context, where teachers/lecturers rarely have the same intensity of interaction that a schoolteacher would have.

Table 1.3 Aptitude Measures

Fig 1.8 Examples of SRL Inventories/questionnaires

the Learning and Study Strategies Inventory (LASSI, Weinstein *et al.,* 1987; Weinstein *et al.,* 2016).

Student self-report scale

60 items, divided into **10** sub-scales: Anxiety, attitude, concentration, information processing, motivation, selecting main ideas, self-testing, test strategies, time management, and using academic resources.

Seen as a robust instrument for gaining nuanced insights into SRL approaches and competencies in learners (Cano, 2006).

The *Motivated Strategies for Learning Questionnaire* (MSLQ, Pintrich *et al.* 1991).

Student self-report scale

2 major subscales: Motivation and Learning Strategies

31 Motivation questions, and 50 Learning Strategies questions), and =supplementary questions.

Validated in several studies (a meta-analysis of these is reported in Credé &Phillips 2011). Seen as a robust measure of SRL activity.

The ***Metacognitive Awareness Inventory*** (MAI, Schraw and Dennison, 1994)

Student self-report scale

Key focus: metacognitive awareness, 52-item scale and **8** sub-scales: Declarative knowledge, procedural knowledge, conditional knowledge, planning, information management strategies, monitoring, debugging strategies, and evaluation of learning.

The ***Online Self-Regulated Learning Questionnaire*** (OSLQ, Barnard-Brak *et al.,* 2010)

SRL in the online context

24 items across **6** sub-scales:

Environment structuring, goal setting, time management, help seeking, task strategies, and self-evaluation. (Barnard *et al.,* 2009).

The ***Self-Regulated Learning at Work Questionnaire*** (SRLWQ, Fontana *et al.,* 2015)

SRL activity in the workplace

The scale has **5** sub-scales Workplace Learning Activity (WLA), Workplace Learning Context (WLC) and 3 self-regulation sub-scales: Self-Regulated Learning Forethought (SRL-F), Performance (SRL-P) and Self-reflection (SRL-SR).

Internal validity established in specific contexts

Measuring SRL as an event/process can be done through think-aloud measures, methods of error detection, trace methodology and other measures that observe task execution in practice. Assuming that SRL is an activity, conducting these tests requires completing tasks or being involved in an activity, through which learners can report the details of the strategies and processes they utilise to succeed, in order to capture how students self-regulate their learning in real time as a concurrent, active, and contextualised process (Dent & Koenka, 2016).

Bandura's 'Microanalytical' approach to measuring self-regulated learning involves a **series of small interventions with the learner,** before, during and after the learning activity (Bandura *et al.* 1982). The use of microanalytical methodologies for measuring SRL, include different self-reports of SRL, may provide a better predictor of student performance than questionnaire instruments (DiBenedetto & Zimmerman, 2013).

Measuring SRL as an event/process	Advantages	Disadvantages
'Think Aloud' Measures: involve the learner narrating their thinking process, to "Explain your work" (Ericsson, 2006).	• Can be powerful as a reflective tool, but it is in itself an intervention, and has potential to impact the learner's SRL process through undertaking the measurement.	• Quite difficult to quantify objectively, and to compare between those doing the measuring. • Thoughts can be difficult to put into words and so this too may cause inconsistencies in the measurement process (Bandura, 1986).
Error Detection Tasks: observe learners' behaviour as they firstly identify errors in some work, and then the actions they undertake when they find those errors.	• Useful in enhancing practice but need good AI to extend this to large groups.	• This approach has differential outcomes if the learner is told that the work contains errors before or after they have read it.
Trace Methodologies: involve identifying learner behaviours as learners develop work, such as highlighting important words or phrases, identifying areas for improvement, or annotating sections as they progress through a source.	• Very useful in supporting learning • Technologies and software solutions available (such as tagging of computer use (e.g., search engine activity), video recordings, video, or audio diaries).	• Involves the student being asked to monitor their engagement with a task in a manner which may not necessarily be intuitive or natural to their study approach.
Observations of Performance: This ethnographic approach has powerful benefits, but observer is looking through a specific lens – how objective is observation?	• The observer can identify key activities in the learners' behaviours and attitudes to tasks and self-directed activities. • Technologies may support more accurate observations of practice (e.g., recording eye movements; that detects errors in the moment and ways students navigate tasks.	• The observations will be very context-specific, and not necessarily generalisable. • The presence of an observer may change the behaviour of the learners involved. • The observer sees through a specific lens- videoing is useful to enable multiple perspectives but can be intrusive and alter the learner's behaviours.

Table 1.4: Event/Process Measures of SRL

1.8 Self-regulation variables

SRL encompasses many **individual and contextual variables,** and the **complex interactions** between them. Factors impacting student success are summarised in Figure 1.9 (for more information on the related theoretical constructs associated with these see Evans & Waring (2020).

Individual difference variables impacting student success

Students' prior academic achievement and previous experience of success impact how they do in higher education; so, addressing potential gaps in knowledge, and lack of confidence at point of entry are important. The interrelationships (intersectionality) between individual differences and many other variables need careful consideration to avoid assumptions about students' learning needs.

Personality constructs linked with academic success include **need for cognition** (desire to understand and make sense of information), **openness to new ideas, and conscientiousness**.

Control cognitions such as academic **self-efficacy** (belief in ability to do well), **grade goal** (what standard a learner is aiming for), **self-motivation** (goal orientation, mastery & performance goals), **persistence, effort regulation** (Panadero, 2017; Richardson et al., 2012; Schneider & Preckel, 2017) and impact attainment. Control cognitions are closely linked with prior knowledge and experience of success in learning (Fyfe & Rittle-Johnson, 2016; Van der Zanden et al., 2018). Intrinsic motivation is linked to students adopting deep approaches to learning (Kyndt, et al., 2011).

Beliefs about learning are important, in that they impact student choice of learning strategies which correlate with achievement e.g., **incremental beliefs** about ability not being fixed, for example, growth mindsets highlighted by Dwek (2006) vs **entity beliefs** that ability is fixed (e.g., fixed mindsets) (Burnett, O'Boyle et al., 2013). See also work on the plasticity of the brain from a neuroscience perspectives in relation to learners' beliefs about their capacity for growth.

How students perceive the learning environment matters. Students who see the value of assessment to support learning are more likely to adopt positive self-regulatory approaches (Brown, 2011).

The dispositions students adopt impact learning outcomes (Figure 1.10): **Strategic approaches** to learning, being discerning about where and how one applies effort in relation to the needs of the task is associated with positive learning outcomes (Schneider & Preckel, 2017). However, **deep approaches to learning** (searching for meaning e.g., McCune & Entwistle, 2011) are not always associated with positive outcomes (it may be the learner has gone too deep and ended up globetrotting and lost focus on key areas, and it may also be that the task set did not reward a deep approach). Evans (2014) redefined, a deep approach to incorporate metacognitive dispositions to suggest a deep approach should **reflect the students' ability to utilise resources efficiently to meet the needs of a task which incorporates strategic and deep approaches to learning, and also surface ones, where it is appropriate to do so**.

Developing a **deep approach** (Marton & Saljo, 1976) to learning is traditionally described as searching for meaning rather than purely reproducing information. A key element of a deep

approach is that through deep understanding an individual can manipulate information, adapt it to new contexts and come to new understandings. In modern conceptions of a deep approach the importance of self-regulation is noted in students' abilities to be able to be discerning in how they allocate resource as well as the quality of it (Waring & Evans, 2015). In Evans' (2013) work exploring successful boundary-crossers, the following characteristics were evident : (a) focus on meaning making; (b) self-management skills; (c) perspective; (d) noticing; (e) resilience; (f) managing personal response to feedback; (g) pro-active feedback-seeking behaviour; (h) adaptability, and (i) forward thinking.

Thinking dispositions provide a useful take on a deep approach to learning. Perkins and Tishman (2001) identified three distinct elements comprising thinking dispositions to include sensitivity, inclination, and ability. Sensitivity concerns awareness of occasion, inclination concerns motivation or learning and ability concerns capability in being able to follow through appropriately. In moving this forward. McCune & Entwistle (2011; Figure 1.10) considered sensitivity in terms of **mindfulness**, with a 'mindful' state implying openness to new information and different points of view, whereas mindlessness they defined as a rigid reliance on old categories and distinctions created in the past (Langer, 1989). They also offered up 'a willingness to offer' as an important attribute, in that students needed to be willing to offer up their ideas for scrutiny by others as part of a deep approach.

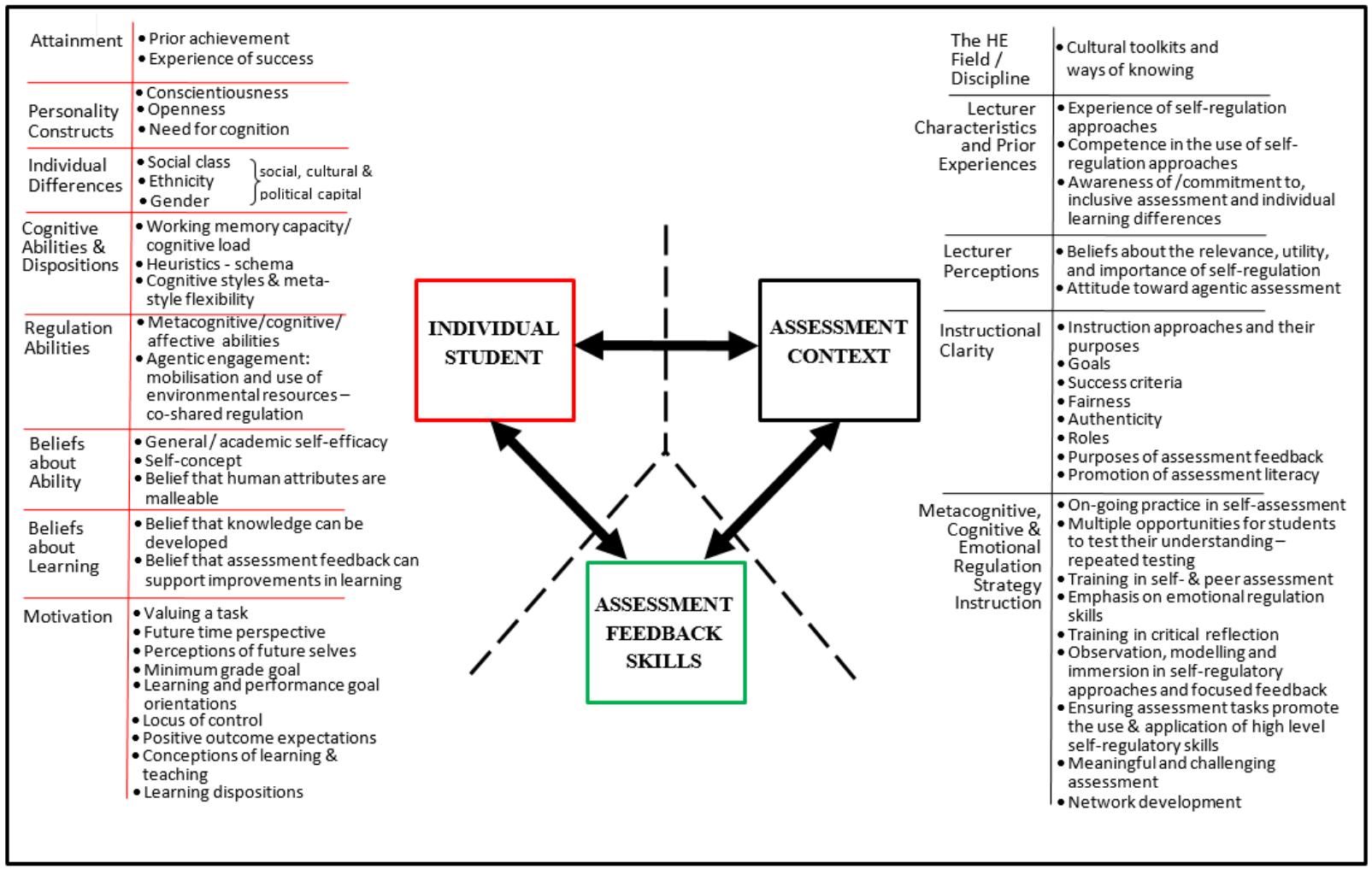


Figure 3: Triadic symbiotic relationship between individual and contextual factors, and assessment feedback skills. Evans & Waring (2020).

Figure 1.9 Factors impacting student academic success – a triadic relationship (Evans & Waring 2020)

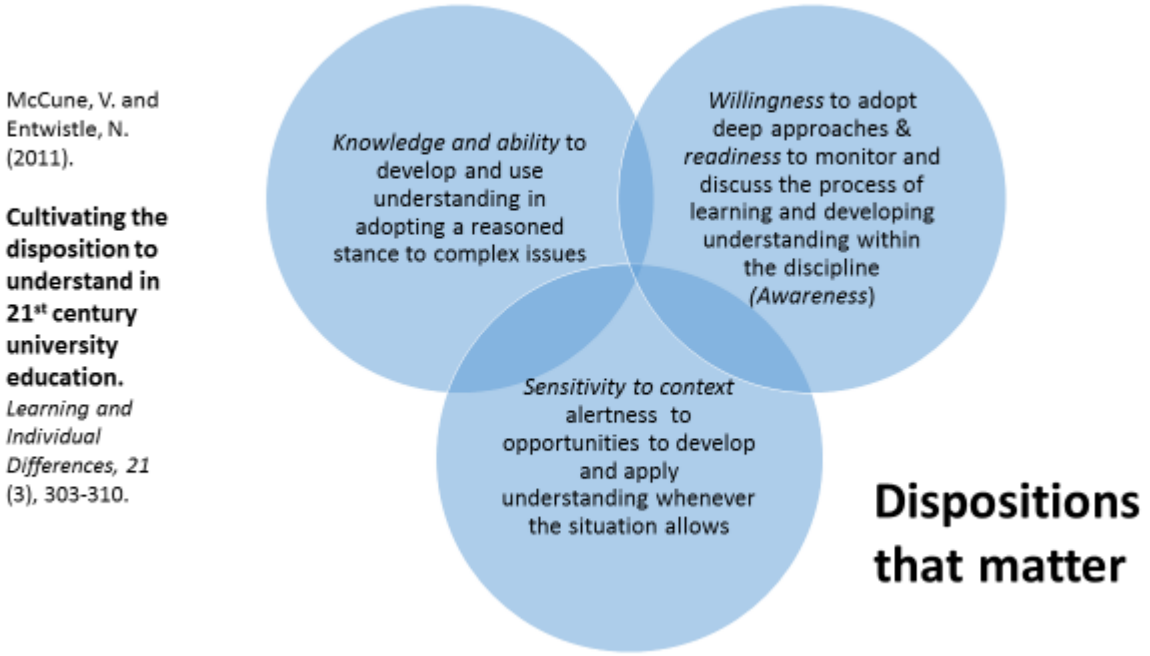


Figure 1.10 Learning Dispositions from McCune & Entwistle (2011)

Learning Patterns are an important predictor of variance in student learning outcomes. As outlined by Vermunt and Verloop (1999) they consider the interrelationships between processing and regulation: cognitive processing strategies, metacognitive regulation strategies, metacognitive conceptions of learning, and learning motivations or orientations (Vermunt & Donche, 2017).

The " learning patterns that students adopt are embedded in a range of personal factors such as personality, academic motivation, goal orientation, attributions of academic success, self-efficacy, effort, epistemological and intelligence beliefs, prior education, age, and gender" (Vermunt & Donche, 2017, 279), and are highly impacted by how individuals perceive their learning contexts:

> "*The more students viewed assessment as inappropriate the more their learning pattern was reproductive in nature."* (Vermunt & Donche, 2017, p. 272).

The interaction of personal and contextual factors leads to distinct patterns of learning reproduction-directed (trying to reproduce the learning content); application directed (attaching value to applying learning to practice), meaning-directed (deep approach), and undirected learning (lack of understanding of how to approach learning effectively) (Vermunt & Verloop, 1999; Vermunt & Donche, 2017).

Section II: Creating the Conditions to Support SRL Development

How can we use an understanding of self-regulation to inform assessment practice in higher education and how can assessment design promote self-regulation?

2.1 Promoting Student Engagement

Greater emphasis should be placed on assessment designs that promote student engagement with all dimensions of the assessment process as part of 'knowing to'

(Sadler, 2013)

"To be an agent is to influence intentionally one's functioning and life circumstances"

(Bandura, 2006, p. 164).

Engaging students centrally in assessment practices is essential in promoting SRL.

The development of students' self-regulatory skills is dependent on their active engagement in meaningful learning activities (e.g., as co-producers) (Evans, 2016).

Unless students see themselves as agents of their own change, and develop an identity as a productive learner who can drive their own learning, they may neither be receptive to useful information about their work, nor be able to use it. (Boud & Molloy, 2013, p. 705)

Unless students are aware of the value of specific activities in supporting their learning, they may not engage with them (Evans, 2016; Panadero & Alonso-Tapia, 2013).

Crucially, it is the **quality of student engagement that matters** (Evans et al., 2015). Engagement provides the possibility for students to self-regulate and to take ownership of assessment and in doing so, to develop high level self-regulatory skills. **Students' perceptions of their engagement in assessment impacts outcomes**, however the relationship of student engagement to outcomes is complex and is mediated by many factors (Evans et al., 2019)

Engagement is complex and influenced by many individual and contextual variables. Understanding the barriers to, and facilitators of, self-regulatory assessment practices is important in enabling teams (educators and students) to move forward together. Students' perceptions of their engagement in assessment can impact how well they do. However, the relationship between engagement and performance is complex and mediated by a number of individual and contextual variables (Evans et al., 2015).

Engagement	= Outcomes X	Need to promote right types of engagement
High-level engagement	= Outcomes ✓	but depends on interrelationships between individual and contextual variables and assessment needs to test high SRL skills

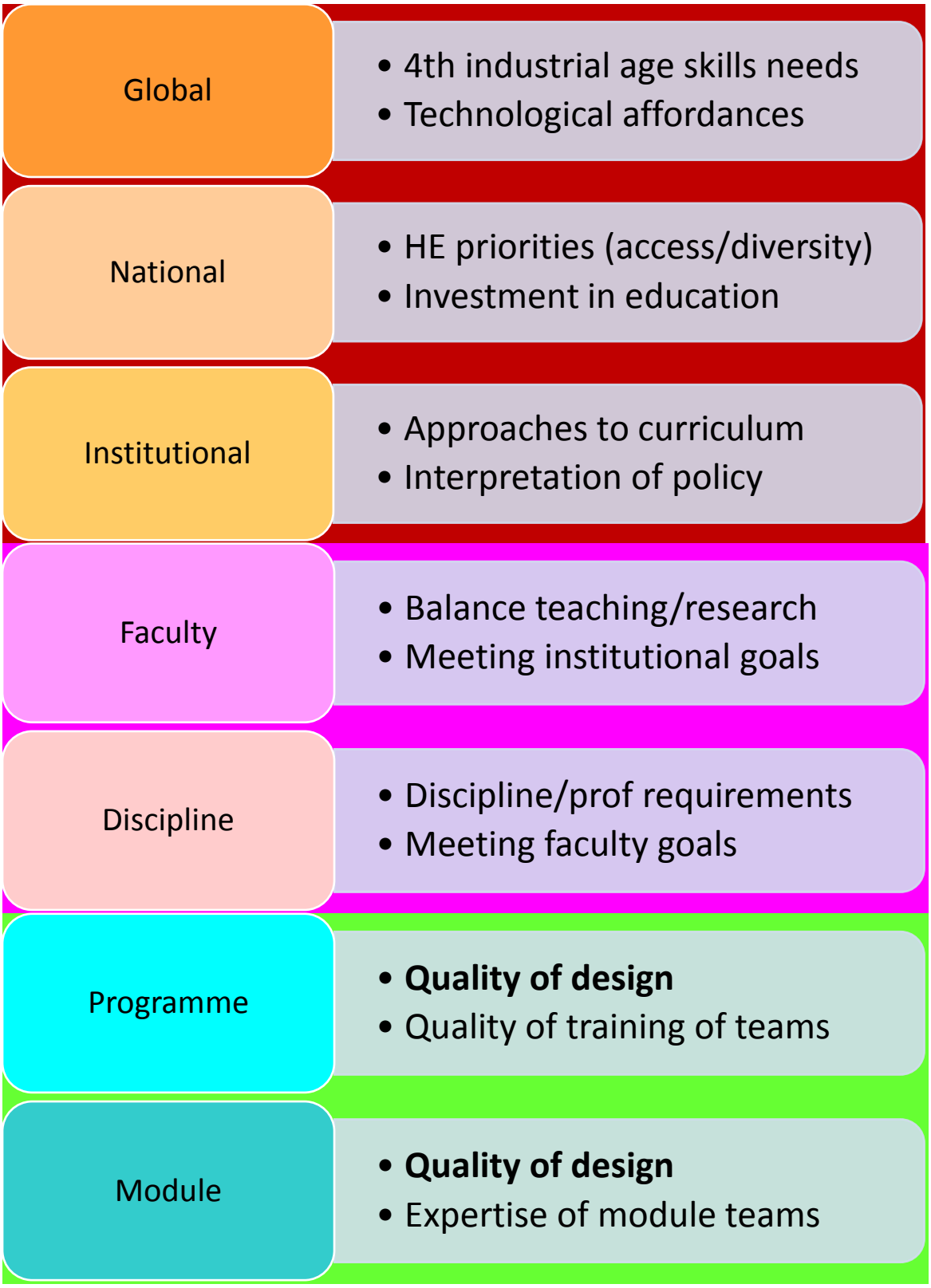
Agentic engagement in summary is about student-initiated, proactive, intentional, collaborative, and constructive action, to support their learning, and how as educators we promote this (Reeve, 2013). The quality of engagement matters. How we engage with students and what knowledge and skills we promote in partnership with them. Student and educator beliefs about their respective roles within assessment are instrumental in impacting the quality of student engagement within assessment (Waring & Evans, 2015).

2.2 The role of context in impacting self-regulatory skills development

The global and national context of higher education, institution, faculty, department, and team cultures of assessment all contribute to how assessment is experienced at the individual level. However, it is at the **microlevel that the way in which assessment is enacted that real differences to how students experience learning are mediated and where impact on student learning outcomes is greatest** (Schneider & Preckel, 2017).

> **The danger is that a strong and well-evidenced pedagogic rationale for change remains a weak bargaining tool in the face of established social relations of the field and the interests at stake in the field, and is therefore destined to talk at cross-purposes with those interests.** (James, 2014, p. 164)

Table 2.1 Factors impacting students' development of self-regulatory skills within assessment in HE



There are many macro and meso level factors that impact capacity to develop SRL capacity within the HEI context (e.g., policy reform promoting student-centred learning, the work of government and international agencies in promoting research-informed approaches to practice) (Evans & Bunescu, 2020), and commitment to SRL approaches at the institutional level).

Investment in pedagogy and the quality of professional development matters. The last decade has seen increases in the sharing of SRL good practice globally; a key question remains as to how SRL approaches can be co-ordinated at the institutional level to support effective local delivery of them in practice.

2.3 Factors impacting the development of self-regulatory approaches at the individual level: The educator perspective

It is important to understand **student and educator perceptions of barriers to their active engagement** in developing SRL practice if learning contexts are to enable all learners to have equal access to them.

Educator and student conceptions of learning and teaching are important in impacting how individuals engage in learning contexts (Evans, 2014, 2015a; McCune & Entwistle, 2011). Perceptions of barriers and affordances to learning and individual and team responses to them are linked to people's **conceptions of learning**, **neurobiological factors** (Friedlander et al., 2011), the **processing heuristics** (methods of evaluating or revising ideas) and **schemas** (mental structures that individuals use to organize knowledge and guide cognitive processes and behaviours that individuals use (Waring & Evans, 2015).

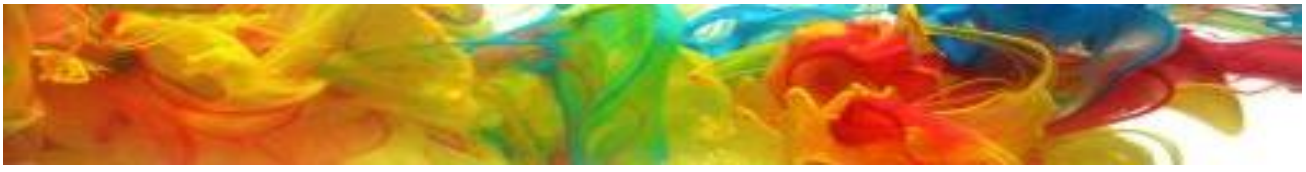
Educator perspectives: The **design of assessment** (e.g., organisation and coherence of assessment, progressive nature of it, focus of assessment, types of tasks, clarity of information, and role of feedback) is critical in impacting how students engage with learning. There are a number of barriers to implementing effective self-regulatory approaches to assessment (Evans et al., 2019) to include:

Access to concepts	Lack of knowledge and experience of core SRL concepts and relevance of them; nothing to hang new ideas on – no reference point; accessibility of the language/ideas –'pedagogical gobbledygook'.
Pedagogical expertise	Baseline knowledge of subject and understanding of how to apply concepts to practice.
Sensitivity to context	Knowledge and understanding of students' starting points; colleagues' strengths and weaknesses.
Political capital	Understanding of context and perceptions of ability to leverage change for self and others.
Data expertise	Ability and interest in using data to support learning decisions.

Experience	Educator experience of, and confidence in using SRL approaches.
Conceptions of learning and teaching	Pre-established schema- Beliefs about what effective learning/teaching looks at and what the roles of staff and students should be- what does empowerment of learners look like? What does SRL mean? What does deep look like?
Mindset/confidence	Belief about ability to effect positive change and confidence in working in new ways with students.
Resilience	Persistence, bouncebackability; ability to change direction in light of setbacks.
Flexibility	Willingness to use different approaches and enable students to utilise different approaches.
Creativity	To design new approaches and to navigate barriers.
Willingness to engage	Goals…Interest in enhancing practice -Priorities and perceived value of engaging – linked to institutional systems of recognition/reward/challenge/risk.
Individual - toleration of uncertainty / need for cognition	Unphased by lack of clarity and desire to master complexity.
Team identity	Importance of being part of a team and belonging – being valued outside of a discipline/function

2.4 Factors impacting the development of self-regulatory approaches at the individual level: The student perspective

Students' perceptions of **the value of a task** and their **perceptions of control** (Panadero, 2017; Pekrun, 2006; Shell & Husman, 2008). Belief in the ability to realise one's goals has a strong impact on assessment and feedback behaviours. Links between an individual's **self-esteem→ self-efficacy→ mastery→ effort→ performance** have been noted, leading Gebka (2014) to suggest that strengthening any of the elements of this path by students, academics and institutions can have beneficial impacts on students' academic performance.



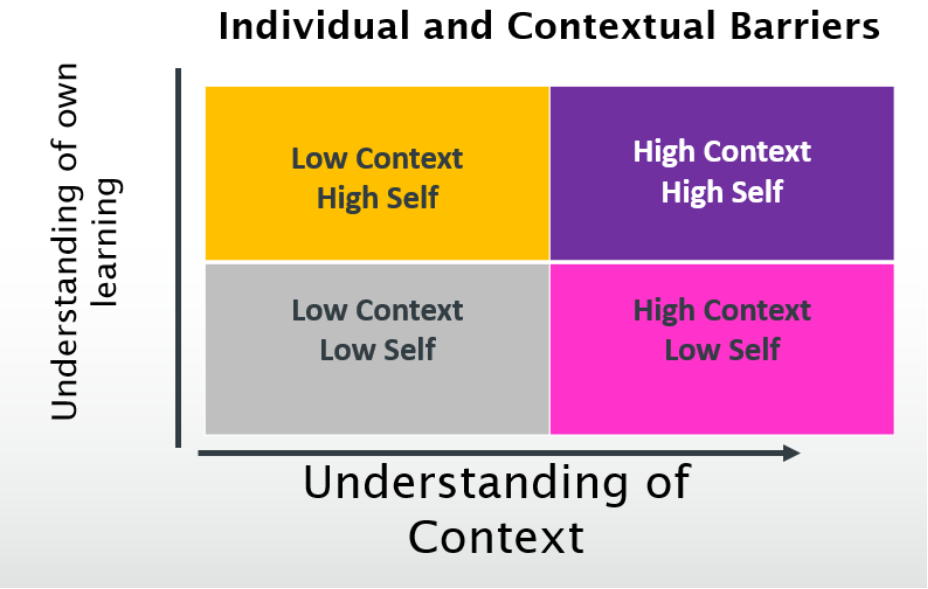


Figure 2.1: Understanding of self and context

Relationships between **perceptions of high control, mastery goal orientation and positive affect** are highlighted in Pekrun et al.'s (2002, 2006) **control-value theory** and similar theoretical perspectives are found in **self-worth theory** (Covington, 2004), and **self-determination theory** (Reeve et al., 2004; Ryan & Deci, 2002, Deci & Ryan, 2008). Self- determination theory explores the interaction between perceptions of autonomy and control, goal orientation/motivations, affect, locus of control (whether an individual feels outcomes are within his or her control or not), expectancy of success, and relatedness (the need to have meaningful relationships with others).

Students coming into university may be dependent on being told what to do (**externally regulated**) and may find the call to take responsibility for their own learning challenging. Similarly, from an educator perspective the pressure of higher education league tables, and the need to manage student satisfaction may lead educators to overcompensate and overly scaffold students' learning which ironically impedes students' development as independent learners.

Some individuals think that self-regulation requires total independence and self-reliance, whereas others see it as using the environment including help from others to support one's learning. Perceptions of how students should be actively engaged in their learning varies among educators and students (Balloo et al., 2018).

Strategies to promote students' self-regulatory development can have different impacts in different contexts (Dargusch et al., 2017), therefore methods or models of self-regulated learning have to be sensitive for **contextual differences** (Al' Adawi, 2020).

2.5 Developing self-regulatory learning environments

> In order to develop a culture of authentic assessment and academic integrity, [there needs to be] alignment between enabling leadership, policies, systems, resourcing, practices, professional development, recognition and rewards. [We] need to **engage students and staff as partners in this culture**. Opportunities for sharing ideas, developing good practices and mentoring should be actively encouraged and resourced. Policies and systems that hold traditional practices in place or discourage innovative approaches should be critically reviewed and revised. (Opportunities for program teams [including students] to **collaborate on program-level assessment** design should be fostered and resourced.
> (ATN, 2019)

Self-regulatory approaches to assessment include a wide range of activities, in varying combinations, with varying methodologies and using a range of instruments to measure efficacy. The sheer complexity regarding the number of variables involved, makes it difficult to be definitive about what works, and especially given the role of individual learner differences, and the specific requirements of contexts.

What is effective for a learner in one context may not be effective in another or at a different point in time given all the variables involved. However, it is possible to synthesize key messages from an extensive review of the literature. In sum, important considerations include the creation of **autonomy supportive learning environments** and ensuring **integrated approaches** to delivery:

Autonomy supportive learning environments

- **High quality engagement with students**

  > ***How students come to co-own their programs with lecturers and see themselves as active contributors to the assessment feedback process rather than seeing assessment as something that is done to them.*** *(*Evans, 2016, p. 2)

  The nature of student engagement is of crucial significance. Addressing student and lecturer conceptions about their respective roles within learning and teaching need to be explicitly addressed from the outset. As part of this, **what constitutes high level student engagement needs to be clarified and agreed.**

  Students need opportunities to be **co-constructors of their learning contexts**. Co-construction requires educator understanding of how to promote high level engagement while at the same time ensure workload-efficient means of involving students in classroom activities which develop self-regulative capacities (Evans, 2016; Yang & Carless, 2013). (5.1)

  Assessments also need to be appropriately designed to test high-level self-regulatory skills.

- **Supporting co-construction of learning**

> teachers who provide choice but also listen to students and allow them to manipulate instructional materials and ideas… consider student preferences and interests in selecting and designing tasks, provide rationales for those activities, and give students opportunities to ask questions… embrace student perspectives… culturally responsive pedagogy that encourages [students] to own their learning by questioning and challenging curricular assumptions and constructing their own reality.
>
> (Kumar et al., 2018)

- **Promoting Universal Design principles** (CAST, 2018) within assessment to enable all learners to access and do well in a learning context. The curriculum is not designed with a specific type of learner in mind. **A critical pedagogy** needs to underpin this work to ensure that assessment design does not unintentionally disadvantage some groups of learners compared to others (Waring & Evans, 2015). To support access the following are important:

  - **Ensuring transparency of the learning process through the giving of explicit and focused guidance.** (5.2)
  - **Appropriately scaffolding students' entry into new learning contexts through understanding the starting points/individual learning needs of students** (Kim & Shakory, 2017). For example, by making use of **early interventions to address students' conceptions of learning** in order to support effective strategy use (Vermunt & Donche, 2017). (5.3)
  - **Making local cultures explicit** rather than adapting them to accommodate diverse learners (Blasco, 2015; Friedlander et al., 2011).(5.3)
  - Being cognisant of the varying ways in which i**ndividuals process information** (see Friedlander et al.'s 2011 work on the neurobiology of learning and Kozhevnikov et al.'s 2014 work on cognitive styles). (5.3)
  - Designing environments to reduce **cognitive overload** which can impact high and low self-regulators (e.g., overloading those who regulate well with unnecessary information can lead to **expertise-reversal**, i.e., having a negative impact on them) (Fyfe & Rittle-Johnson 2016; Krause et al., 2009). (5.3)
  - **Providing sufficient challenge** (**constructive friction**) (Vermunt & Verloop, 1999) to promote student SRL development and as part of this designing assessments that require students to use high level skills. An essential part of this is clarifying what a '**deep approach'** looks like within a discipline; what are the dispositions a student should be able to demonstrate both now and in the future? (5.4)
  - **Making effective use of data** to enhance understanding of the processes of learning and how learning processes may vary for different individuals/groups, and over time, so as to enhance practice and ensure

inclusive approaches. This includes engaging students and educators in owning the data.

Ensuring an integrated approach:

- **Attending to metacognitive, cognitive, and affective elements of learning:** The teaching of metacognitive self-regulatory strategies needs to go hand in hand with the teaching of cognitive strategies (Pintrich, 2002). Focusing on individual interventions without considering self-regulation holistically may have limited impact on students' learning (Dorrenbacher & Perels, 2016). For example, in providing feedback to a student on how they can improve, consideration needs to be taken of the different elements of self-regulation by making the key messages clear and to the point (COGNITIVE); exemplifying how a student can make the necessary adjustments through links to examples demonstrating this and utilising peer support effectively (METACOGNITIVE) AND agreeing goals for improvement of the work, considering what is reasonable to expect a student to be able to do within timeframes, ensuring sufficient time/space for a student to be able to reflect on feedback and supporting perspective taking through identifying positive features of the work (AFFECTIVE).

- **Embedding SRL within disciplinary delivery:** Self-regulation strategies taught in the absence of content have limited impact. Schneider & Preckel (2017) in reviewing first-year student experience training programs involving over 2,000 students found that these had virtually no average effect on achievement. Specific skill sets need to be taught and aligned within the way in which accruement of such skills is rewarded (Douglas et al., 2016). **Transition programmes** need to be integrated within disciplinary delivery i.e., within the course/programme and not separate to it where its relevance may be lost.

- **Embedding SRL practices throughout students' learning journeys.** Supporting the development of students' self-evaluative capacity needs to take place throughout a students' learning journey. For example, by integrating evaluation activities including peer and self-assessment into all stages of the learning process and providing students with multiple opportunities to test their understandings are important (Boud et al., 2013; Mays & Branch-Mays, 2016).

- Maximising opportunities for students to have direct evaluative experience in working with others requires training in developing **shared regulation capacity.** To support students' ability to come to their own understandings of quality requires immersion in direct and meaningful experiences to test understandings (Sadler, 2010, 2013, 2017).

Section III. Developing High Level Self-Regulatory Skills

> **Learners may self-regulate in different ways with varying levels of success. What matters is the selection of the most appropriate strategies required in a specific learning situation and good execution of them.** (Dinsmore, 2017; Evans & Waring, 2020)

Engaging students in SRL activities is important (Jansen et al., 2019). There is general consensus that such "training should (a) be in context, (b) use tasks within the same domain as the target content, (c) and promote a high degree of learner activity and metacognitive awareness" (Hattie et al., 1996, p. 131). While there is debate around whether SRL activities should be focused on a specific element of practice or be more broad-based (Richardson et al., 2012), it is known that focusing on control cognitions to include students' perceptions of their ability to do well in the subject and goals are important in driving motivation (effort and persistence), and student success (Hattie et al., 1996; Panadero, 2017).

Focusing on the development of high level metacognitive capabilities is important (see Table 3.1). Key areas of importance include **metacognitive self-monitoring and evaluation strategies**, **motivational strategies** (self-efficacy and goal setting), to include **student beliefs about learning** and **their ability to do well** (Benbenutty et al., 2015). In promoting high level self-regulatory skills emphasis has to be on:

- **Discernment** with regards to choice of approaches (most suitable selection of approaches to achieve goals, use of time, use of others); and
- **Quality** (how well SRL is enacted; best combination of approaches; in the moment and looking to the future)

Choosing the right strategy and deploying it to the best of ones' ability are dependent on **effective integration and utilisation** of **cognitive, metacognitive, and affective strategies**. A summary of high level metacognitive strategies is summarised in Table 3.1.

Key metacognitive strategies implicated in learning success include:

- **Planning** strongly correlates with achievement (Dent & Koenka, 2016) – quality of thinking and nature of goals are important (e.g., setting specific and focused goals)
- **Accuracy of self-monitoring** refers to the awareness of how task performance compares to a learning goal and activation of appropriate strategies to manage progress (DiFrancesca et al., 2016; Eva & Regehr, 2011);
- **Adaptive control** concerns the flexible use of strategies to achieve goals;
- **Social interaction skills** include dialogic classrooms with high levels of exchange with teachers from focused questioning and open discussion, peer to peer interactions, group work which encourages high levels of interaction. In offering a rationale for the effectiveness of social interaction, Schneider & Preckel (2017) highlight the **importance of student engagement** in learning where students are required to explicitly verbalise their own knowledge, constantly compare their own views with those of others and find perspective.

Table 3.1: High Level Self-Regulatory Skills implicated in Assessment Feedback: Key Concepts-Process Model (adapted from Evans & Waring, 2020)

	Self-regulatory behaviours in managing assessment and feedback	Specifics	How are we designing assessment to support students to master these skills?	Are there ***disciplinary variations*** in how these are prioritised and tackled?
1	**Metacognitive strategy use:** knowing how, when, and where to deploy a strategy	• **Quality:** how well a strategy is executed • **Conditional use**: how appropriately a strategy is used		
2	**Task analysis:** accurate assessment of task and what you know and do not know	• **Meta-memory:** memory of what you know • **Accuracy** for recognizing or knowing a task and predicting one's knowledge		
3	**Planning regulation of a task:** organisational and motivational skills in setting goals, understanding the necessary steps in the assessment process and developing an action plan to achieve these goals.	• **Goal setting:** grade goal (minimum level one wants to achieve); learning-oriented goals versus performance goals; coherent goal hierarchy • **Ability to set specific, manageable, and challenging mastery goals**		
4	**Contextual regulation:** ability to influence the environment to support learning. Requires an awareness of the situation and personal-interpersonal competence • **Mediation of Peer interaction:** ability and/or opportunity to react effectively to guidance and/or peer feedback. • Ability to effectively manage co-regulatory interactions.	• **Selective use**: knowing when, why, and from whom to seek support - cue seeking; help-seeking • **Quality of, and selective use** of networks of support • **Flexibility**: boundary crossing-adaptability- ability to transfer and adapt ideas across contexts • **Co-regulatory capacity:** ability to interact effectively with others to develop appropriate outputs; • **Accuracy** in mediating effective interactions with others • **Selectivity:** ability to recognise and utilise key skills of others most effectively in relation to task completion		

	Self-regulatory behaviours in managing assessment and feedback	Specifics	How are we designing assessment to support students to master these skills?	Are there ***disciplinary variations*** in how these are prioritised and tackled?
5	**Metacognitive monitoring** of cognitive, volitional (motivational and affective) states to support effort regulation and attention-focusing in pursuit of goals. • Ability to rely on own internal processes to make progress against goals and adapt one's plan as necessary. • To self-monitor in the moment, and to monitor overall plan of activity.	• **Adaptive control** - flexible use of self-regulation strategies. • **Absolute accuracy** in relation to expected and actual performance. • **Relative accuracy** –being able to discriminate between the differential learning for some materials versus others. • Availability and accurate use of **predictive cues** to measure progress. • **Best use of time:** choosing deliberately when and where to invest time and mental resources.		
6	**Self-reflection:** • ability to critically reflect on one's own performance and also to be reflexive. • to be able to see the situation from different perspectives. • an 'outward in glance.' • objective assessment of the situation.	• **Self-evaluative capacity:** ability to accurately estimate one's performance bringing together information from a range of sources. • **Accuracy in attributing the causes of success and/or failure.**		

PART IV: An Integrated Approach to Self-Regulation

4.1 Steps in developing SRL

1. Achieving consensus with teams on **what the key high level self-regulatory skills** are that you are trying to promote within modules and courses requires consideration and articulation of what a **deep approach to the discipline is**. It also requires stripping back the curriculum to focus on the knowledge and skill sets that are core to the module/programme.

2. Key SRL skills need to be **mapped in a module/ programme blueprint** to enable them to be **transparent** to educators and students. The **progressive development** of these SRL skills needs consideration, especially in relation to connections across modules taking consideration of the importance of valuing process and outcomes in relation to student acquisition of skills.

3. The **techniques** to best support the development of SRL skills then need to be embedded throughout the teaching of the curriculum so that students have multiple opportunities to develop their competence in them.

4. **Ongoing evaluation and review** need to be carried out throughout the process to enable iterative development of the curriculum to ensure it meets the needs of all students, and that students are actively engaged in the review process.

4.2 Using SRL activities as a learning tool

There are a number of useful frameworks to support the implementation of SRL approaches:

- **Learner-focused**: Winne's (2019) model places emphasis on the planning phase which all too frequently does not receive sufficient attention. The 4-phase model to support learners in developing SRL includes:
    - ***Phase 1***: The learner identifies the constraints and affordances that they perceive will impact on the task. These can be internal or external factors.
    - ***Phase 2***: The learner develops goals and aims for the learning activity and plans for how to achieve those goals.
    - ***Phase 3***: The learner puts that plan into action and undertakes the activity in doing so.
    - ***Phase 4***: The learner re-evaluates the first 3 phases and reflects how to embed the lessons learned in future work.

The phases outlined above do not necessarily need to occur in this order. Phase 4 may occur at the beginning of the process or be absent altogether. Taken together, observation of these phases can track a learner's aptitude in these different key SRL activities, and also while they are engaged in learning.

- **Educator Focused:** In embedding SRL throughout the curriculum, Zimmerman's (2000) four stage development model is useful. This approach highlights the importance of clear programme blueprints for educators and students in outlining the progressive development of knowledge and skills within and across modules. Students need **concrete opportunities** to observe alternative ways of approaching learning and **multiple opportunities to use new knowledge and skills in** order to develop competence, ownership and adaptation capacity.

Zimmerman's (2000) four stage development model to support SRL development include:

(i) Observation involving vicarious learning from others
(ii) Emulation – guided support in developing practice
(iii) Self-Control – applying ideas in practice
(iv) Self-Regulation – ownership of ideas and practices and ability to adapt and use across contexts

4.3 Self-Regulatory Skills Framework

The Self-Regulatory Framework presented in Table 4.3 identifies generic self-regulatory skills using the EAT Assessment Dimensions to support an integrated approach to developing self-regulatory skills within assessment.

The EAT Integrated approach to assessment and feedback synthesizes key factors impacting assessment and feedback success drawing comprehensively on research literature (>50, 0000 articles) and research in practice. There are two key factors underpinning the EAT framework which include students' ability to **make sense of their learning environment** and their ability to be **agentic** within it; both of these variables require high level self-regulatory skills.

In bringing together work on effective assessment feedback and merging this with students' ability to engage with assessment and manage their learning environments effectively, the EAT framework figuratively highlights **three dimensions of practice.** These three dimensions are all interrelated and include: **assessment literacy** (AL), **assessment feedback** (AF) and **assessment design** (AD). The EAT framework presented in the form of a wheel or web (Appendices B and C) provides a workable model to support the design of effective assessment and feedback.

To support student self-regulation through a focus on **assessment literacy,** the model highlights: the importance of shared expectations and understanding of assessment requirements; students/ educators' internalisation of standards in being able to know what quality looks like; understanding how assessment elements fit together; clarity around one's role in assessment; and the requirements of the discipline.

The **assessment feedback dimension**, tackles students' entitlement to, and engagement with feedback where feedback comprises all cues available to support learning from the environment in addition to the student's own internal reference system.

The third aspect of the web is **assessment design**, whereby transparency, meaningfulness, collaboration and equal opportunities act as important mediators in impacting students' self-regulatory behaviours.

EAT promotes an integrated approach in considering how **learners combine metacognitive, cognitive and affective** strategies to support their learning, acknowledging that learners may vary considerably in their use of approaches and with varying degrees of success.

The **Self-Regulatory Framework** (Table 4.3) provides a route map to thinking about SRL within assessment and feedback, and specifically how the design of assessment can support the development of SRL skills. In bringing together student engagement and self-regulation as illustrated in the EAT Framework, it is possible to identify key self-regulatory skills that are essential within specific disciplinary /professional contexts and at different levels of enquiry (e.g., aligned to specific skills sets and disciplinary knowledge).

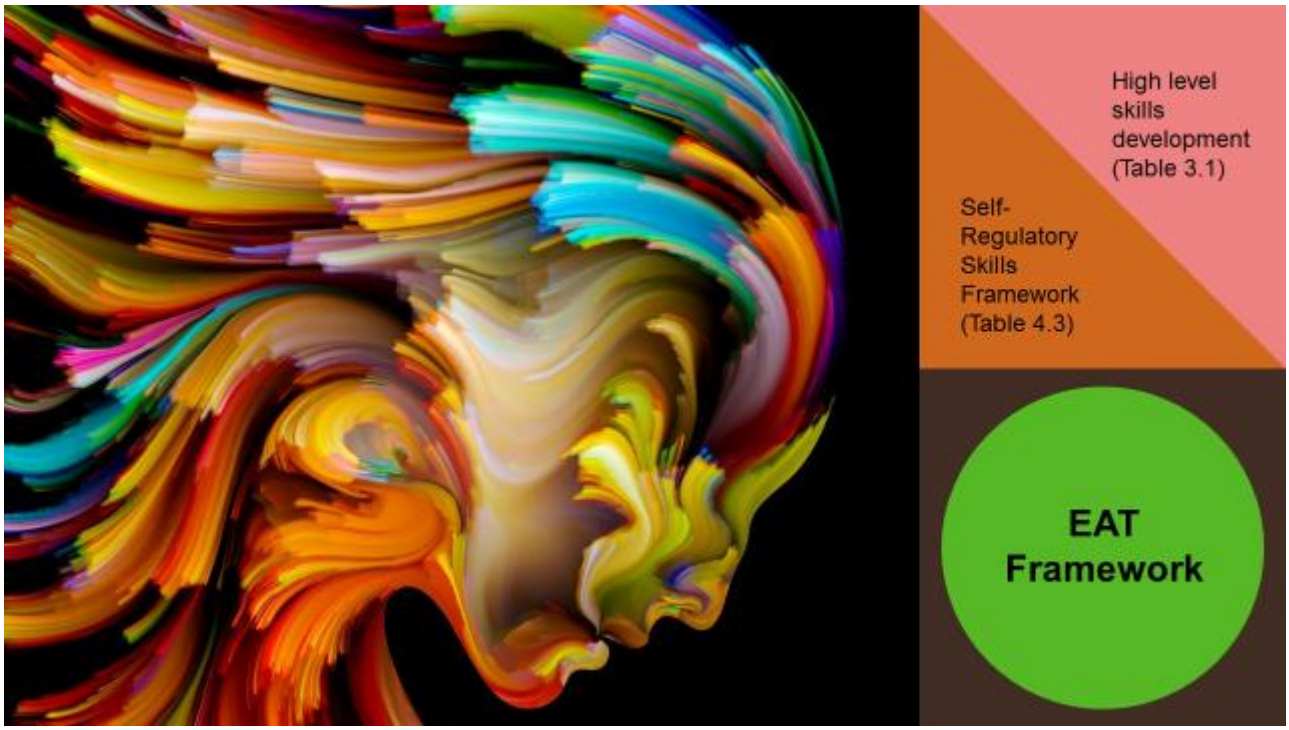


Table 4.3. Self-Regulatory Skills Framework

Assessment Literacy	**Self-Regulation Competences (examples)** **Our role** **What we need to be developing with students:**		Self-Regulation Overview	How are we designing assessment to support students to develop these competences?	Disciplinary examples
AL1: What constitutes **'good'**	How are we clarifying what the goals and core knowledge and skills required are? How would students gain an understanding of what 'good work' looks like? How are we supporting students to plan what they need to do to meet the learning outcomes?	○ **Alignment of personal goals** with **those required to be successful** in completing a specific task ○ Effective **goal management** to maintain focus/momentum ○ **Understanding the task requirements** ○ **Understanding what quality looks** like and how to achieve it ○ **Awareness of own strengths and limitations** in meeting task requirements, and how to utilise/develop these most effectively	**<u>Goal setting and planning:</u>** Develops and implements a coherent and effective plan to set and meet assessment goals (includes effective choice and use **of strategies)** **<u>Internalisation of standards</u>:** Understands what quality looks like and in relation to academic levels of achievement	Explaining the rationale underpinning assessment. Adapting assessment criteria to the requirements of the task with students. Engaging students in assessing a wide range of work.	
AL2: How assessment tasks fit together	Have we explained how the different assessment tasks fit together?	○ Ability to **identify connections** between assessment tasks ○ Ability to **discriminate between the specific learning requirements of different tasks**	**<u>Task Management:</u>** Manages assessment load, recognises connections between tasks, knows where and when to invest time and effort to best effect	Provide students with a route map of how assessments fit together. Plan assessment journey with students.	

Assessment Literacy	**Self-Regulation Competences (examples)** **Our role with students:**	**What we need to be developing**	Self-Regulation Overview	How are we designing assessment to support students to develop these competences?	Disciplinary examples
AL3: Student and educator entitlement	How are we developing student engagement in assessment so that they can manage their learning for themselves?	○ Student understanding of the need to take responsibility for their own **assessment journey** (i.e., moving away from relying on others to manage assessment for them to having an active voice in assessment) ○ Willingness to **offer one's own ideas up** for scrutiny by others ○ **Confidence in partnering** with educators	**<u>Assessment Engagement:</u>** Takes **personal responsibility** for assessment. Confident to actively engage in the assessment process.	Making explicit the boundaries of support and expectations of students. Giving students opportunities to co-design/research	
AL4: Clarity around the requirements of the discipline	How are inducting students into the ways of working within our disciplines?	○ Understanding the **ways of thinking and knowing within a discipline** ○ **Ability to separate what is important from the minutiae** ○ Understanding how to **act/be/perform** as a member of a discipline ○ Understanding the **professional requirements** of a specific disciplinary field and has currency (knows what is needed now within the field) ○ **Engages effectively with disciplinary networks**	**Demonstrates the aptitude, knowledge, and skills to achieve mastery within a discipline.** **Clear about what is required to achieve mastery, and willing to apply oneself to achieve it.**	Signposting key concepts. Identifying key threshold and rate limiting steps (what prevents someone from moving forward). Developing a shared language of how the discipline works. Modelling key ways of being successful. Providing opportunities for collaboration.	

Assessment **Feedback**	**Student Self-Regulation Competences** **Our role**	**What we need to be developing with students**	Self-Regulation Overview	How are we designing assessment to support students to develop these competences?	Disciplinary examples
AF1: Being able to use feedback effectively to improve work	How are we ensuring that students are able to use feedback effectively?	○ **Accurately identifies the key intended messages** in feedback ○ Uses **feedback effectively** to enhance performance ○ **Openness to alternative ideas and approaches** and **willingness** to try new strategies ○ **Manages the emotional dimension of feedback** and can take feedback at the task and not personal level	**<u>Judicious use of feedback:</u>** **Efficient in use of feedback** (selective in what feedback to use and effective in deploying it to enhance performance) **Confident in one's own ability, effective filtering of information, and flexibility in being able to adapt thinking.**	Ensuring feedback focuses on the key requirements. Making the feedback message clear: what was good, what let you down; how to improve. Placing feedback where it is of most use. Training students in how to give and act on feedback.	
AF2: Making best use of formative assessment opportunities	How are we designing assessment so that students can regularly test their understanding and are encouraged to do so?	○ Willingness to engage in formative activities. Ability to see the **relevance and value of tasks** to support learning ○ **Ability and confidence to seek** specific feedback ○ Ability to identify the most **useful sources** of feedback	**<u>Cue Consciousness</u>** **Confident in using learning situations to best effect** to support understanding**.** **Understands the role and value of formative assessment in relation to summative assessment**	Ensuring early opportunities for students to test their understanding. Making sure formative tasks closely relate to summative ones. Engaging students in developing formative learning opportunities	

Assessment Feedback	**Key questions**	○ Self-Regulation Overview	Self-Regulation Overview	How are we designing assessment to support students to develop these competences?	Disciplinary examples
AF3: Participating fully in peer engagement activities	How are we using peer learning activities to enable students to have a better understanding of task requirements?	○ Ability to use **one's own knowledge and skills and those of the peer group to best effect** to achieve outcomes. ○ Ability to give **accurate** and useful feedback to peers ○ Ability to **challenge and critique** feedback from different sources and be discerning in use of it ○ **Sensitive to task and group needs** in being able to adapt role and ways of working to suit context (good boundary-crossing skills). ○ Able to take on board **alternative perspectives** to achieve goals in relation to the requirements of a task. ○ **Self-advocacy capabilities –** ensuring own needs are met within the group context in addition to working to support group needs	**<u>Relational skills:</u>** **Able to meet own needs and those of the group** in successfully navigating the requirements of a task and group dynamics. Requires **strong sense of self** to 'have a voice and be heard'	Training for students in how to work effectively within groups and how to give and receive feedback. Ensuring individual responsibility within group activities. Preparing students to do the preparation in order to be able to engage effectively. Ensuring peer activities are used authentically. Valuing process and outcomes.	

Assessment Feedback	**Key questions**	Self-Regulation Overview	Self-Regulation Overview	How are we designing assessment to support students to develop these competences?	Disciplinary examples
AF4: Accurately evaluating the quality of one's own work	How are we ensuring that students get multiple opportunities within a course to develop their self-assessment skills?	○ Effective **self-monitoring skills** to diagnose progress and needs, and make adjustments in relation to goals ○ **Integrative judgement capacity** (the ability to see the depth and surface features of a piece of work; the detail and the overview) ○ **Self-evaluative skills** in being able to use all relevant sources of information to come to an accurate judgement of the quality of one's own work, and that of others.	**Accuracy in ability to judge the quality of work** **Reflexivity**: Able to **step back and look at work from the 'outside in'** in order to view it objectively	Providing requent opportunities for students to evaluate their own work and that of others. Modelling of different ways to successfully achieve outcomes. Enabling students to generate criteria for themselves when first marking work – what do they think the criteria should be. Co-marking and moderating with peers and educators. Co-developing rubrics with students to support learning.	

Assessment Design	**Student Self-Regulation Competences** **Our role**	**What we need to be developing with students**	Self-Regulation Overview	How are we designing assessment to support students to develop these competences?	Disciplinary examples
AD1: Understanding of higher education assessment regulations	How are we ensuring that students have a clear understanding of assessment regulations and processes?	○ Understanding of **assessment** protocols including the implicit/ hidden rules of assessment ○ Understanding how to effectively **navigate systems and processes** to get answers to questions	**<u>Political Assessment Literacy</u>:** Understands how the assessment system works and how to get the best from it	Inducting educators and students in the rules and hidden rules of assessment to ensure shared understandings. Engaging students in moderation activities. Making marking and moderation processes explicit.	
AD2: Meaningful Assessment	How are we encouraging students to adopt a deep approach to assessment?	○ Driven to achieve **mastery** (deep understanding) of the subject ○ Selects **appropriate strategies** and **uses them effectively** to advance knowledge and understanding ○ Ability to **create new knowledge and understanding** (new perspectives, new products, innovative solutions) ○ Ability to see the **value of current learning to a future context** (future time perspective)	**<u>Knowership</u>**: (see Sadler's work) Has **deep understanding of a subject** and the strategies necessary to gain deeper insights **<u>Creativity:</u>** Able to **manipulate information and use it in a variety of ways** including novel ways (translation and adaptability skills).	Developing authentic assessment tasks related to real life with students. Engaging students in the design of assessment tasks. Valuing process and product in assessment.	

Assessment Design	**Student Self-Regulation Competences** **Our role students** **What we need to be developing with**		Self-Regulation Overview	How are we designing assessment to support students to develop these competences?	Disciplinary examples
AD3: Ensuring Access and Equal Opportunities	How are we ensuring that all students have equal access to assessment and equal opportunities to do well?	○ **Awareness of one's own learning needs and how to manage them effectively** ○ **Knowing how to get the necessary support from the learning environment** ○ **Ability to modify the learning environment** and promote change in it support one's own learning. ○ **Ability to make good choices.** ○ **Ability to adapt** to the requirements of different contexts.	**<u>Agentic Engagement:</u>** Metacognitive **awareness of learning needs** and how to **utilise the environment to best support one's learning**	Using Universal Design principles to ensure shared understandings of inclusive assessment. Ensuring resources to include course materials are available to students in good time. Tracking student performance to ensure that the nature of assessment does not disadvantage individuals and groups.	
AD4: Ongoing Evaluation of Assessment and Feedback Curriculum Design	How are we empowering students to give feedback on the effectiveness of assessment design and delivery?	○ **Willingness and ability** to **engage in critical evaluation** of the efficacy of a course and to offer up suggestions for improvement ○ Holistic understanding of how course is organised and perspective on how best to support learning for self and others.	**<u>Critical Evaluation:</u>** Has a deep **understanding of the relationships** between learning outcomes, assessment criteria, assessment tasks and course delivery, and **one's role within assessment**	Ensuring ongoing evaluation integral to curriculum design Encouraging students to take responsibility by offering solutions and delivering on them Partnering with students requiring transparency in how assessment is designed and evaluated.	

PART V: Case Study themes

Overview

In this section, themes identified as important in supporting the development of self-regulatory behaviours in assessment are briefly outlined with reference to examples from the literature. The importance of an integrated and progressive approach to the development of self-regulatory assessment practices in relation to the themes identified below is highlighted. The themes are interrelated.

Key themes highlighted are:

5.1 Co-creation

5.2 Transitions

5.3 Transparency

5.4 Metacognitive Regulation

5.5 Emotional Regulation

5.6 Integrated Approaches to Assessment

5.7 Large Groups

5.8 Making Feedback Discourses Accessible

5.9 Self-Assessment

5.10 Peer Assessment

5.1 Co-Creation to support self-regulation

- Co-creation is seen as a prerequisite to supporting effective self-regulation through promoting active engagement in learning.
- Emphasis needs to be on high level authentic tasks.
- Preparing for co-creation requires consideration of factors such as:

    - Clarifying learner and educator roles in learning and teaching.
    - Ensuring clarity around the boundaries of engagement.
    - Ensuring adequate preparation to be able to engage from a position of knowledge.
    - Creating the conditions to enable students and educators to be confident to engage – importance of trust
    - How to embed activities throughout curriculum.

Relevant constructs include conceptions of learning; dialogic assessment; engagement; authenticity

ACTIVITIES

The EAT survey scale (EAT-SS) (EAT Appendices B, C, F) can be used with students and educators in many ways:

- to explore educator and student perceptions of engagement in different elements of assessment and feedback using the EAT Survey Scale (EAT-SS).
- to support enhancement of curriculum design, and shared understandings of the student role in assessment.
- to assess changes in perceptions following interventions to engage students and educators in promoting shared ownership of assessment.

1. **Use the staff-version of the EAT-SS** to
    - determine which areas of practice =you have identified as less well developed than others? (1=not well developed; 5 = highly developed);
    - compare educator profiles for modules in helping to support shared understandings of what engagement should look like for a given context.
2. **Use the student-version of the EAT-SS** to**:**
    - Determine student patterns of engagement with assessment
    - Consider if student perceptions of engagement impact their attainment.
    - Consider if there have been changes in engagement levels of students during the course of your module/unit (using EAT wheel as a pre- and post-test), and if this has impacted attainment.
3. **Looking at the 12 sub-dimensions of EAT**, what is one thing you/your team could do to enhance student engagement? What would your focus be and why?
4. **Evaluate the impact of changes you have made to assessment on student engagement. Are there different patterns of engagement for different groups of students? Why do you think this is this the case?**

Theme: Co-Creation to Support Self-Assessment

Fraile, J. Panadero. E., & Pardo, R. (2017). Co-creating rubrics: The effects on self-regulated learning, self-efficacy and performance of establishing assessment criteria with students. *Studies in Educational Evaluation*, 53, 69-76.

DOI link: http://dx.doi.org/10.1016/j.stueduc.2017.03.003

Focus:

Compares the effectiveness of students co-creating rubrics against them just using rubrics

Premise:

- Co-creation of rubrics allows students the opportunity to better internalize them.
- Supports learner agency in enabling students to have a voice in the assessment criteria.

Theoretical Underpinnings:

Assessment for learning: Cognitive constructivism

Key contribution

- Considers the benefits and limitations of co-creation.
- Contributes to literature base on importance of opportunity for students to discuss assessment criteria rather than having a rubric imposed on them.

Methodology

Experimental Study: Treatment and control group comprising 65 UG students studying Sports Sciences in Spanish HEI. Treatment group co-created and used the rubrics and the control groups used the co-created rubrics.

Key arguments

- Rubrics seen as important in supporting formative assessment processes and especially self-evaluation.
- Importance of introducing rubrics during the planning phase before undertaking a task.
- Importance of rubrics in supporting students' self-efficacy, autonomy, empowerment.
- Importance of co-creation to get student buy-in and reduce instrumentation approach

- **Key learning points**

- The students who co-created the rubrics compared to those who did not co create it only did better on 1 out of 3 tasks.
- Co-creation enhanced transparency for students.
- Thinking aloud protocols exposed differences in thinking between the 2 groups. This may be because this method exposes understanding better than self-reports of competence.

- **Conclusions**

- Both student groups reported higher SRL following the intervention.
- The co-creation treatment group had higher levels of learning self-regulation measured through thinking aloud protocols but not in other tasks.
- The co-created rubric group understood and better internalized the assessment criteria and standards from the rubrics.

Potential for application to other settings

Concept of co-creation is applicable to other contexts. Methods of doing this need to be adjusted to the needs of the context. Key element is student opportunity to engage in dialogue in the generation of them in order to be able to use them effectively and gain capacity to develop rubrics for use in different contexts.

Panadero, E. & Romero, M. (2014). To rubric or not to rubric? The effects of self-assessment on self-regulation, performance and self-efficacy, *Assessment in Education: Principles, Policy & Practice*, 21(2), 133-148.

Theme: Co-Creation: Building Autonomy Supportive Contexts

Lozano-Jiménez, E. J., Huéscar, E., & Moreno-Murcia A. (2021). From autonomy support and grit to satisfaction with life through self-determined motivation and group cohesion in higher education. *Frontiers in Psychology, 11.*

DOI link: doi: 10.3389/fpsyg.2020.579492

Focus:

- Promoting autonomy supportive environments - Role of teacher and student factors.
- Addressing Basic Psychological Needs (BPN) - autonomy, competence, relationship with others.
- Tested a model that emphasized the predictive capacity of a high perception of teacher's autonomy support and student grit to improve life satisfaction in university students, being mediated by the satisfaction of basic psychological needs, intrinsic motivation, and group cohesion.

Premise:

- Teachers have a decisive influence on satisfaction of BPN, intrinsic motivation, and satisfaction with life. Highlights the need to create student-friendly environments.
- Teachers need to become facilitators to enhance a sense of consistency and perseverance, and group cohesion in student active participation in learning.

Theoretical Underpinnings

- Self-Determination Theory (Ryan and Deci, 2017)
- Looks also at group cohesion, the individual sense of belonging to a group and moral feelings associated with the other members of the group

Key contribution

'Relationship with others' had the greatest correlation with intrinsic motivation

Consistency and perseverance predict basic psychological needs and intrinsic motivation

Key point:

"… teachers have the opportunity to enhance student motivation through pedagogical strategies that promote group cohesion …This represents a challenge, **since according to Ryan and Deci (2020) conventional relationship styles are installed under the protection of institutional models and educational policies conventionally centered on control** practices" (p. 8)

Methodology

Predictive study: Structural equation modelling (SEM) used to explore relationships between variables.

Key arguments

- The way teachers interact with students impacts student adaptive behaviours (group cohesion, wellbeing)
- Students with higher grit scores (consistency and perseverance) tend to work more persistently - and achieve greater psychological well-being
- Satisfying basic psychological needs promotes intrinsic motivation.
- Importance of teamwork tasks for collaborative learning

Key learning points

Autonomy support, grit, and solid interpersonal relationships, are key factors associated with the satisfaction of basic psychological needs, motivation, and well-being.

Conclusions

- Promoting student engagement in tasks is associated with setting of realistic goals.
- Consistency and perseverance and group cohesion important in p positive outcomes.

Potential for application to other settings

Emphasis is on relationship building and student engagement – wide applicability of key messages.

Relevant additional reads

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York: Guilford Publications.

5.2 Supporting Transitions

Transition to HE is a progressive event, incurring personal and academic challenges (Matheson 2018; Matheson, & Sutcliffe 2018) to include: (i) adapting to being an independent person, (ii) adapting to being a learner in HE, (iii) understanding the conventions and requirements of the discipline/ and wider context of HE (Rutherford, 2019).

Key pointers

- **Importance of starting early:** *Interventions early in a students' university career may be most effective because the strongest correlates...performance self-efficacy and grade goals, are likely to be more fluid during the early stages of skill development..."* (Richardson et al., 2012, p. 375)
- **Early identification of needs through use of baseline assessments** to ensure appropriate approaches to SRL are promoted (Kim & Shakory, 2017).
- **Addressing the orientations that students bring with them into university is essential** given that learning outcomes within HE are impacted by the pre-existing cognitive skills and orientations towards learning of students entering HE (Seifert et al., 2014; Vermunt & Donche, 2017).
- **Goal discussions are most effective when initiated early and integrated throughout the learning experience** (Farrell et al., 2017).
- **Feedback may be most critical during the early formative months of student entry into higher education during the acquisition stages of learning** (Playford et al., 2013).
- **Transitions work needs to be integrated into course content and not be separate from it** (Schneider & Preckel, 2017).
- **Importance of supporting students' network development and how they manage the interfaces between them (academic and social networks) and understanding of how HE works.**

In summary, transitions support needs to be developed within the discipline delivery of the subject where early identification of needs is essential**.**

Key concepts: effective use of data; integration into course delivery; anticipation of skills gaps

ACTIVITIES

Review provision of transitions support in relation to the Supporting Transitions check-list (Figure 5.1) – adapt this to your own context(s)

- What areas are done well?
- Is there consistency across units/courses/modules within a programme to ensure students have equitable experiences of transition?
- Are any groups of students disadvantaged by the ways in which support is organised?
  Which areas need improvement? What needs to be your key focus and why?

Supporting Transitions Checklist

> [Students] are rational agents, with tremendous demands on their time and attention, and must make choices about where to focus their energies and attention most efficiently. Thus, at both the conscious and unconscious levels, their brains are engaging in a continuous process of triaging for the allocation of finite neural resources. (Friedlander et al., 2011, 416-417)

How are you supporting students' cognitive needs at point of entry?

- ☐ How are you ensuring that students are **not overloaded with information** at point of entry?
- ☐ Are **key information sets clearly signposted** so that students can easily access these?
- ☐ Are you clearly explaining to students how **course/program components fit together**?
- ☐ Has the **organisation of the program** been made explicit?
- ☐ Have students been provided with a **route map of the student learning journey**?
- ☐ Have students been given a **tour of the VLE platform?**
- ☐ Are you clearly explaining how all parts of the VLE work together and how students can contribute to this?
- ☐ Have students been introduced to **key online tools** that s/he will be required to use, and directed to **training support resources**?
- ☐ Have you established **clear baselines on online teaching delivery** for all those who teach on a course/program to ensure consistency in the quality of the student experience from the very start?

How are you supporting students' emotional needs at points of entry?

- ☐ Have all the **core teaching staff been introduced** to students and their roles clarified?
- ☐ Do students know **who they can contact, where, and when** if they have a specific issue?
- ☐ Has the **nature of support that students** are entitled to been made explicit?
- ☐ Have you provided an overview of **core support services** that are available to students and how to access them (e.g., wellbeing, learning support services, and relevant networks)?
- ☐ How are you welcoming students into a **community of learning**? What is distinctive about it? What are the expectations?
- ☐ How are you supporting students' **confidence building and academic self-efficacy**?
- ☐ How are you supporting students to build their own **networks of support**?
- ☐ How are you ensuring regular contact points to check on **student wellbeing**?

How are you supporting students to be able to manage learning for themselves as part of a metacognitive approach?

Making things clear:

- ☐ Has the **approach to learning and teaching** been explained?
- ☐ Are **all key resources available on the VLE for students at point of entry**?
- ☐ Has the **rationale underpinning** the nature of assessment been made clear?
- ☐ Have the **core concepts and capabilities** required to be successful been made explicit?
- ☐ Have the **principles underpinning course delivery** been shared?
- ☐ How are **students being supported to manage what to do, when they do not know what to do?**

Promoting students as partners: How are you engaging with students from day 1?

- ☐ Have you set up **informal and formal peer learning teams** with 'every student a mentor approach' utilising the diverse skills of cohorts?
- ☐ Have students been **briefed on their role** in preparing materials for taught sessions – Does the design of assessment enable students to actively **contribute to teaching sessions**?
- ☐ Have students been **trained in seeking, giving and receiving peer feedback?**

Figure 5.1. Evans, (2020). *Supporting Students' Transitions, Griffith University, Australia*

Theme: Supporting Students to take Ownership of their Learning

Hawe, E., & Dixon, H. (2017). Assessment for learning: a catalyst for student self-regulation. *Assessment & Evaluation in Higher Education*, 42(8), 1181-1192.

DOI link: https://doi.org/10.1080/02602938.2016.1236360

Focus:

Creating Learning environments that support SRL through use of Assessment for Learning (AfL) strategies.

Premise:

Developing AfL Approaches

Theoretical Underpinnings:

Constructivist, Socio Cognitive and Situated

Key contribution

- Explores the issue of how to support students to be the 'animators' of their own learning and teaching processes.
- Focuses on interaction between students and teachers.
- Reinforces notion of communication trust: "willingness to share information admit mistakes, maintain confidentiality and give and receive feedback, promotes development off 'an atmosphere that fosters engagement, risk taking and a willingness to take part in sustained and challenging dialogues around both subject matter and the learning process"(Carless 2013, 100)

Methodology

Teaching intervention over 12 weeks UG students (n = 18), UK context
Qualitative thematic analysis of student perceptions of AfL approaches
Five AfL strategies were embedded into the teaching design.

Key arguments

- Clarification of goals helped students know where they were going.
- Exemplars provided insights into what was expected and what constituted quality work; course activities elicited evidence of learning
- Dialogic interactions generated feedback about understandings and progress
- Evaluation of exemplars developed evaluative knowledge, skill and expertise
- Peer review and feedback provided an authentic context for evaluation and monitoring of work.

- **Key learning points**
- Importance of looking at AfL strategies as interconnected.
- Highlighted student lack of confidence to engage in discussion with teachers.
- Emphasized the importance of focused, proximal goals oriented towards task completion.
- Value of concrete representations of what students needed to aim for (exemplars)
- Value of reviewing peer's work and receiving feedback from peers

Conclusions

For maximum impact, AfL strategies need to be comprehensive, cumulative and recursive.

Potential for application to other settings

AfL strategies can be used across contexts and scaled

Relevant additional reads

Carless, D. (2013). Trust and Its role in facilitating dialogic feedback. In *Feedback in Higher and Professional Education*, edited by D. Boud and E. Molloy, 90–103. London: Routledge.
Nicol, D. (2013). Resituating feedback from the reactive to the proactive. In *Feedback in higher and professional education*, edited by D. Boud and E. Molloy, 34–49. London: Routledge
Sadler, D. R. (2009a). Grade Integrity and the Representation of Academic Achievement. *Studies in Higher Education,* 34(7), 807–826. doi:10.1080/03075070802706553.

Sadler, D. R. (2009b). Transforming holistic assessment and grading into a vehicle for complex learning. In *Assessment, Learning and Judgement in Higher Education*, edited by G. Joughin, 45–63. Dordrecht: Springer.

Theme: Culturally Inclusive Pedagogy – Making the Tacit Explicit

Blasco, M. (2015). Making the tacit explicit: rethinking culturally inclusive pedagogy in international student academic adaptation. *Pedagogy, Culture & Society, 23*,(1) 85–106.

DOI link: http://dx.doi.org/10.1080/14681366.2014.922120

Focus:

Culturally Inclusive Pedagogy – supporting ways of knowing

Premise:

Focus is on international students transitions into HE. Key argument is that emphasis should be placed on making the tacit aspects of local learning cultures explicit rather than adapting them.

Theoretical Underpinnings:

Tacit knowledge and sense making theories (concepts of disruption, noticing and bracketing, and labelling)

Explicit learning theory: all students can learn in new ways if they know what is expected of them.

Key contribution

A framework is offered to help teachers conceptualise, and excavate, the tacit dimensions of local learning cultures.

Adds to debate about what inclusive cultures are, and are not.

Methodology

Focus group-based exploratory study of international student experiences at different stages of their studies at a Danish business school (n = 35)

Key arguments

The need for a holistic approach to explaining the learning cycle that both explains the purpose and behaviours required at each step, but also the relationships among the different steps and the logics underpinning how things are done.

Importance of not rushing into solving issues for students – importance of students experiencing discomfort and solution finding as part of the process.

Key learning points

The steps in learning, intentions behind them and how learning elements link together needs to be made explicit.

Conclusions

The importance of making explicit the tacit aspects of the host institution's learning culture, rather than adaptation.

Potential for application to other settings

High transferability – affects not only international students. Important to understand the challenges facing students at each stage in the learning journey and to use this to inform the learning process.

Key questions (p. 91) can be used with students – first word that sums up thinking about your studies; key challenges; what you think other new students need to know – advice/tips…….

Relevant additional reads

Hodkinson, P., Biesta, G., & James, D. (2007). Learning cultures and a cultural theory of learning. In Improving learning cultures in further education, edited by D. James and G. Biesta, 21–38. Oxon: Routledge.

Weick, K. E., Sutcliffe, K.M., & Obstfeld, K. (2005). Organizing and the process of sense-making. *Organization Science* 16(4), 409–421.

5.3 Transparent and Explicit

Supporting student access to the curriculum is a key concern. The EAT framework highlights the importance of clear route maps so that students are clear about the learning journey ahead. In promoting access to learning a number of key considerations highlighted in the literature include:

- The importance of **not overloading students with information at point of entry**. As Friedlander et al. (2011, p. 417) have noted: "*our brains are engaging in a continuous process of triaging for the allocation of finite neural resources",* and thus we attend to what is most important to us at that time. This also links to notions of **cognitive load** and **working memory capacity** (Fyfe & Rittle-Johnson, 2016).
- Clarifying and signposting **key concepts within a discipline** (Lin et al., 2014)
- **Explaining criteria and the 'rules of the game'** increases students' perception of control (Panadero & Alonso-Tapia, 2013).
- Promoting universal design principles (CAST, 2018) to ensure all students have equal access to learning (Waring & Evans, 2015).
- Utilising technology (e.g., AI) to support individualised instruction (Khawaja et al., 2013).
- Encouraging **culturally responsive pedagogy** that encourages [students] to own their learning by questioning and challenging curricular assumptions and constructing their own reality (Kumar et al., 2018)
- **Making local cultures explicit and providing a blueprint of a programme** so that students are clear about the purpose and behaviours required at each step, the relationships among the different steps and the logics underpinning how things are done - tacit logics of learning within higher education. (See section 5.2)
- **Making programme specifications more accessible** through reconsidering the language of them and encouraging student engagement in developing them.
- Enabling sufficient **constructive friction** so that students are challenged and given time to find solutions for themselves prior to being given explicit support, to enable students to work things through for themselves and are receptive to information deemed by them to be important and therefore a focus of their attention (Blasco, 2015).

Key concepts: working memory capacity; cognitive challenge; critical pedagogy

ACTIVITIES

1. Ensure clear mapping of the different kinds of support available to students/educators at point of entry. A Map on a Page concept.
2. Agree, map and signpost the key concepts within a module and relevance to other modules.
3. Clarify what a deep approach within a discipline looks like with educators and students.
4. Ask students who have completed a module to highlight the key stumbling blocks and what resources were most useful to them at that time.

Theme: Supporting Understanding: A Neurobiological Approach

Friedlander, M. J., Andrews, L., Armstrong, E. G., Aschenbrenner, C., Kass, J. S., Ogden, P., Schwartzstein, R., and Viggiano, T. R. (2011). What can medical education learn from the neurobiology of learning? *Academic Medicine: Journal of the Association of Medical Colleges*, 86(4), 415–420.

DOI link: 10.1097/ACM.0b013e31820dc197

Focus: Summary of insights from

Demonstrate the application of neurobiology and cognitive processing to learning and teaching. 10 key factors impacting learning capacity are presented.

Premise:

An understanding of how the brain processes information, from a neurobiological perspective, can give insights into the pros and cons of different learning and teaching practices in HE.

Theoretical Underpinnings:

The neurobiology of learning identifies key biological processes that explain how learning works, and identifies the limitations and restrictions that biology places on people's capacity to learn, concentrate, and conceptualise information.

Key contribution

Identifying the biological underpinnings for effective educational practice and how these can be applied to support learning.

Methodology

Conceptual drawing from literature

Key arguments

The authors identify 10 key considerations when designing curricula and learning & teaching methodologies:

1) The value of **Repetition** in supporting learning.
2) **Rewarding** activity, and **reinforcing** progress/good outcomes can help establish information pathways in the brain.
3) **Linking learning to a stimulus**, such as a sensory cue, enables **visualisation** of the learned concept, and makes accessing that information easier.
4) **Active engagement** in the learning process has a powerful role for reinforcing the neural pathways that surround the knowledge learned.
5) The negative impacts of **stress** on the learning process are considerable.
6) The importance of **rest** to reinforce neural pathways.
7) Requiring students to undertake too many activities at the same time can limit learning, therefore requiring **multitasking** of students is potentially detrimental.
8) Different individuals have their own unique set of **learning styles** and **learning approaches**.
9) **Active involvement** in authentic tasks reinforces learning.
10) Importance of **revisiting** information through a range of **different sensory processes**.

Key learning points

The authors recommend that we pay more attention to the underlying biology of cognitive processing, when we consider the shape of curricula, and the format, timing, and intensity of learning and teaching activities. Making *learners* aware of these principles, and why curricula have been structured in the way they are, helps learners regulate their learning, and supports development of cognitive and metacognitive SRL.

Conclusions

Understanding (and sharing/discussing) the neurobiology of learning with both learners and faculty is important when developing curricula and teaching practices.

Potential for application to other settings

Focused on medical education but applicable to all disciplines.

Theme: Use of Adapted Technology to Support Student Understanding

Khawaja, M.A., Gangadhara B. Prusty, G.B., Ford, R.A.J., Marcus, N., & Russell, C. (2013). Can more become less? Effects of an intensive assessment environment on students' learning performance. *European Journal of Engineering Education*, 38(6), 631-651.

DOI link: DOI:10.1080/03043797.2013.834295

Focus:

- Online interactive adapted tutorials allow teachers to observe and analyse patterns in students' interactions with the online system. They can assess the current learning status of individual students and facilitate adapted feedback, assessment and remediation.
- By visualising patterns in students' responses within the interactive tutorials, educators can gain a better understanding of where students are having problems with the key concepts that they need to grasp if they are to undertake more complex learning tasks.

Premise:

Adapted instruction supports individual learners as part of dynamic design and enhances design.

Theoretical Underpinnings:

Cognitive load theory effects –i.e. the nature of the load for different students.
The **redundancy effect** indicates that processing non-essential information is not neutral but actually has a negative effect on learning (Chandler & Sweller 1991). Attempting to solve many problems is often a cognitively overwhelming task for less knowledgeable students.
Expertise-reversal, is when knowledgeable students are loaded with information that they do not need and this compromises their performance (e.g., repeated testing while helpful for some students to help automation of basic processing may negatively impact others).
Notion of **threshold concepts**

Key contribution

Potential of adaptive tutorials (ATs) to customise students' learning solutions and inform pedagogy

Methodology

Case study intervention – Engineering – development of blended learning environment to incorporate Adapted Tutorials (ATs) (N = 932)

Key arguments

Emphasizes the need to map the core constructs in a module and relationships between them.
The knowledge level of the learner needs to direct the approach to avoid unwanted impacts.

Key learning points

Keeping the quantity and nature of the information to be processed by each individual student to an appropriate level will enhance their learning performance.
Higher performing students generally performed better with more ATs.

Conclusions

Cognitive load needs careful consideration.
Importance of adapted instruction in being able to offer a range of activities within the ATs on each key concept, so that the ATs take higher performing students beyond the threshold into skilled practice, yet do not overload the weaker students who may still need to study more worked out examples and practise simple problems themselves.

Potential for application to other settings

Useful especially for large groups
Potential to use students written/spoken language in real time to assess cognitive load level

Relevant additional reads

- Meyer, J.H. F., & Land, R. (2005). Threshold concepts and troublesome knowledge (2): epistemological considerations and a conceptual framework for teaching and learning. *Higher Education: The International Journal of Higher Education and Educational Planning,* 49(3), 373–388.
- Sweller, J., Ayres, P., & Kalyuga, S. (2011). *Cognitive load theory*. New York: Springer-Verlag.

5.4 Developing Metacognitive Competence

High Level metacognitive self-regulatory competencies were outlined in Table 3.1 where emphasis was placed on the **quality and appropriate use** of strategies (**conditional use**). High level metacognitive competencies can be taught but cognitive and affective dispositions need to be developed in unison with metacognitive ones, and in some definitions of metacognition, these different components of SRL are seen as integral to metacognition. Sadler-Smith (2012) highlights that the concept of metacognition has broadened to encompass concepts such as organisational meta-learning, and for many also includes psychological and cognitive components. The different attributes and functions of metacognition are summarised by Sadler-Smith, (2012, p. 166). Kozhevnikov (2007) in examining how individuals process information identified a 'metastyle' which was concerned with style flexibility, which given its trait and state characteristics means that some learners have much greater capacity for flexibility in learning approaches than others; this has significant implications for learning and teaching. Sadler in breaking down metacognition into basic building blocks highlights the following:

Metacognition — Involves information processing

Requires self-awareness of one's own thinking processes

Understanding of **different types of knowledge:**

Declarative:	About ourselves as learners – what are our preferences?
Procedural:	What strategies to use and how
Conditional:	When or why to use a strategy

Metacognition also involves regulation of cognition:

- Selection of strategies such as deep processing
- Allocation of appropriate cognitive and emotional resources to support learning
- Information management to process information
- Monitoring – assessing one's own strategy use and making modifications where necessary
- Evaluation of performance and one's own approach as a learner.

Learners arrive within learning contexts with established SCHEMA about the right ways to do things; challenging existing schema is uncomfortable and requires confidence in being able to recognise the need to adapt one's approach in a new context. EXPLICIT modelling of alternative approaches is needed if students are to be able to adapt their approach, and FREQUENT opportunities are needed to test understanding. Tests of understanding need to be appropriate to the outcomes desired. For example, requiring students to be able to demonstrate their ability to apply what they have learnt to a new context is indicative of DEEP approaches to learning.

Key concepts: quality of use; conditional use (appropriate use); schema, metacognitive flexibility; interrelated nature of metacognitive, cognition and affective dimensions of SRL

ACTIVITIES

- Identify and signpost the key high level self-regulatory skills within a module to students.
- Review ways in which these skills are introduced, modelled, and developed.
- Work with students to develop high quality exemplars of their application in practice.
- Ensure regular opportunities for students to practice and apply these skills.
- Ensure assessment design rewards students' use of these high level skills.

See: Sadler-Smith, E. (2012). Metacognition and styles, in L-f Zhang, R. J. Sternberg, & S. Rayner. (2012). Handbook of intellectual styles. *Preferences in cognition, learning and teaching* (pp. 153-172) New York: Springer.

Theme: Direct Instruction of SRL: Focus on Meta/cognitive Skills Acquisition

Bensley, A., & Spero, R. A. (2014). Improving critical thinking skills and metacognitive monitoring through direct instruction. *Thinking Skills and Creativity,* 12, 55-68.

DOI link: https://doi.org/10.1016/j.tsc.2014.02.001

Focus

Tested the effectiveness of a direct infusion, instructional approach on the acquisition of argument analysis, critical reading, and metacognitive monitoring skills.

Premise

- Value of direct infusion in impacting outcomes: Direct infusion involves the explicit instruction of
- Critical Thinking (CT) rules and principles infused into course work, providing practice with exercise and formative assessments with feedback to guide skill acquisition (p. 56).
- Infusion defined as: explicit instruction of CT, delivered in conjunction with the study of relevant subject matter (Bensley et al., 2010)

Theoretical Underpinnings

- Explicit Instruction -general, immersion, infusion, and mixed (Ennis, 1987)
- Critical thinking seen as a multi-dimensional construct (Bensley, 2011) p. 67.

Key contribution

- Tested the effectiveness of direct infusion of CT in a classroom setting to increase ecological validity while controlling potentially confounding variables related to differences in instructional groups. To increase internal validity, other individual difference variables that could have contributed to CT performance, such as CT disposition, academic ability, academic achievement, background knowledge, and assessment motivation were measured.
- The direct infusion approach offers a systematic approach to incorporating the use of rules and principles into instructional and assessment discourse.

Methodology

Experimental Design. Participants were undergraduate psychology students (n= 87) from a US university.

Explicit instruction of Critical Thinking in conjunction with the study of relevant subject matter

- Students were instructed in cycles of practice, feedback, assessment, and more feedback.

Key arguments

- Direct infusion approaches enhance student performance and accuracy.
- Impact of direct infusion on 'far transfer' (i.e., beyond immediate assessment) is debateable.
- The importance of attending to explicit practice, feedback, and motivation.

Key learning points

- The group receiving direct infusion of CT showed significantly greater gains on the post-tests of those skills with large effect sizes (in terms of CT skills and metacognitive monitoring).
- Had value especially for lowest performing students in enhancing metacognitive monitoring.

Conclusions

- Specific instruction with CT rules produced the gains in CT.

Potential for application to other settings

High transferability potential as part of an integrated assessment approach.

Relevant additional reads

- Bensley, D. A. (2011). Rules for reasoning revisited: Toward a scientific conception of critical thinking. In C. P. Horvath, & J. M. Forte (Eds.), *Critical thinking* (pp. 1–36). Hauppauge, NY: Nova Science Publishers.
- Bensley, D. A., Crowe, D. S., Bernhardt, P., Buckner, C., & Allman, A. L. (2010). Teaching and assessing critical thinking skills for argument analysis in psychology. *Teaching of Psych*, 37, 91–96.
- Ennis, R. H. (1987). A taxonomy of critical thinking dispositions and abilities. In J. B. Baron, & R. F. Sternberg (Eds.), *Teaching thinking skills: Theory and practice* (pp. 9–26). New York: Freeman.

Theme: Metacognitive Training

Van Merrienboer, J. J. G., & de Bruin, A, B, H. (2019). Cue-based facilitation of self-regulated learning: A discussion of multidisciplinary innovations and technologies. *Computers in Education*, 100, 384-391.

DOI link: https://doi.org/10.1016/j.chb.2019.07.021

Focus: Cue-utilization (draws on Koriat (1997) and previous work by authors)

- Students need support to identify appropriate cues to support their self-regulated learning.
- Cues can be external (e.g., exams, feedback from others) or internal (cognitive, physiological, affective) and the quality of curriculum design matters
- Type of support required depends on the type of learning and whether it is focused on a specific task, or development of skill set over a broader time span.

Premise:

Learners use whatever cues are available to monitor and control their learning processes.

Theoretical Underpinnings:

Information Processing / Socio-Cognitive

Key contribution

Authors provide a **framework for investigating self-regulated learning**, the findings are useful for considering SRL skills development

Methodology

Conceptual paper reviewing SRL approaches and provision of an **instructional framework** to support students' cue utilisation.

Key arguments

- Self-regulated learning is described as comprising 2 complementary processes: **metacognitive monitoring of the learning process (**metacognitive thoughts learners have about their own learning**)** and **controlling the learning process (**how learners respond to the environment or adapt their behaviour based on their metacognitive thoughts).
- Students' use of cues determines their regulation of learning processes. Students make high use of cues with low diagnosticity.
- Much emphasis is placed on monitoring and reflection whereas more emphasis is needed on goal setting and students' control of the learning process in relation to how they manage the learning environment and make adaptations.
- The effectiveness of cues and prompts depends on the desired type of learning.
- Metacognitive prompts are needed to affect the use of cues but development of these skills requires support.

Key learning points

"good monitoring and/or reflection are a necessary but not a sufficient condition for effective self regulated learning: Monitoring is of no use, and may even be experienced by learners as a pointless exercise, when it does not actually enable them to respond to their environment or adapt their behavior".(p. 390)

- Nature and value of cues needed depends on the type of learning being undertaken
  e.g. if the aim is transfer of learning – being able to perform a task in different ways and/or using different approaches is a good cue for future learning as is being able to self-explain information.
- Training students to utilise cues to support future performance can have negative effects on immediate performance (transfer paradox).

Conclusions

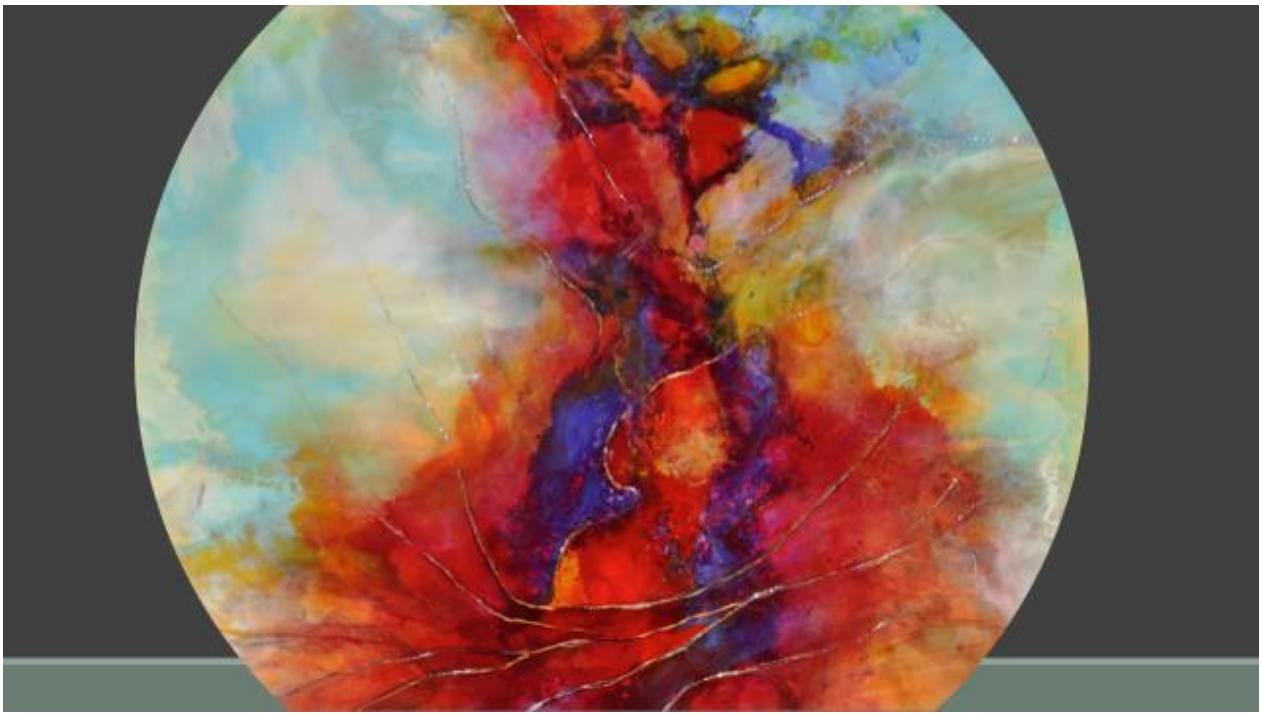
1. The full learning cycle needs to be considered, not just learners' monitoring and reflection.
2. There is a clear need for the provision of metacognitive prompts to learners that stimulate them to use more diagnostic cues and make better control decisions.
3. Facilitation of self-regulated learning might include 'second-order' scaffolding where the number of prompts decreases as learners acquire more self-regulated learning skills
4. Affective states may serve as cues but how they interact with cognitive cues is unknown.

Potential for application to other settings

Valuable in providing examples of metacognitive prompts to support self-regulation at task/topic and instructional sequence levels .The framework provided can easily be adapted to different contexts.

Relevant additional reads

Kirshner, P., & Van Merrienboer, J. J. G. (2018). Chapter 26, Ten steps to complex learning: A new approach to instruction and instructional design in J. J. G Van Merrienboer, P. Kirschner *Ten steps to complex learning, A systematic approach to four-component instructional design*. London: Routledge.



5.5 Emotional Regulation

- The need to create **autonomy supportive environments** is essential in enabling students to regulate effectively. Key factors include student self-efficacy (their belief in their ability to do well), their previous experiences of success, their goals, and feelings of connectivity with others.
- Strategies need to support students in **managing their 'self', 'self in context', and the requirements of the discipline** (See Evans, Waring, & Christodoulou, 2017).
- In addressing different elements of emotional regulation, key areas of activity include:

Vermunt and Verloop affective regulation categories (1999)	**Considerations**
Motivating/expecting	Attending to value (e.g., ensuring assessment is authentic and relevant to students). Supporting autonomy and cooperation (e.g., collaborative planning as well as opportunities for lone working)
Appraising task relevance in relation to goals	Achievement goal structures and achievement expectations (e.g. clarification of goals and negotiation of them).
Concentrating effort	Teaching effective monitoring and control of emotions to support both persistence and flexibility in knowing when to adjust strategies when they are not working effectively.
Dealing with emotions /coping strategies	Supporting students' sense of self (e.g., involving them in decisions about the nature and timing of assessment; ensuring clarity). Addressing students' appraisals and emotions (e.g., focusing on changing emotions – reactions to events and also promoting students' problem-solving skills and agency).
Reaction to feedback	Management of feedback (e.g. ensuring feedback on successes – which are clearly signposted and on areas for development with an emphasis on achievability) Importance of smart failing and learning to fail fast. The right way to fail (Dweck 2006). Failure comes from avoiding errors. Mistake free does not lead to success.
Attributing / judging	Embedding self and peer assessment into curriculum to support accurate evaluation.
Savvy feedback seekers	Supporting students to manage their learning environments effectively through supporting their network development and clarifying the nature of supports available. Relates to the building of self-efficacy – students' beliefs in their ability to do well.
Managing interactions with others	Support development of self-awareness of own learning and the impact of one's beliefs and values on learning. Developing students' relational skills (their ability to connect to others, and their awareness of their impact on others - e.g. ability to

	notice, to listen, to support, to lead, to build their own networks of support).
Noticing	Working with students so that they better recognise cues (internal and external) to support their learning.

Key concepts: autonomy, agency, empowerment, relational and boundary-crossing skills; reflexivity, resilience, flexibility

ACTIVITIES

- The exercise outlined below can be used with students and educators.

How good are your emotional regulation strategies?

Why does this matter?

Our emotions help us to navigate every aspect of our lives, so we need to how and when to trust them. We also need to know when to adapt them: for example, to regulate them down when we are over excited, or to regulate them up when we need to get motivated.

How good are my emotional regulation strategies?
To identify the strategies you most commonly use to manage your emotions, rank the following strategies from 1 to 10. As you rank them, write down some of the situations in which you use them: for example, when you're stressed, when there's a deadline looming, or when you are angry.

Here is the key: 1 = dominant strategy and 10 = least used strategy

Emotional Regulation Strategies

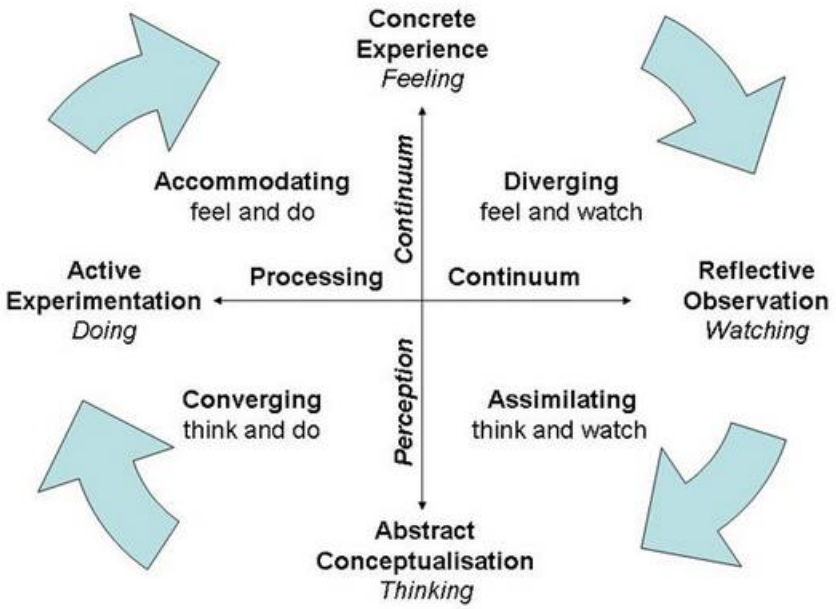
Dimension	Description	Rank	Situation when used
Attention: Vigilance avoidance Repressive coping (need oriented)	I do not focus on the issue I am concerned about. I try to distract myself by thinking about something positive.		
Knowledge: Cognitive dissonance reduction (need oriented)	I tend to reject feedback I do not like. I blame others to deflect the attention from myself and my own limitations.		
Bodily manifestations (need oriented)	I rely on activities that take my mind off the issue e.g., Eating or non-eating / Drinking Smoking/Physical exercise		
Attention: Focused distraction (goal oriented)	I focus on other tasks to keep the mind busy.		
Knowledge: Cognitive reappraisal (goal oriented)	I try to tell myself the feedback was intended for someone else. It is not about me.		
Bodily manifestations (goal oriented)	Inhibiting emotions: I tend to hide my feelings and don't let people know how bad I am feeling. Redirecting strategies I laugh when I am stressed and give out the wrong impression and/or I get quite angry about things – I have to get it off my chest.		
Attention: Counter-regulation (person-oriented)	Flexible action control: I use a range of strategies to make me feel better – I work thorough the issue using meditation, mindfulness – seeing it differently – removing own biases.		
Knowledge: Cognitive integration	Eventually, I am able to put my feelings into perspective.		
Bodily manifestations (person-oriented)	Deep breathing Progressive muscle relaxation		
Other strategies	What else do I do?		

Bennet and Evans (2018). How good are your emotional regulation strategies (developed from Waring & Evans 2015)

What now?

Use Kolb and Fry's (1975) experiential circle to reflect critically on the following questions.

1. Experiencing (when I last experienced or avoided this)
2. Observing and experiencing (what I did and felt in the past)
3. Forming abstract concepts (what this makes me think about now)
4. Testing in or anticipating new situations (what I will try next time)



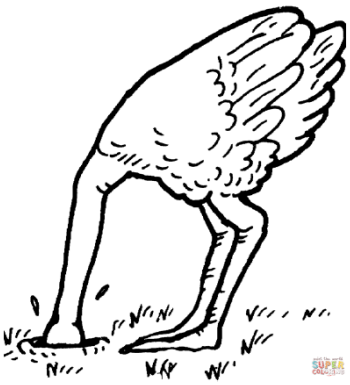
Kolb and Fry's experiential circle (1975), illustrated in Smith (2001, 2010)

- To what extent do you take on board feedback and/or try to do something about it?
- How long does it take you to work through how you feel and to become objective?

What networks of support do you use to support you in understanding what you need to do? Finally, make a commitment to test your new strategies and to reflect on them once you do.

Working with students to address attitudes to feedback

- What do I know I could have done better in retrospect?
- What I am still confused about?
- Who can I ask for clarification?
- What resources can I go to?
- Do I not know enough: do I need to go back and research this?
- I have worked hard on this but have misconceptions. Do I need support?
- I do not know of any other way to do this task. I need to see and be made aware of other approaches. Where can I go for help?
- What is my strategy to address the issues?



Bennett & Evans (2018)

References

Deimann, M., and Bastiaens, T. (2010). The role of volition in distance education: an exploration of its capacities. *International Review of Research in Open and Distance Learning, 11*(1), 1-16.

Fried, L. (2011). Teaching teachers about emotional regulation in the classroom. *Australian Journal of Teacher Education, 36*(3), 117-127.

Gross, J.J. (2001). Emotion regulation in adulthood: Timing is everything. *Current Directions in Psychological Science, 10*, 214-219.Koole, S. (2009). The psychology of emotion regulation: An integrative view. *Cognition and Emotion, 23*, 4-41

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice-Hall.

Koole, S. (2009). The psychology of emotion regulation: An integrative view. *Cognition and Emotion, 23*, 4-41.

Smith, M. K. (2001, 2010). 'David A. Kolb on experiential learning', *the encyclopedia of informal education.* Available from: http://infed.org/mobi/david-a-kolb-on-experiential-learning/.

Theme: Emotional Regulation of Feedback

Evans, C. (2015b). Exploring students' emotions and emotional regulation of feedback in the context of learning to teach. In V. Donche, S. De Maeyer, D. Gijbels, H. van den Bergh (Eds.) *Methodological challenges in research on student learning* (pp. 107- 160). Garant: Antwerpen.

DOI link: Evans, C. (2015b)

Focus

Exploration of students' emotions and emotional regulation strategies

Premise

- The lack of attention given to the role of emotions in assessment feedback.
- Important role of students' emotional regulation of learning in impacting on their successful management of learning transitions.
- Importance of looking at the interaction between metacognition, motivation, and affect.

Theoretical Underpinnings:

Socio-cultural and constructivist theoretical frameworks

Key contribution

- Addresses an under-researched area of students' emotions & their ability to regulate emotions.
- Addresses the absence of studies using a phenomenological methodology.
- Proposes an integrated approach to the study of emotions and emotional regulation.

- **Methodology**

- Phenomenological (UK) longitudinal study of 14 students' experiences in learning to teach.

- **Key arguments**

- The importance of supporting students' development of the metacognitive dimension of awareness and monitoring of motivation and affect.
- Validates Vermunt & Verloop's (1999) affective regulation activities: (i) *motivating/ expecting*; (ii) *concentrating/exerting effort*; (iii) *attributing/judging oneself*; (iv) *appraising task relevance*, and (v) *dealing with emotions*

- **Key learning points**

- Identified four meta-themes involved in the students' emotional regulation of feedback (*future goals perspective, sense of self, rationalising*, and *internalising*) and factors impacting their use of different strategies.
- Importance of students' 'sense of fit' with their environments and how this mattered more to some types of learner compared to others.

Conclusions

- Students used emotional regulation strategies in both similar and qualitatively different ways.
- Suggests pedagogical implications of the findings in supporting student agency.
- Importance of training in the use of volitional strategies (Jakhelln, 2011)

Potential for application to other settings

Widely applicable to other contexts

Relevant additional reads

Evans, C., Waring, M., & Christodoulou, A. (2017). Building teachers' research literacy: integrating practice and research, *Research Papers in Education*, 32:4, 403-423.doi: 10.1080/02671522.2017.1322357

Koole, S. L. (2009.) The psychology of emotion regulation: An integrative review, Cognition & Emotion, 23:1, 4-41.doi: 10.1080/02699930802619031

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review, 18*, 315–341.

Schutz, P. A., Y. Hong J. Y., Cross, D. I., & Osbon, J. N. (2006). Reflections on investigating emotion in educational activity settings. *Educational Psychology Review, 18*, 343–360.

Vermunt, J., & Verloop, N. (1999). Congruence and friction between learning and teaching. *Learning and Instruction, 9*, 257–280.

Theme: Framing Feedback around GOALS to Managing Motivations/Emotions

Farrell, L., Bourgeois-Law, G., Ajjawi, R., & Regehr, G. (2017). An autoethnographic exploration of the use of goal oriented feedback to enhance brief clinical teaching encounters. *Adv in Health Sci Educ,* 22, 91–104.

DOI 10.1007/s10459-016-9686-5

Focus

Goal oriented feedback and co-construction

Premise

- Importance of engaging learners in feedback based on well defined, negotiated goals.
- Need for congruence between learner and teacher goals.

Theoretical Underpinnings

Socio/cognitive-constructivist

Key contribution

Reinforces focus on goals as key within SRL. Important point of conflict mentioned p.100 "Learner-centred can easily be conflated with learner directed, which will be problematic when a feedback conversation must be guided toward gaps in performance perceived by the preceptor, but not identified by the learner. However, when framed as a negotiation or co-construction, goal-oriented feedback provides a tool that allows the preceptor to bring forward an important goal that was not being met".

Methodology

Autoethnography (n = 23) Medical – Canada

Narrative and thematic analyses of feedback interactions

Key arguments

Relationships between teacher and learner important in generating dialogic feedback.

Key learning points

- Goal discussions were most effective when initiated early and integrated throughout the learning experience.
- Feedback needs to include a continual reassessment of goals, whether these are preceptor or learner goals.

Conclusions

- Need to reconceptualize feedback from information telling at the end of a performance to an ongoing dialogue between learner and teacher.
- Interaction should ideally end not just with an action plan for achieving the identified goal, but also a discussion of how the goal might have evolved through the discussion or what the next goal should be.

Potential for application to other settings

Wide relevance across contexts

Relevant additional reads

Nicol, D., & MacFarlane-Dick, D. (2006). Formative assessment and self-regulated learning: A model and seven principles of good feedback practice. *Studies in Higher Education,* 31(2), 199–218.

5.6 Integrated Approaches to Self-Regulated Learning

Integrated approaches to SRL within assessment as demonstrated in the EAT Framework encompass:

- Aligning theories, ideas, and concepts from across disciplines and contexts to support informed curriculum design within specific contexts.
- Good understanding of the **disciplinary demands and attributes of the learners**.
- Ensuring **constructive alignment** between program learning outcomes, assessment criteria, and assessment tasks (Biggs, 1987). In the case of SRL – do the assessment tasks test the high level SRL skills the programme wants students to develop?
- **Coordination of activities** to support attainment of a specific goal.
- Ensuring the **progressive development of understanding** throughout a module and programme so that students have regular opportunities to test their understanding in an environment where each task supports understanding for the next one.
- **Ongoing evaluation of data** to support learning, working with students to explore the impact of approaches to learning on outcomes.
- Bringing all **activities together (convergence) to support key outcomes**. For example if the aim is to improve student use of feedback then efforts need to be placed throughout the EAT cycle to ensure students have a good understanding of what they need to do in the first place, are aware of the different sources of support available including their own resources, that feedback from lecturers is placed where it can have maximum benefit, that feedback is simplified to ensure key messages can get through, that students have regular opportunities to test their understanding and to be able to judge the quality of work for themselves so they are less dependent on external feedback to support their learning.
- Dynamism – **ongoing evaluation with students** allows adjustments to be made to enhance learning. It is about being able to use rich evidence to support educator and student understandings (Fielding & Regehr, 2017).
- Institutional alignment in ensuring that systems, processes and policies support student engagement within the curriculum (Evans & Benuscu, 2020).

Concepts: alignment; process-oriented; data-informed; embedded

ACTIVITIES

- Identify the pivotal activities that are required to support students' understanding of a particular concept/skill/idea. How can these be put together to best support students' learning?
- Map assessment questions to the core concepts of the module.
- Review how you are using data individually and as a team with students to review progress.
- What are the most efficient strategies to get students up to speed with the requirements of the key tasks?

The need to balance volume of activity is important in not overloading students. Can you identify the most efficient approaches to support student learning – QUALITY OF EXPERIENCE VS VOLUME/ EMERSION.

Theme: Importance of a Cognitive Roadmap

Lin, J.-W., Lai, Y.-C., Szu, Y.-C., Lai, C.-N., Chuang, Y.-S., & Chen, Y.-H. (2014). Development and evaluation of across-unit diagnostic feedback mechanism for online learning. *Educational Technology & Society*, *17* (3), 138–153.

Link

http://www.jstor.org/stable/jeductechsoci.17.3.138.

Focus:

Using across-unit diagnostic feedback to help students understand concepts that they were weaker on and what needed addressing first.

Premise

- Solving well-structured problems requires using considerable related concepts which are usually scattered and introduced throughout different learning units of a subject.
- Poor learning of related concepts of preceding units may block the learning of subsequent units.
- An explicit representation of the structure of conceptual knowledge is constructed by capturing ke knowledge concepts and their relationships in a visual format.

Theoretical Underpinnings

Draws on Ausubel's (1968) assimilation theory, highlighting the importance of the role of prerequisite knowledge for learning new concepts.

Key contribution

Highlights importance of understanding the conceptual knowledge structure for a subject.

Methodology

Experiment : quasi-experimental design (n = 159) (Taiwan HEI)

- Diagnostic feedback on students' understanding of key concepts was provided through the use of a series of online assessments that detected students' weak concepts within and across assessments and provided support materials.
- Maps assessment questions to concepts

Key arguments

Importance of conceptual understanding of a domain: A **visual knowledge structure is a cognitive roadmap** that facilitates the knowledge construction and high-level thinking of online learners (Wang al., 2011).

Key learning points

To build the online system – teachers need to map the course content and sequential relationships between concepts within and across modules.

Conclusions

- Providing the cognitive roadmap leads to enhanced student learning outcomes.
- Potential to further explore SRL on behaviours and outcomes.

Potential for application to other settings

Designed for maths/computer science

Relevant additional reads

Ausubel, D. (1968). *Educational psychology: A cognitive view.* New York, NY: Holt, Rinehart, and Winston.

Theme: Assessing Mis/Understanding

Parker, J.M., Anderson, C.W., Heidemann, M., Merrill, J., Merritt, B., Richmond, G., &Urban-Lurain, M. (2012). Exploring undergraduates' understanding of photosynthesis using diagnostic question clusters. *CBE-Life Sciences Education*, 11(1), 47-57.

DOI link:

Focus

- Importance of diagnostic assessment that identifies patterns across students' responses to questions, revealing root problems that can inform teaching.
- Uses principled reasoning which involves using a coordinated set of practices related to the scientific principles.

Premise

Importance of organising teaching around core concepts

Theoretical Underpinnings

- Information Processing
- Principled Reasoning - reasoning guided by basic *scientific principles* and habits of mind or *practices* that facilitate students' learning and understanding

Key contribution

Development of an interpretative framework that looks for patterns *across* misconceptions.

Methodology

Mixed methodology to explore students' understanding of core concepts - Biology Students (US)

Key arguments

Principle 1: People tend to organize their experiences and observations into patterns or mental models" (Redish, 1994, p. 798). "Principle 2: It is reasonably easy to learn something that matches or extends an existing mental model" … "Corollary 2.1*:* It's hard to learn something we don't almost already know"… "new information should always be presented in a context that is familiar to the learner and the context should be established first" (Redish, 1994, p. 801).

People can remember only a limited number of unrelated pieces of information (Miller, 1956)

Key learning points

- Useful for identifying gaps in knowledge and basic understanding of concepts
- Importance of identifying core concepts

Conclusions

The need to make principles and practices explicit during instruction, and orient all instruction around these ideas.

Potential for application to other settings

Specific to biological sciences: developed framework that assesses students' principled reasoning about photosynthesis but principled reasoning can be applied to other subjects/contexts.

Relevant additional reads

- Miller G.A. (1956). The magical number seven, plus or minus two: some limits on our capacity for processing information. *Psychol Rev*, *63*, 81–97.
- Redish E. F. (1994). The implications for cognitive studies for teaching physics. *Am J Phys 62*, 796–803.

Theme: Principles of Good Design: Integrated Approach

Eva, K.W., Bordage, G., Campbell, C., Galbraith, R., Ginsburg, S., Holmboe, E. & Regehr, G. (2016). Towards a program of assessment for health professionals: from training into practice, *Advances in Health Sciences* Education, 21(4), 897-913.

DOI link: DOI 10.1007/s10459-015-9653-6

Focus

Looks at principles of good design: " the creation of a coherent and integrated system of assessment that promotes ongoing learning across the continuum of training and practice requires a process that (a) is made efficient for candidates, ensuring appropriate and comprehensive coverage of many aspects of performance while eliminating unnecessary redundancy; (b) emphasizes the primacy of learning by harnessing the power of feedback …and (c) creates a shared accountability between the learner, educational programs, and regulatory authorities for engaging in continuous performance improvement" (p. 899).

Premise

Explores fitness for purpose of assessment and suggests ways forward.

Theoretical Underpinnings

Draws on Van der Vleuten's (1996) model of utility (reliability, validity, feasibility, acceptability, and educational impact) and Messick's (1989) notion of consequential validity

Key contribution

Generation of key assessment principles

Methodology

Reflection Paper – Health Professional Education (Canada)

Key arguments

Overcoming unintended consequences of competency-based assessment.
Striving to implement quality assurance efforts while promoting performance improvement.
Authentically linking assessment and practice.

Key learning points: In evolving assessment practice the following need consideration:

1. Broadening the base of assessment beyond knowledge tests;
2. Rigorously focusing data collection and decision-making practices in order to draw relevant and meaningful inferences;
3. Adding emphasis on processes and outcomes, including strengthening of the ability of the assessments to predict who will perform well against those outcomes & will further develop in their ability after training;
4. Building a coherent, integrated system of assessment across the continuum of training to practice;
5. Emphasizing the primacy of learning as an integral part of assessment;
6. Harnessing the power of feedback;
7. Shifting accountability towards a model of shared responsibility (individual & educational system).

Conclusions

(1) Increasing opportunities to promote learning rather than simply measuring performance.
(2) Enabling integration across stages of training and practice.
(3) Reinforcing point-in-time assessments with continuous professional development in a way that enhances shared responsibility and accountability between practitioners, educational programs, and testing organizations.

Potential for application to other settings

Developed in Health context but applicable to other settings.

Relevant additional reads

- Messick, S. (1989). Validity. In R. L. Linn (Ed.), *Educational measurement (*3rd ed., pp. 13–104). New York: American Council on Education and Macmillan.
- van der Vleuten, C. P., & Schuwirth, L. W. (2005). Assessing professional competence: From methods to programmes. *Medical Education,* 39(3), 309–317.
- van der Vleuten, C. (1996). The assessment of professional competence: Developments, research and practical implications. *Advances in Health Sciences Education,* 1, 41–67.

Theme: Programmatic Assessment Design

van der Vleuten, C. P. M., Schuwirth, L. W. T., Driessen, E. W., Dijkstra, J., Tigelaar, D., Baartman, L. K. J., & van Tartwijk, J. (2012). A model for programmatic assessment fit for purpose, *Medical Teacher*, 34(3), 205-214.

DOI link: http://dx.doi.org/10.3109/0142159X.2012.652239

Focus:

Proposes a model for programmatic assessment based on a set of assessment principles

Premise:

A key principle is that individual data points are maximised for learning and feedback value, whereas high-stake decisions are based on the aggregation of many data points.

Theoretical Underpinnings:

Principles of instructional design including Assessment for Learning (Harden et al. 1984; van Merrienboer & Kirschner 2007).

Key contribution

- Proposes a systems approach to assessment design underpinned by empirically grounded theory.
- Framework offers concrete recommendations for structuring an assessment programme.
- Important in investigating principles underpinning assessment design and methods to ensure robust decision making. See: **van der Vleuten, C.P.M., Schuwirth, L.W.T., Driessen, E.W., et al. (2014). 12 Tips for programmatic assessment. Early Online, 1-6.**

Methodology

Conceptual piece about translating theory into a workable model of programme assessment.

Key arguments

Programme assessment should be designed around the following principles: to optimise its fitness for purpose:

- Any single assessment data point is flawed – only low-stake decisions should be based on single data points.
- Standardised assessment can have validity 'built-in' the instrument.
- Validity of non-standardised assessment resides in the users and not so much in the instruments.
- The stakes of the assessment should be seen as a continuum with a proportional relationship between increases in stakes and number of data points involved.
- Any assessment should be both formative and summative, only to varying degrees.
- Assessment drives learning.
- Expert judgement is imperative.

Key learning points

- Importance of assessment integrated throughout the curriculum design.
- Importance of scaffolding of self-directed learning through social interaction.
- Ongoing collection of data to support learning.
- Assessment as dynamic.

Conclusions

Highlights the value of the suggested model in designing fit for purpose assessment and also the challenges associated with this.

Potential for application to other settings

Large scale application potential but many challenges to realisation in practice.

Relevant additional reads

- Dijkstra, J., Van der Vleuten, C.P., & Schuwirth, L.W. (2010). A new framework for designing programmes of assessment. *Adv Health Sci Educ Theory Pract,* 15, 379–393.
- Schuwirth, L.W., Van der Vleuten, C.P. (2011). Programmatic assessment: From assessment of learning to assessment for learning. *Med Teach,* 33, 478–485.

5.7 Managing SRL with Large Groups

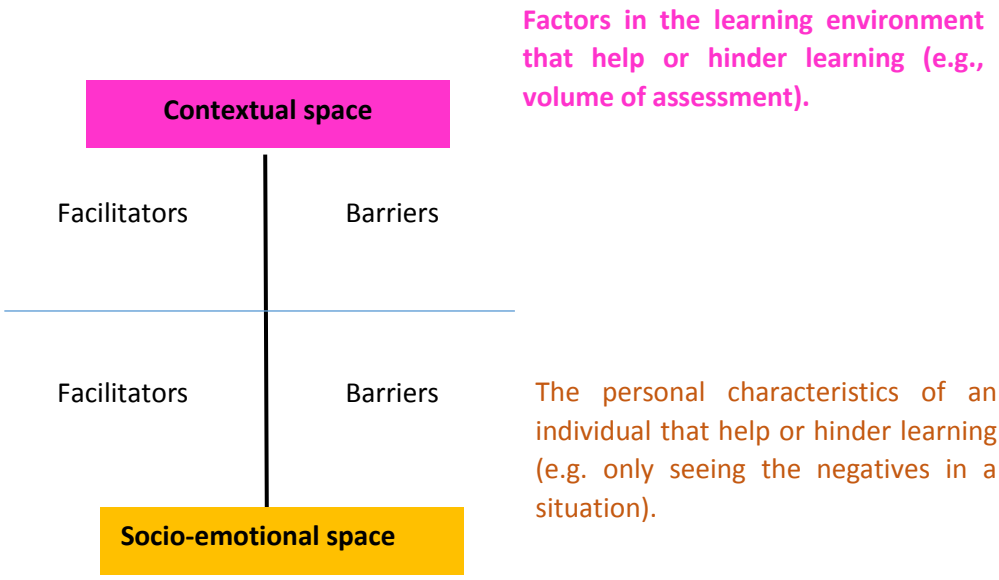
Managing SRL with large groups to support self, co- and shared regulation requires high levels of organisation to embed key principles of good practice already outlined in Section II. Key themes within the literature include:

Personalisation:	How can students best be inducted into groups to support their sense of belonging/connection with the group? Supporting the development of effective networks of support is crucial.
Peer Support:	A range of peer support initiatives can be implemented that draw on the relative strengths of individual group members. A key issue is how students are trained to work effectively with peers. (5.10)
Clear guidance	Guidance needs to be explicit, with use of good quality exemplars and links to core resources. Again, how can the skills-sets of the group best be used to contribute to the resource base?
Consistency	Making boundaries of support explicit and ensuring all students receive the same quality of guidance and support requires shared understandings of quality among all members of the delivery team.
Agency	Ensuring peer activities are authentic is important especially when students are working in groups: How are they using the skills of the group most effectively to get the desired results as part of shared SRL?
Effective use of technology	How can technological assists such as AI personalise online support for students, and how can data be used most effectively to support learning?
Efficient use of assessment	Tracking student responses to questions can identify key concepts that students are struggling with to enable teaching to focus on troublesome areas. Keeping feedback focused is helpful, and maximising the ways that students can support each other, and directing students to high quality resources all enable students to make better use of the learning environment for themselves.
Tracking student's emotions	Integrating time within teaching sessions to identify key areas of concern allows the curriculum to be dynamics and needs addressed.

Key concepts: efficiency, co-ordination, use of data, training, co-partnership in delivery; maximising accessibility of resources.

ACTIVITIES

1. Use the facilitators and barriers exercise in the Appendix I to assess facilitators and barriers to learning from organisational perspectives (contextual space), and from individual perspectives (socio-emotional space). This exercise can be carried out with educators and students to identify the key concerns of students at key points in time.



Developmental Space (Van der Zwet et al., 2011)

2. Map student and educator learning and teaching concerns over a semester – develop a programme of support that is run and managed by students to address key crunch points during the module using a just in time approach.

Theme: Managing Co-creation with Large Cohorts

Broadbent, J., Panadero, E., & Boud, D. (2018). Implementing summative assessment with a formative flavour: a case study in a large class, *Assessment & Evaluation in Higher Education*, 43:2, 307-322.

DOI link: https://doi.org/10.1080/02602938.2017.1343455

Focus:

How formative practices can be implemented as part of summative assessment in very large groups.

Premise

Teaching large classes presents real challenges in design, management and standardisation of assessment practices.

The value of embedding rubrics in classroom activities via modelling and feedback and cost effective use of exemplars and audio feedback to support learning.

Theoretical Underpinnings:

The importance of formative assessment to support learning (Black & Wiliam, 1998).

Key contribution

Demonstrates how formative and summative assessment can be transferred to a large class context.
Demonstrates practical application of key concepts underpinning effective assessment design

Methodology

Case study – psychology (Australia) involving the use of exemplars, rubrics and audio feedback.

Key arguments

For summative assessment to benefit learners, it should contain formative assessment elements.

Key learning points

Describes a highly interconnected model of formative and summative assessment including online low stakes assessment linked to a summative examination; interlinked journal assessments supported by in-class testing and ongoing reflective exercises; student set goals linked to authentic assessment; with assessments requiring evidence of transfer of knowledge. Progressive development of skills was facilitated through targeting similar skills throughout each of the assessments.

Explicit description of support mechanisms:

- an authentic online exemplar was created based on an authentic example, which included a detailed application of the rubric.
- Developmental – The exemplar unfolded over the same time period as the students' own assignment.
- Creating and sharing an online exemplar and rubric discussion – ensured the same message reached every student in the same way.
- Structured audio feedback (5 mins average) and graded rubric were time/process efficient.
- Ongoing moderation of feedback ensured consistency and quality during the process.

Conclusions

Formative and summative assessment aligned & combined result in more powerful learning environments. Students can have a sense that what is actually being promoted is their learning rather than simply recording their performance (e.g. grade).The most important feature of this set of practices is not the use of any particular strategy, but the ways they have been put together.

Potential for application to other settings: Wide application

Key consideration is the relative complexity and number of assessment points needed to be effective and not overloading. Critical to this model are the inbuilt moderation processes.

Relevant additional reads

Dawson, P. (2017). Assessment Rubrics: Towards Clearer and More Replicable Design, Research and Practice. *Assessment & Evaluation in Higher Education* 42 (3): 347–360.

Theme: Promoting Experiential Learning in Large Classes

Dean, K.L., & Wright, S., 2017. Embedding engaged learning in high enrolment lecture-based classes. Higher Education, 74(4), pp.651-668.

DOI link: DOI 10.1007/s10734-016-0070-4

Focus

Explores practical challenges of integrating experiential learning approaches in large classes, and discusses the contextual changes that matter in modifying a learning environment

Premise

Importance of active and experiential learning opportunities

Theoretical Underpinnings:

Experiential learning theoretical framework

Key contribution

Integrative model to support development of effective assessment and feedback

Methodology

Conceptual: Experiential learning framework

Key arguments

Importance of clarifying the roadmap signalling activities, relationship to each other and roles – walking students through the process.

Key learning points

- Need to consider variable impacts of the learning environment; not all students benefit in same ways - acknowledges importance of individual learning differences.
- Signposts relational elements:
  "Feeling at home," for example, predicted students' study efforts in a large class setting more than it did in smaller classes, leading to more academic success; "feeling at home" itself is a complicated, student-determined experience (2015), p.666

Conclusions

Need to consider nature of engagement depending on type of learning being promoted.

Potential for application to other settings

Widespread relevance

Relevant additional reads

- Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educ Psychol,* 41(2), 75–86.
- Schmidt, H. G., Loyens, S. M. M., van Gog, T., & Paas, F. (2007). Problem-based learning is compatible with human cognitive architecture: commentary on Kirschner, Sweller, and Clark (2006). *Educ Psychol,* 42(2), 91–97.
- Severiens, S., Meeuwisse, M., & Born, M. (2015). Student experience and academic success: comparing a student-centred and lecture-based course programme. *High Educ,* 70(1), 1–17.

5.8 Making Feedback Discourses Accessible

Feedback is viewed as central to the enhancement of the learning process (Hawe & Dixon, 2017), and the development of self-regulated learning (Fyfe & Rittle-Johnson, 2016). Hattie and Timperley (2007) discussed the power of feedback to impact learning when it is focused on supporting students in how to improve their work.

DeNisi and Kluger (2000) highlighted the negative impact of feedback when it did not have potential to impact outcomes (i.e. looking back rather than supporting moving forward). Sadler (2010, 2017) has bemoaned the amount of time spent contemplating feedback when efforts should be placed on supporting students to immerse themselves in situations where they are able to calibrate quality for themselves through carefully guided exercises such as marking and moderation of work.

Evans (2016, 2020a,b) in agreement with Sadler (2010) highlights the importance of broader interpretations of feedback to include students' self-feedback and feedback seeking and using skills. She argues that given the vast number of variables impacting student receipt and use of feedback, assuming feedback is 'good' in the first place, efforts should be placed on designing integrated learning experiences which give students progressive opportunities to experience what quality looks like and how to achieve it. Key messages from the literature regarding self-regulation of feedback include:

Feedback as a learning process with the learner as central to it

- *''feedback must be conceptualised as a **supported sequential process**, rather than a series of unrelated events''* (Archer, 2010, p. 106).
- The need to move away from a receipt model of feedback to encourage **student ownership and direction of the feedback** process through ensuring transparency of the assessment process, and student access to requisite information to enable them to make informed decisions (Evans, 2013).
- "Feedback should not be about the delivery or receipt of information at all. Instead, it should be about **identifying appropriate challenges** (i.e., desirable difficulties) that enable individuals to maintain their perspective as competent and conscientious practitioners while also continually evolving their practice" (Eva & Regehr, 2013, p. 464).
- The learner needs to be a **central agent** in the assessment and feedback process, and therefore aware of criteria of success, and their role in developing competency in self-assessment (Boud, 2015).
- Efforts should be on supporting students to **build capacity to seek, interpret and use feedback** rather than focus all efforts on providing expert feedback (Du Toit, 2012; Nicol, 2009).
- More attention needs to be placed on the **mechanisms and procedures** of implementing formative feedback strategies to enhance self-regulation (Bose & Rengel, 2009).
- 'The most direct approach to evaluating and improving the effectiveness of feedback is… for **teachers to audit their students' subsequent work themselves**, and to adjust their feedback in response to the results' (O'Donovan, 2014, p. 1028).

Supporting students to make sense of feedback

Clarity of message

- **Dominant disciplinary discourses need to be made explicit** (Van Heerden et al., 2017) and students need to be encouraged to articulate their tacit knowledge (e.g., existing motives, ideas, opinions, beliefs, and knowledgeable skills) (Clark, 2012).
- Given individual differences in learning, the **feedback message needs to be kept simple and focused on what matters most**.

Facilitating dialogue

- Feedback needs to be **dialogic** to support student self-regulation, efforts should be placed on those interactional features that promote and sustain feedback dialogue (Ajjawi & Boud, 2017; Al' Adawi, 2021; Yang & Carless, 2013; Evans, 2013).
- Feedback should be based on **well-defined, negotiated goals** rather than purely on the quality of the learner's performance given the numerous goals (specified and unspecified) in play and impacting student decisions (Eva & Regehr, 2013).
- People are unlikely to change in response to data-delivery methods that attack their self-perceptions' (Eva & Regehr, 2013, p. 463).
- Efforts should be placed on **checking students' interpretation and use of feedback**: does feedback achieve what we need it to?

Preparing for feedback

- Students need to **prepare for feedback.** Where students have insufficient knowledge, detailed feedback may be inappropriate as students may not be able to process this. Similarly sufficient time is needed for students to process feedback messages prior to discussions about how to move work forwards; this introduces the notion of space to process feedback to maximise effectiveness of feedback encounters with others.

Opportunities to construct own meaning

- Students must have opportunities to **construct their own meaning** from the received message (Clark, 2012; du Toit, 2012; Sadler, 1989).
- If students are to learn from feedback, they must **have opportunities to do something with it** (Nicol, 2010; Carless et al., 2011; Price et al., 2011).
- Students need **multiple opportunities to assess work for themselves** so they can internalise the requirements of assessment (Sadler, 2009b).

ACTIVITIES

1. Review the distribution of assessment tasks on your module to see if feedback is positioned appropriately to enable students to make best use it to inform the quality of their work.
2. How can you streamline feedback to maximise its effectiveness (focusing on the key message?
3. What activities are in place to check students' understanding and use of feedback?
4. What opportunities do students have to mark and moderate work?

Theme: Simplifying Feedback

Butler, Godbole, & Marsh (2013). Explanation Feedback Is Better Than Correct Answer Feedback for Promoting Transfer of Learning. *Journal of Educational Psychology*, 105(2), 290-298.

DOI link: DOI: 10.1037/a0031026

Focus

What information should the feedback message contain to be most effective.

Premise

- Explanation feedback enables learners to better comprehend the concepts, thus facilitating the application of that knowledge to new contexts.
- Importance of focusing on understanding and not just retrieval of information when reviewing the effectiveness of feedback.

Theoretical Underpinnings

- Looks at work of Barnett and Ceci (2002) to explain the process of transfer (recognition, recall, and application).
- Highlights the value of text-processing theories that conceptualize the development of understanding as a process that requires representing a text on multiple levels (Graesser et al., 1997; Kintsch, 1998). It is possible to differentiate between three levels of representation: the surface level—the specific words and syntax used in the text; the textbase—an abstract representation of the ideas and their connections; and the situation model—a personal interpretation of the text that often includes pre-existing knowledge

Key contribution

Enhancing understanding of the role of feedback in promoting transfer of knowledge. Investigated whether feedback that provides an explanation of the correct answer promotes superior transfer of learning when testing for deeper understanding of material (i.e. application rather than replication).

Methodology

Looked at impact of correct answer versus explanation feedback on transfer of learning
Experimental study (n =60, 24) USA

Key arguments

- The situation model is the representational level that reflects deep understanding and supports the transfer of knowledge.
- Macrolevel theories explaining feedback are limited in that they cannot account for what happens at the level of a task in a specific context.

Key learning points

- One method that may help to produce substantial understanding is to give students correct answer feedback and then have them generate their own explanations for why their response is correct or incorrect.
- Giving explanation feedback after a delay can still help to improve transfer.

Conclusions

Correct answer feedback and explanation feedback led to equivalent performance, but explanation feedback produced superior performance when students were asked to demonstrate understanding of learning by applying what they had learnt to a new context.

Potential for application to other settings

Relevant across contexts.

Relevant additional reads

- Barnett, S. M., & Ceci, S. J. (2002). When and where do we apply what we learn? A taxonomy for far transfer. *Psychological Bulletin, 128,* 612–637.
- Graesser, A. C., Chipman, P., Haynes, B. C., & Olney, A. (2005). Auto-Tutor: An intelligent tutoring system with mixed-initiative dialogue. *IEEE Transactions on Education, 48,* 612–618.
- Graesser, A. C., Millis, K. K., & Zwaan, R. A. (1997). Discourse comprehension. *Annual Review of Psychology, 48,* 163–189. doi:10.1146/ annurev.psych.48.1.163.

Theme: Making Feedback Discourses Accessible

Eva, K.W., & Regehr, G. (2013). Effective feedback for maintenance of competence: from data delivery to trusting dialogues. *CAMJ,* 185 (6), 463-464.
DOI link: DOI: https://doi.org/10.1503/cmaj.121772

Focus: Summary of the impact of Feedback on self-regulation in Medicine

Emphasizes the importance of effective feedback on developing self-regulatory strategies.

Premise:

Effective dialogic feedback is the key to developing self-regulation in medical professionals.
Mistake to treat feedback as a rational process.

Theoretical Underpinnings:

Cognitive constructivist; socio-cultural
Focus on cognitive dissonance –the discomfort created by trying to maintain 2 conflicting beliefs at the same time.

Key contribution

The authors provide a challenge to the prevalence of data-driven metrics to identify professional competencies and development needs. They argue that a dialogic approach providing effective and challenging feedback has more potential impact.
The authors argue that coaching, and the provision of effective guidance and goal-setting is required to develop self-regulatory capacity.

Methodology

A commentary, based on a literature review.
Provides critique of professional norms, using reference to various theoretical frameworks.

Key arguments

- Effective self-regulation in physicians is essential to maintaining the ongoing self-determination of the medical profession.
- Previous self-reflection has been based highly on data and metrics, but this is identified as being limiting, due to the varied capabilities of individuals to use these data effectively.
- Research into cognitive dissonance suggests that individuals are unlikely to change their behaviours based on data, but instead are more prone to challenge those data instead, to justify maintaining their current activities.
- Proper dialogue encourages individuals to challenge their own behaviours, and to identify remedies and alternative approaches.
- Dialogue should focus on co-negotiation of how practices could develop or evolve, rather than identifying flaws that need to be addressed.
- Setting realistic and achievable goals as an outcome is important.

Key learning points

- Dialogue and peer-led self-evaluation are important tools for the development of effective self-regulation.
- Data-based metrics are problematic bases for reflection and self-regulated improvement.
- Setting realistic and achievable goals after discussion has a high potential positive impact.

Conclusions

Dialogue with a peer has more impact on changing and evolving behaviours and practices than expecting individuals to self-evaluate their practice based on data sources alone.

Potential for application to other settings

This commentary is focused on the professional development of medical practitioners, however the concepts involved resonate strongly with both the development of self-regulatory competencies in students, and reflective approaches used by educators/course teams, faculties

Relevant additional reads

A critique of the effectiveness of self-evaluation:
Davis, D. A, Mazmanian, P. E., Fordis, M. et al. (2006). Accuracy of physician self-assessment compared with observed measures of competence: a systematic review. *JAMA*, 296:1094–102.

Theme: Co-construction of Feedback

Farrell, L., Bourgeois-Law, G., Ajjawi, R., & Regehr, G., 2017. An autoethnographic exploration of the use of goal oriented feedback to enhance brief clinical teaching encounters. *Advances in Health Science Educational Theory and Practice*, 22(1), 91-104.

DOI link: DOI 10.1007/s10459-016-9686-5

Focus:

Explored the use of goal-oriented feedback in brief encounters with learners.

Premise:

- Feedback process is co-constructed through bi-directional loops of feedback dialogue.
- The nature of the relationship between feedback giver and receiver impacts outcomes.
- Draws on previous work: focusing attention away from the quality of the learner's performance per se and toward a set of achievable goals, may allow learners and preceptors to jointly ''grapple with available data while clearly keeping the best interest of the recipient at heart'' (Eva & Regehr, 2013, p. 464).

Theoretical Underpinnings:

Feedback theories focusing on the relational and dialogic aspects of feedback

Key contribution

Explores the nuances in negotiating goals and models an approach that has been used successfully in a medical context.

Methodology

Autoethnography (n= 23) Clinical practitioners, Canada.
Thematic and narrative analyses of data

Key arguments

- Importance of unearthing hidden goals of teacher and student and the need to negotiate goals.
- Most effective when feedback becomes an integral part of the entire teaching episode.
- The need to reposition feedback from telling mode to a negotiated co-constructed approach.

Key learning points

(1) Goal discussions were most effective when initiated early and integrated throughout the learning experience.
(2) Both learner and preceptor goals were multiple and varied, and feedback needed to reflect this complexity.
(3) Negotiation or co-construction of goals was important when considering the focus of feedback discussions in order to create safer, more effective interactions.
(4) Goal oriented interactions offer potential benefits to the learner and preceptor.

Conclusions

Goal oriented feedback promotes dialogue as it requires both [teacher] and learner to acknowledge and negotiate learning goals throughout their interaction. In doing so, feedback becomes an explicit component of the [teacher]–learner relationship. This enhances feedback interactions even in relatively brief encounters, and may begin an early educational alliance that can be elaborated with longer interactions.

Potential for application to other settings

Highly relevant to professional settings. The concept of co-construction of feedback is highly applicable across the HE sector – the issue is how this is framed successfully in contexts where conceptions of learning and teaching are strongly located within a 'telling approach'.

Relevant additional reads

- Boud, D., & Molloy, E. (2013). Rethinking models of feedback for learning: The challenge of design. *Assessment and Evaluation in Higher Education*, 38(6), 698–712.
- Eva, K., & Regehr, G. (2013). Effective feedback for maintenance of competence: From data delivery to trusting dialogues. *Canadian Medical Association Journal,* 185(6), 463–464.

5.9 Self-Assessment Supporting SRL

Individuals who can accurately judge their learning are more effective learners (DiFrancesca et al., 2016).

Self-assessment includes a "wide variety of mechanisms and techniques through which students describe (i.e. assess) and possibly assign merit or worth to (i.e. evaluate) the qualities of their learning processes and products" (Panadero, Brown, & Strijbos, 2016, p.2).

Self-assessment comprises two main components:

- **self-monitoring** (a moment-by-moment awareness of the likelihood that one maintains the skill/knowledge to act in a particular situation)
- **overall self-assessment** which requires a global judgement of one's ability in a particular domain.

The ability of individuals' to be able to accurately assess the quality of their own work has been questioned. In disaggregating self-assessment, Eva and Regehr (2011) argue that **self-monitoring** is generally more reliable in individuals than their **overall self-assessment**.

The importance of being able to **accurately judge the quality of one's own learning** is central to definitions of self-assessment which is seen as a **key component of self-regulation**. **Accuracy in self-assessment** (SA) is key to the internalization of standards so that students can regulate learning more effectively (Evans & Waring, 2020; Panadero & Alonso-Tapia, 2013; Panadero, 2017; Schneider & Preckel, 2017).

Notably, **self-assessment is moderated by the perfection level that a learner wishes to achieve**, which takes us back to goals (Panadero & Alonso-Tapia, 2013).

Perfecting self-assessment requires support (Eva & Regehr, 2011). Self-regulation does not happen alone. Accurately calibrating where one is in relation to attainment of goals, and what needs to done, is central to self-assessment. Being able to critically reflect, and to see things in a different way links to Vygotskian notions of the zone of proximal development. Supporting students in learning to use the environment effectively, and to selectively use resource to support enhanced understandings is vital. **Scaffolding needs to support students to think in different ways.** Emphasis has be on guided mindful activities to avoid the negatives associated with the proliferation of unsupported self-reflection activities that may result in mindless activity given that students will be shackled by existing frames of reference unless there has been sufficient challenge, and exposure to alternative approaches to enable them to question existing strategies (Evans, 2020).

While notoriously difficult to address (Panadaro, Jonsson, & Botella, 2017), there are a number of strategies that have been found to be helpful in developing self-assessment capacity to include:

- **Integrating SA into all stages of learning process** (Boud et al., 2015; Mays & Branch-Mays, 2016).

- **Promoting the development of self-assessment skills from the outset, prior to completion of a task** (e.g., inducting students into the language and meaning of assessment) supports students' ability to monitor their own learning, and to set and retune/refine goals impacting efficacy beliefs and perceptions of control over their learning which feeds perceptions of self-regulatory capacity.
- Students need to be **clear about the criteria** being used to assess their work and have active opportunities to engage in the development of criteria.
- Providing **ongoing opportunities** for them to practice their self-assessment skills using modelling, guided activities, approximations of practice to enable students to calibrate what quality is for themselves. While at the same time noting, the importance of individual, co- and shared regulation processes required to support SA, key considerations include. :
- Reinforcing the **SA experience across the curriculum**, using a similar structure of self-assessment throughout a course to increase the predictive value of self-assessment (Mays & Branch-Mays, 2016).
- **Self-assessment needs to be modelled** in an explicit way to support students in self-evaluating as part of the learning process (Panadero & Alonso-Tapia, 2013).
- **Providing explicit tools to support understanding** e.g. clearly structured rubrics (Panadero & Romero, 2014; Jones & Alcock 2014) - The Law of **"Comparative Judgement"** constant comparison of pairs of scripts-' human beings are more reliable at making relative judgements of one sense impression against another than they are at making objective judgements of individual sense impressions in isolation' approach.
- **Placing students in situations that elicit errors** and exposing them first to ill-structured problems followed by well-structured problems can lead to better learning outcomes in line with theories of desirable difficulties (E. L. Bjork & R. Bjork, 2011; Bjork, 2017), and productive failure (Kapur, 2008), as these approaches may encourage students to spend more time, and at a deeper level trying to solve problems. They also draw on retrieval of information and metamemory, memory of what you know.
- **Need for challenge** - overreliance on well-structured problems causes students to be underexposed of recognising, representing, and justifying problems (Kelly et al., 2016**).**
- **The power of feedback to support self-assessment understanding is important.** Situations need to be created for learners and teachers to experience the limits of their competence in the presence of feedback. Improvement strategies need to be tailored to those experiences rather than on self-assessment alone (Eva & Regeher, 2011). As part of this students need **comprehensive opportunities to mark and give feedback on work of others** (Nicol et al., 2014).

Key Concepts: self-monitoring, self-evaluation, accuracy, internalisation of standards

ACTIVITIES

1. Map student self-assessment opportunities throughout a programme.
2. Engage students in 'approximations of practice' – opportunities to replicate the marking and moderation panels and processes that are used within your institution.

Theme: Embedding Evaluative Judgement Opportunities throughout the Curriculum

Tai, J., Ajjawi, R., Boud, D., Dawson, P., & Panadero, E. (2018). Developing evaluative judgement: enabling students to make decisions about the quality of work. *Higher Education,* 76, 467-481.
DOI link: https://doi.org/10.1007/s10734-017-0220-3

Focus

Explores evaluative judgement and use of the following to support students' development of it: self-assessment, peer assessment, feedback, rubrics, and use of exemplars.

Premise

- Importance of supporting students' development of evaluative judgement (being able to judge the quality of one's own and others' work).
- Importance of engaging with students in their learning.

Theoretical Underpinnings:

- Builds on Sadler's work (1989, 2010, 2013).
- Metacognitive – in understanding quality and being able to use such understandings to accurately monitor and evaluate one's own work.
- Authors use staged theory of expertise of decision-making by Schmidt and Rikers (2007) to explore development of evaluative judgement.

Key contribution

- Makes the argument for evaluative judgement as an integrating and encompassing concept, part of curricular and pedagogical goals, rather than primarily an assessment concern.p.470.
- The authors highlight the lack of work conducted within an explicit evaluative judgement framework.

Methodology

Conceptual piece

Key arguments

- Evaluative judgement is domain specific but can be carried over to other domains.
- Looks at 5 ways in which evaluative judgement can be supported within the curriculum.

- **Key learning points**

- Importance of engaging with students in exploring assessment criteria.
- Need for feedback to be dialogic.
- Co-creation of rubrics and exemplars.

Conclusions

Confirmatory of self-regulation literature of the need to embed opportunities to develop student evaluative judgement throughout the curriculum.

Potential for application to other settings

Relevant across contexts

Relevant additional reads

- Boud, D. (2017). Standards-based assessment for an era of increasing transparency. In D. Carless, S. Bridges, C. Chan, & R. Glofcheski (Eds.), Scaling *up assessment for learning in higher education* (pp. 19–31). Dordrecht: Springer. https://doi.org/10.1007/978-981-10-3045-1_2.
- Panadero, E., Brown, G. T. L., & Strijbos, J.-W. (2016). The future of student self-assessment: a review of known unknowns and potential directions. *Educational Psychology Review*, 28(4), 803–830. https://doi.org/10.1007/s10648-015-9350-2.
- Schmidt, H. G., & Rikers, R.M. J. P. (2007). How expertise develops in medicine: knowledge encapsulation and illness script formation. *Medical Education*, 41(12), 1133–1139. https://doi.org/10.1111/j.1365- 2923.2007.02915.x.

Theme: Supporting self-assessment through embedding opportunities in curriculum design

Erlich, D. R., & Shaughnessy, F. (2014). Student–teacher education programme (STEP) by step: Transforming medical students into competent, confident teachers, *Medical Teacher*, 36:4, 322-332. DOI link: http://dx.doi.org/10.3109/0142159X.2014.887835

Focus

Examined the effects of a novel didactic teaching curriculum for students embedded in a practical teaching experience.

Premise

The power of ongoing training and opportunities to apply learning in authentic settings to promote SRL skills development.

Theoretical Underpinnings:

- Peer teaching has value due to **cognitive congruence** (thinking similarly) and **social congruence** (ability to relate to others).
- Knowledge based objectives informed by Blooms Taxonomy. Used Kirkpatrick's hierarchy of curriculum evaluation (1959).

Key contribution

- Exemplifies a 'student as teacher' programme embedded within the curriculum.
- Demonstrates impact in that a curriculum to develop teaching knowledge, skills and attitudes for student–teachers corresponded with improvements in their teaching confidence, observable teaching behaviours and outcomes of their students.

Methodology

Intervention involving 4th year medical students teaching 1st year students (Medicine) experimental design. (US)

Key arguments

- Importance of authentic design enabling theory and practice to come together.
- Importance of teaching-to-teach programmes in facilitating learning.

- **Key learning points**

- The value of interleaving sessions devoted to didactic educational principles—such as small group facilitation theory and techniques—into a practical teaching experience with actual students in a real course.
- Direct faculty guidance in developing knowledge, skills, and attitudes of teaching.

Conclusions

Reinforcing educational theory with practical teaching experience under direct faculty supervision promotes teaching competency for graduating medical students.

Potential for application to other settings

Can be applied to professional practice widely across disciplines

Relevant additional reads

Kirkpatrick, D.L., (1959). Techniques for evaluating training programs. *J Am Soc Training Directors (Training and Development Journal*), 13(11):3–9.

Smith, M.K., Wood, W.B., Adams, W.K., Wieman, C., Knight, J.K., Guild, N., & Su, T.T. (2009). Why peer discussion improves student performance on in-class concept questions. *Science 323*(5910):122–124.

5.10 Peer-Assessment Supporting SRL

Peer assessment is linked with enhanced learning outcomes given the power of peer assessment to support an individual's understanding of assessment for themselves through assessing others (Schneider & Preckel, 2017). In line with this perspective, Li et al. (2012) found that the quality of students' work was related to the quality of feedback they gave to others and not the quality of feedback they received. What was important was the **ability of students' to critically evaluate the feedback they received** and be able to utilise constructive feedback while also being able to ignore misleading information.

Peer assessment has been found to enhance assessment skills when designed carefully and this includes ensuring **sufficient training is provided in it** (Khan et al., 2017). The power of peer assessment lies in how it is configured to include, the extent to which it is developmental, trains students in the giving and receiving of feedback, is integrated into the curriculum as part of a continuing process, enables students to have autonomy over the process, measures process and outcomes, and engages students in authentic assessment (Evans, 2015a). This developmental nature of peer assessment can be referred to as peer engagement (CowaIreme, 2005).

While the relationship between self-regulated learning and peer assessment is complex. Guidelines for supporting peer engagement are summarised in Figure 5.2 and also confirmed in Panadero, Jonsson and Strijbos' (2016) utilisation of Topping's (2003) work in describing a formative version of peer assessment (PA):

1. Clarifying the purpose of PA, its rationale and expectations to the students
2. Involving students in developing and clarifying assessment criteria
3. Matching participants (e.g., individuals, groups) in a way that fosters productive PA
4. Determining the PA format (e.g., rating with or without comments) and mode of PA interaction (e.g., face-to-face or online)
5. Providing quality PA training, examples and practice (including feedback about PA)
6. *Providing rubrics, scripts, checklists, or other tangible scaffolding for PA
7. Specifying PA activities and timescale
8. Monitoring the PA process and coaching students.

*Engaging students in the development of rubrics and addressing student perceptions of peer assessment (e.g., the 'uncomfortableness' often associated with peer learning activities) (Evans, 2015a) are also important.

Peer engagement activates self-regulation, co-regulation and shared regulation possibilities. In self-regulating individuals how they seek and make use of feedback is important. In co-regulation, support may be gained from more knowledgeable others, and in genuine shared regulation opportunities, learners develop the skillsets to regulate as a team with shared goals so that they 'pivot together'.

Co-construction of understanding through the use of tools such as co-created rubrics and ongoing developmental opportunities to build shared understandings of quality are known to be

helpful. Fraile et al. (2017) found that students engaged in co-creating rubrics did better than those who had a rubric imposed on them, arguing that the former approach was more conductive to activating appropriate learning strategies.

Jones et al.'s (2017) work demonstrates the power of a structured and developmental approach to using rubrics on student performance. They describe implementation of 4 interrelated activities: (1) deconstruction of the rubric and standardising the marking method; (2) providing examples and exemplars; (3) peer review; (4) self-review; and (5) use of a reflective diary. Similarly, Gikandi and Morrow (2016) discuss the positive benefits of engaging students in open discussion around on-going work and the importance of clear guidance and focused opportunities to facilitate such sharing.

Key Concepts: peer engagement (formative) vs peer assessment (summative), trust, training, maintaining quality, authentic use of peer assessment

Activities

Review Figure 5.2 (Effective Peer Feedback Designs) in relation to preparing students to engage in peer feedback activities.

1. Map with students where peer activities are within the module and how each activity builds on the next to support learning.
2. How are students supported to reflect on the quality of the feedback they give?
3. How are students encouraged to critique the feedback that they receive?

Figure 5.2 Effective Peer Feedback Designs

Importance of pre-programme preparation and induction

1. Induction needs to acknowledge individual differences.
2 Time is needed to explore student and educator beliefs and perceptions of the value of peer feedback to fully exploit peer feedback opportunities.
3. Awareness is needed of students' previous experiences of peer feedback.

Attention to assessment including feedback design

4. The theoretical framework underpinning the peer feedback design needs to be shared with students.
5. Peer feedback needs to be perceived as an integral and iterative element of the curriculum.
6. Clear direction needs to be given in relation to peer feedback requirements.
7. The rationale underpinning why peer feedback is being used needs to be transparent.
8. Examples of good practice need to be shared with students in a timely fashion. Students need training in the elements of effective feedback practice in the context of the requirements of the specific assessment.
9. Students need to be given opportunities to develop and critically reflect on their giving and receiving of feedback.
10. Peer feedback opportunities need to be authentic.
11. The timing of assessment needs to enable peer feedback opportunities.

Clarity regarding roles

17. The nature of choice, affordances and limitations of peer feedback requires discussion (degree of student involvement in assessment design; degree of assessment choice; ways of working with peers etc.).
18. The roles and responsibilities of students within the feedback process need to be negotiated and be explicit.
19. Exploration of, and clear direction to, support networks need consideration.
20. The relevance of peer feedback to feed-up/ professional practice needs to be clear.

Source: Evans, C. (2015a).Students' perspectives on the role of peer feedback in supporting learning. *Journal of Cognitive Education and Psychology*, 14(1), 110-125.

Theme: Peer Assessment to Support Students' Internalisation of Standards

Jones, I., & Alcock, L. (2014) Peer assessment without assessment criteria, *Studies in Higher Education,* 39:10, 1774-1787.

DOI link: http://dx.doi.org/10.1080/03075079.2013.821974

Focus

Looked at effectiveness of students judging pairs of scripts against one another in the absence of assessment criteria.

Premise

- Comparative judgement (CJ) is an effective technique to promote higher-order learning.
- CJ enabled peers to perform well as assessors and this was due to the absence of criteria.

Theoretical Underpinnings:

"The Law of Comparative Judgement" (Thurston–, 1927) - human beings are more reliable at making relative judgements of one sense impression against another than they are at making objective judgements of individual sense impressions in isolation

Key contribution

- Assessment in the absence of criteria can be a useful approach.
- CJ useful for difficult-to-specify constructs such as conceptual understanding of advanced mathematical ideas.

- **Methodology**

- Experiment involving students doing a test, and then assessing their peers' responses using pairwise comparative judgement via online browser (n = 194) (UK) (Maths)

- **Key arguments**

- CJ enabled students to reflect on their own conceptual knowledge and mathematical communication

- **Key learning points**

- CJ has potential but variations in student ability to conduct this accurately is an issue.

- **Conclusions**

- Students were able to assess their peers' conceptual understanding of advanced mathematics reliably and validly in the absence of assessment criteria.
- CJ useful for difficult-to-specify constructs such as conceptual understanding of advanced mathematical ideas.

- **Potential for application to other settings**

- Other argue benefits of (i) marking without criteria and then with criteria; (ii) need for explicit criteria to assist marking accuracy. There are a range of approaches – CJ has a place amongst these approaches.

- **Relevant additional reads**

- Orsmond, P., Merry, S., & Reiling, K. (1996). The importance of marking criteria in the use of peer assessment. *Assessment and Evaluation in Higher Education* 21: 239–50.
- Orsmond, P., Merry, S., & Reiling, K. (2000). The use of student derived marking criteria in pee rand self-assessment. *Assessment and Evaluation in Higher Education* 25: 23–38.
- Thurstone, L.L. (1927). A law of comparative judgment. *Psychological Review* 34, 273–286.

Theme: The Relative Value of Peer and Self-Assessment in Supporting SRL

González De Sande, J.C., & Godino-Llorente, J.I. (2014).Peer assessment and Self-assessment: Effective Learning Tools in Higher Education, *International Journal of Engineering Education, 30(3)*, 711–721.

Focus

Comparison of instructor formative assessment and feedback, self-assessment (SA), and peer-assessment (PA) using formative assessment approach.

Premise

- That SA and PA are not used as effectively as they could be in HE.
- Benefits of SA and PA in promoting SRL.

Theoretical Underpinnings:

Assessment for learning work on PA and SA from cognitive perspective

Key contribution

- Provides a model for engaging with SA and PA.
- Contributes to the literature base around value of SA and PA in supporting learning.

Methodology

Quasi experimental – Engineering (Spain)

Key arguments

- PA and SA promoted student engagement and contributed to retention.
- Students' relatively negative perceptions of PA compared to SA at odds with the power of PA in helping them to assess the quality of their own work.
- Also indicates student reliance on instructor feedback.
- **Key learning points**
- Students who participated in PA performed better than those who participated in SA.
- The comparison of the problem solving abilities of the same students after receiving only the instructor assessment supported the idea that SA and PA were more effective than the instructor formative assessment.
- Students had a better understanding of the course contents when they participated in PA than when they performed SA of their own assignments.
- Students *believed* that SA and instructor feedback was more helpful than PA.

Conclusions

PA is a more effective learning tool than SA, and both are more effective than instructor formative assessment.

Potential for application to other settings

Wide applicability

Relevant additional reads

Tai, J., Canny, B. J., Haines, T. P., & Molloy, E. K. (2016). The role of peer-assisted learning in building evaluative judgement: opportunities in clinical medical education. *Advances in Health Sciences Education*, 21(3), 659. https://doi.org/10.1007/s10459-015-9659-0.

Theme: Using Peer Support to Support One's Own Understanding

Nicol, D., Thomson, A., & Breslin, C. (2014). Rethinking feedback practices in higher education: a peer review perspective. *Assessment & Evaluation in Higher Education*, 39(1), 102-122.
DOI link: http://dx.doi.org/10.1080/02602938.2013.795518

Focus:

The value of peer review in supporting the development of one's own work.

Premise:

- Need to move beyond a view of feedback as transmission and acknowledge the active role that students must play in such pr–cesses. - Peer review seen as a reciprocal process.
- Importance of looking at the process of peer review to see how it engages cognitive processes, & supports learners to engage with and take ownership of evaluation criteria, to make informed judgements about the quality of the work of others, and to use this to improve one's own work.

Theoretical Underpinnings:

Socio-constructivist

Key contribution

- Provides a perspective on effective feedback practice, one which moves thinking away from a sole concern with how students learn from constructing meaning from received feedback, to a concern with how they can learn through becoming better feedback producers.

Methodology

Implementation–project - Engineering (Scotland) (n=82) – engaging students in PA and SA.

Key arguments

- Need to better understand how students calibrate judgements about their own / others' work.
- How peer review shifts control of feedback processes into students' hands, and reduces their need for external feedback
- Producing reviews engages students in multiple and overlapping acts of evaluation or critical judgement, both about the work produced by others and, about their own work.

Key learning points

(i) reviewing involved a **comparative process** wherein students evaluated peers' assignments against an internal representation of their own work; this comparison triggered a reflective process, where students used the feedback they generated for others to update their thinking about their own assignment.

(ii) reviewing involved students in comparing one peer's work against another and using the feedback generated from one to comment on the other. This process also generated internal feedback that students use to inform their own work.

(iii) all students evaluated the work of peers against the review criteria – the questions provided by the teacher – in order to produce a written feedback response. Students reported that, even in constructing this written response, they were conscious of concurrently making background comparisons of others' work with their own work.

Conclusions

Peer review activities need to be given a more prominent role.
Feedback production needs to be recognised as just as valuable for learning as feedback receipt

Potential for application to other settings

Wide applicability

Relevant additional reads

- Carless, D., M. Salter, M. Yang, & J. Lam. (2011). Developing sustainable feedback practices. *Studies in Higher Education,* 36(4), 395–407.
- Price, M., & B. O'Donovan. (2006). Improving Student Performance through Enhanced Student Understanding of Criteria and Feedback. In *Innovative assessment in higher education*, edited by C. Bryan & K. Clegg (pp.100–109). London: Routledge.

Theme: Self (SA) and Peer Assessment (PA) within Self-regulated Learning

Panadero, E., Jonsson, A., & Strijbos, J-W. (2016). Chapter 18 Scaffolding self-regulated learning through self-assessment and peer assessment: guidelines for classroom implementation. Assessment for Learning: Meeting the Challenge of Implementation, pp. 311-326.

DOI link: doi: 10.1007/978-3-319-39211-0_18

Focus

Explores the relationship between self-assessment and peer assessment, and SRL.

Premise

- Lack of research on how AfL affects the different components of the SRL processes.
- When given the choice, teachers may choose *not* to involve students in the assessment process.

Theoretical Underpinnings:

Analyses the relationship between SA and SRL theory (Zimmerman & Moylan, 2009) and between PA and co-regulation or socially shared regulation of learning (Hadwin et al., 2011; McCaslin, 2009).

Key contribution

Provides guidelines on the implementation of peer and self-assessment in the classroom.

Methodology

Conceptual

Key arguments

- SRL research is based on an 'internal perspective' of SA and focuses primarily on the 'inner processes' and on self-regulation as a generic skill.
- AfL research considers SA often as a context-dependent skill that is not easily transferable across different situations or subjects.
- Relatively little evidence on the relationship between PA and SRL.
- Key issue is teachers' engagement in teaching students SRL.

Key learning points

- Difficult to identify which specific SA intervention are the most effective in enhancing SRL skills.
- Teachers should make the criteria by which students assess their work explicit, teach the students how to apply the criteria, give students feedback on their SA, help students in using SA information to improve their performance, and provide sufficient time for revision after SA.
- Important to clarify the rationale for PA in advance, involve students in determining the criteria, clearly specify the PA format and how students are supposed to interact, and provide them with sufficient training and scaffolds to conduct the PA activities. Scaffolding is important in situations where students' domain-specific knowledge and skills are limited.

Conclusions

- Training in SA may enhance the use of SRL skills.
- Key issue is supporting teachers in their implementation of SA and PA, as part of an AfL approach.

Potential for application to other settings: Wide application

Relevant additional reads

- Andrade, H., & Valtcheva, A. (2009). Promoting learning and achievement through self-assessment. *Theory Into Practice, 48*(1), 12–19. https://doi.org/10.1080/00405840802577544
- Hadwin, A. F., Järvelä, S., & Miller, M. (2011). Self-regulated, co-regulated, and socially shared regulation of learning. In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 65–84). New York: Routledge.
- Topping, K. J. (2003). Self and peer assessment in school and university: Reliability, validity and utility. In M. Segers, F. Dochy & E. Cascallar (Eds.), *Optimising new modes of assessment: In search of qualities and standards* (Vol. 1, pp. 55–87): Springer Netherlands.
- Zimmerman, B. J., & Moylan, A. R. (2009). Self-regulation: Where metacognition and motivation intersect. In D. J. Hacker, J. Dunlosky & A. C. Graesser (Eds.), *Handbook of metacognition in education* (pp. 299–315). New York: Routledge.

Core Read

Evans, C. (2020). Enhancing assessment feedback in higher education: The EAT Framework Extended Version, Brisbane: Griffith University.

Evans, C. (2021). Erasmus EAT Version, Cardiff, Cardiff University, UK.

References

Al'Adawi, Sharifa Said Ali (2020). How can a research-informed approach to the integration of self-regulated learning strategies support sustainable assessment practices at a college of education, Oman? *Doctoral Thesis.*

ALLED (2016). Aligning education with labour market needs. Student's enrolment in HEIs in Kosovo *Brief mapping of the higher education provision and policy recommendations.*

Ajjawi, R. & Boud, D. (2017). Researching feedback dialogue: an interactional analysis approach, *Assessment & Evaluation in Higher Education*, 42(2), 252-265, 10.1080/02602938.2015.1102863

Alonso-Tapia, J., & Fernandez, B. (2008). Development and initial validation of the classroom motivational climate questionnaire (CMCQ), *Psicothema,* 20, 883–889.

Andrade, H. (2010). "Students as the definitive source of formative assessment: academic self-assessment and the self-regulation of learning," in H. J. Andrade and G. J. Cizek (eds.), *Handbook of Formative Assessment* (pp. 90–105), New York, NY: Routledge.

Andrade, H., & Valtcheva, A. (2009). Promoting learning and achievement through self-assessment. *Theory Into Practice, 48*(1), 12–19. https://doi.org/10.1080/00405840802577544

Archer, J. C. (2010). State of the science in health professional education: Effective feedback. *Medical Education, 44*, 101-108. https://doi.org/10.1111/j.1365-2923.2009.03546.x

Ariel, R., Dunlosky, J., & Bailey, H. (2009). Agenda-based regulation of study-time allocation: When agendas override item-based monitoring. *Journal of Experimental Psychology: General, 138*(3), 432- 447. https://doi.org/10.1037/a0015928

Artino JR., A. R., Holmboe, E. S., & Durning, S. J. (2012). Control-value theory: Using achievement emotions to improve understanding of motivation, learning, and performance in medical education: AMEE Guide No. 64, *Medical Teacher*, 34(3), e148-e160. doi: 10.3109/0142159X.2012.651515

ATN. (2019). ATN Joint statement on authentic assessment https://www.atn.edu.au/news-and-events/latest-news/atn-joint-statement-on-authentic-assessment/

Ausubel, D. (1968). *Educational psychology: A cognitive view.* New York, NY: Holt, Rinehart, and Winston.

Balloo, K., Evans, C., Hughes, A., Zhu, X., & Winstone, N. (2018). Explicit assessment criteria as the antithesis of 'spoon-feeding': How transparency in the assessment process can support students' self-regulatory development. *Frontiers in Education*, 3, DOI=10.3389/feduc.2018.00069

Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Clinical and Social Psychology,* 4, 359-373.

Bandura, A. (2008). Toward an agentic theory of the self. In H. W. Marsh, R. G. Craven, & D. M. McInerney (eds.), *Self-processes, learning, and enabling human potential: Dynamic new approaches* (15–49), Charlotte, NV: Information Age Publishing.

Bandura, A., Reese, L., & Adams, N. E. (1982). Microanalysis of action and fear arousal as a function of differential levels of perceived self-efficacy. *Journal of Personality and Social Psychology,* 43, 5–21.

Barnard-Brak, L., Lan, W. Y., & Paton, V. O. (2010). Profiles in self-regulated learning in the online learning environment. *International Review of Research in Open and Distance Learning,* 11(1). doi: 10.19173/irrodl.v11i1.769.

Barnard, L., Lan, W. Y., To, Y. M., Paton, V. O., & Lai, S.-L. (2009). Measuring self-regulation in online and blended learning environments, *The Internet and Higher Education,* 12(1), 1-6.

Barnett, S. M., & Ceci, S. J. (2002). When and where do we apply what we learn? A taxonomy for far transfer. *Psychological Bulletin, 128,* 612–637.

Bembenutty H., White, M. C., & Vélez, M. R. (2015). Self-regulated learning and development in teacher preparation training, In Bembenutty H., White M., & Vélez, M. (eds.) *Developing self-regulation of learning and teaching skills among teacher candidates* (9-28). SpringerBriefs in Education: doi.org/10.1007/978-94-017-9950-8_2

Bennet and Evans (2018). How good are your emotional regulation strategies? Developing employability starter kit. https://student.developingemployability.edu.au/student_resources/how-good-are-your-emotional-regulation-strategies/

Bensley, D. A. (2011). Rules for reasoning revisited: Toward a scientific conception of critical thinking. In C. P. Horvath, & J. M. Forte (Eds.), *Critical thinking* (pp. 1–36). Hauppauge, NY: Nova Science Publishers.

Bensley, D. A., Crowe, D. S., Bernhardt, P., Buckner, C., & Allman, A. L. (2010). Teaching and assessing critical thinking skills for argument analysis in psychology. *Teaching of Psychology*, 37, 91–96.

Bensley, A., & Spero, R. A. (2014). Improving critical thinking skills and metacognitive monitoring through direct instruction. *Thinking Skills and Creativity,* 12, 55-68. https://doi.org/10.1016/j.tsc.2014.02.001

Biggs, J. B. (1987). Student approaches to learning and studying. Hawthorn, Victoria: Australian Council for Educational Research.

Bjork, E. L., & Bjork, R. A. (2011). Making things hard on yourself, but in a good way: Creating desirable difficulties to enhance learning. In M. A. Gernsbacher, R. W. Pew, L. M. Hough, J. R. Pomerantz (Eds.) & FABBS Foundation, *Psychology and the real world: Essays illustrating fundamental contributions to society* (pp. 56–64). Duffield, UK: Worth Publishers.

Bjork, R. A. (2017). Creating desirable difficulties to enhance learning. In I. Wallace & L. Kirkman (eds.), *Best of the Best: Progress* (pp. 81-85). Bethel, CT: Crown House Publishing.

Black, P., & Wiliam, D. (1998). Assessment and classroom learning, assessment in education: principles, policy & practice, 5(1), 7-74. doi: 10.1080/0969595980050102

Blasco, M. (2015). Making the tacit explicit: rethinking culturally inclusive pedagogy in international student academic adaptation. *Pedagogy, Culture & Society, 23*(1), 85–106. http://dx.doi.org/10.1080/14681366.2014.922120

Bliuc, A.-M., Ellis, R. A., Goodyear, P., & Hendres, D. M. (2011). Understanding student learning in context: Relationships between university students' social identity, approaches to learning, and academic performance. *European Journal of Psychology of Education,* 26, 417–433. https://doi.org/10.1007/s10212-011-0065-6

Boekaerts, M. (1992a). The adaptable learning process: initiating and maintaining behavioural change. *Applied Psychology*, 41, 377-397. https://doi.org/10.1111/j.1464-0597.1992.tb00713.x

Boekaerts, M. (1994). Confidence and doubt in relation to mathematics. *Sci. Paedagog.*,31, 287–304.

Boekaerts, M. (1995). The interface between intelligence and personality as determinants of classroom learning. In: D.H. Saklofske, M. Zeidner (Eds.), *Handbook of personality and intelligence* (pp.161-183), New York, NY: Plenum

Boekaerts, M. (1996a). "Coping with stress in childhood and adolescence," in M. Zeidner and N. S. Endler (eds.), *Handbook of Coping: Theories, Research, Application* (452–484), New York, NY: Wiley.

Boekaerts, M. (1996b). Self-regulated learning at the junction of cognition and motivation, E*uropean Psycholo*gist, 2, 100–112. doi: 10.1027/1016-9040.1.2.100

Boekaerts, M. (1997). Self-regulated learning: a new concept embraced by researchers, policy makers, educators, teachers, and students, *Learning and and Instruction*, 7, 161–186. doi: 10.1016/S0959-4752(96)00015-1

Boekaerts, M. (1999). Motivated learning: studying student situation transactional units. *European Journal of Psychology Educaiton*, 14, 41–55. doi: 10.1007/bf03173110

Boekaerts, M. (2002). "The on-line motivation questionnaire: a self-report instrument to assess students' context sensitivity," in P. R. Pintrich and M. L. Maehr (eds.), *Advances in Motivation and*

Achievement: New *directions in measures and methods*, Vol. 12 (pp. 77–120), New York, NY: JAI/Elsevier Science.
Boekaerts, M. (2006). Self-Regulation and Effort Investment. In K. A. Renninger, I. E. Sigel, W. Damon, & R. M. Lerner (Eds.), Handbook of child psychology: Child psychology in practice (pp. 345–377). John Wiley & Sons Inc
Boekaerts, M., & Corno, L. (2005). Self-regulation in the classroom: a perspective on assessment and intervention. *Applied Psychology,* 54, 199 –231. doi: 10.1111/j. 1464-0597.2005.00205.x
Boekaerts, M., & Musso. M., C. (2012). Self-*regulated learning and the understanding of complex outcomes*. Hindawi Publishing Corporation: Education Research International.
Boekaerts, M., & Niemivirta, M. (2000). Self-regulated learning: Finding a balance between learning goals and ego-protective goals, In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 417–450). Academic Press. https://doi.org/10.1016/B978-012109890-2/50042-1
Borkowski, J. G., Chan, L. K. S., & Muthukrishna, N. (2000). A process-oriented model of metacognition: links between motivation and executive functioning, in G. Schraw and J. Impara, Is*sues in the measurement of metacognition* (eds.), Lincoln, NE: University of Nebraska–Lincoln.
Bose, J., & Rengel, Z. (2009). A model formative assessment strategy to promote student-centered self-regulated learning in higher education*. US-China Education Review*, 6(12), 29-35.
Boud, D. (2015). Feedback: ensuring that it leads to enhanced learning. Clinical Teacher, 12(1), 3-7.
Boud, D. (2017). Standards-based assessment for an era of increasing transparency. In D. Carless, S.
Boud, D., Lawson, R., & Thompson, D.G. (2013). Does student engagement in self-assessment calibrate their judgement over time? *Assessment and Evaluation in Higher Education, 38*(8), 941-956. https://doi.org/10.1080/02602938.2013.769198
Boud, D., Keogh, R., Walker, D. (2015). Promoting reflection in learning: A model. In: D. Boud, R. Keogh, & D. Walker (eds.): *Reflection: Turning experience into learning*. London, Routledge Falmer.
Boud, D., & Molloy, E. (2013). Rethinking models of feedback for learning: The challenge of design. *Assessment & Evaluation in Higher Education*, 38(6), 698-712. https://doi.org/10.1080/02602938.2013.769198
Briggs, A. R. J., Clark, J., & Hall, I. (2012). Building bridges: understanding student transition to University. *Quality in Higher Education,* 18(1), 3-21.
Broadbent, J., Panadero, E., & Boud, D. (2018). Implementing summative assessment with a formative flavour: a case study in a large class, *Assessment & Evaluation in Higher Education*, 43(2), 307-322. doi: 10.1080/02602938.2017.1343455
Brown, G. (2011). Self-regulation of assessment beliefs and attitudes: A review of the Students' Conceptions of Assessment inventory. *Educational Psychology*, 31, 731-748.
Burnette, J., O'Boyle, E., Epps, E., Pollack, J., & Finkel, E. (2013). Mind-sets matter: a meta-analytic review of implicit theories and self-regulation. *Psychological Bulletin, 139*(3), 655-701.
Butler, A. C., Godbole, N., & Marsh, E. J. (2013). Explanation feedback is better than correct answer feedback for promoting transfer of learning. *Journal of Educational Psychology, 105*(2), 290–298. https://doi.org/10.1037/a0031026
Butler, D. L., & Winne, P. H. (1995). Feedback and self-regulated learning: a theoretical synthesis. *Review of Educational Research*, 65(3), 245-281.
Cano, F. (2006). An in-depth analysis of the learning and study strategies inventory (LASSI). *Educational and Psychological Measurement,* 66(6), 1023-1038.
Carless, D. (2013). Sustainable feedback and the development of student self-evaluative capacities. In S. Merry, S., M. Price, D. Carless, & M. Taras, M. (eds.) *Reconceptualising feedback in higher education: Developing dialogue with students*, (pp.113-122), London, UK: Routledge.
Carless, D., M. Salter, M. Yang, & J. Lam. (2011). Developing sustainable feedback practices. *Studies in Higher Education,* 36(4), 395–407.
Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior.* Cambridge, UK: Cambridge University Press. https://doi.org/10.1017/CBO9781139174794

CAST. (2018). Universal Design for Learning guidelines version 2.2. Retrieved from http://udlguidelines.cast.org

Cetin, B. (2017). The Influence of Pintrich's Self-regulated Learning Model on Elementary Teacher Candidates in a Life Science Course. Journal of Education and Training Studies, 5(8), 30-36.

Chandler, P., & Sweller, J. (1991). Cognitive load theory and the format of instruction. *Cognition and Instruction*, 8, 293–332.

Clark, I. (2012). Formative assessment: Assessment is for self-regulated learning. *Educational Psychology Review,* 24(2), 205-249.

Cleary, T. J., Zimmerman, B. J., & Keating, T. (2006). Training physical education students to self-regulate during basketball free-throw practice. *Research Quarterly for Exercise and Sport*, 77, 251–262.

Covington, M. (2009). Self-worth theory: Retrospection and prospects. *Handbook of motivation at school*. 141-169.

Cowacrème, & Creme, P. (2005). Peer assessment or peer engagement? students as readers of their own work. *Latiss: Learning and Teaching in The Social Sciences, 2*, 99-119.

Credé, M., & Phillips, L. A. (2011). A meta-analytic review of the Motivated Strategies for Learning Questionnaire. *Learning and Individual Differences,* 21(4), 337-346.

Csikszentmihalyi, M. (2008). *Flow: the psychology of optimal experience* (1st ed.). New York, NY: HarperCollins.

Daily, J. A., & Landis, B. J. (2014). The journey to becoming an adult learner: from dependent to self-directed learning. *Journal of the American College of Cardiology,* 64(19), 2066-2068.

Dargusch, J., Harris, L.R., Reid-Searl, K., & Taylor, B.A. (2017). Creating first-year assessment support: lecturer perspectives and student access. *Distance Education, 38*(1), 106-122.

Davis, D. A, Mazmanian, P. E., Fordis, M., et al. (2006). Accuracy of physician self-assessment compared with observed measures of competence: a systematic review. *JAMA*, 296, 1094–102.

Dawson, P. (2017). Assessment Rubrics: Towards Clearer and More Replicable Design, Research and Practice. *Assessment & Evaluation in Higher Education,* 42(3), 347–360.

Dean, K.L., & Wright, S., (2017). Embedding engaged learning in high enrollment lecture-based classes. Higher Education, 74(4), 651-668.

Deci, E., & Ryan, R. (1994). Promoting Self-determined Education. *Scandinavian Journal of Educational Research*, 38, 3-14.

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology/Psychologie canadienne, 49*(3), 182–185. doi:10.1037/a0012801

Deci, E. L., & Ryan, R. M. (2012). Self-determination theory. In P. A. M. Van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology* (pp. 416–436). Thousand Oaks, California: Sage Publications Ltd. https://doi.org/10.4135/9781446249215.n21

Deimann, M., & Bastiaens, T. (2010). The role of volition in distance education: an exploration of its capacities. *International Review of Research in Open and Distance Learning, 11*(1), 1-16.

DeNisi, A.S. and Kluger, A.N. (2000), Feedback Effectiveness: Can 360-Degree Appraisals Be Improved? *The Academy of Management Executive (1993-2005)*, 14(1), 129-139.

Dent, A.L., Koenka, A.C. (2016). The relation between self-regulated learning and academic achievement across childhood and adolescence: A meta-analysis. *Educ Psychol Rev* , 28, 425–474.

DiBenedetto, M. K., & Zimmerman, B. J. (2013). Construct and predictive validity of microanalytic measur's of students' self-regulation of science learning. *Learning and Individual Differences,* 26, 30-41.

DiFrancesca, D., Nietfeld, J. L., & Cao, L. (2016). A comparison of high and low achieving students on self-regulated learning variables. *Learning and Individual Differences,* 45, 228–236. https://doi.org/10.1016/j.lindif.2015.11.010

Dijkstra, J., Van der Vleuten, C.P., & Schuwirth, L.W. (2010). A new framework for designing programmes of assessment. *Advances in Health Science Education Theory and Practice,* 15, 379–393.

Dinsmore, D. (2017). Examining the ontological and epistemic assumptions of research on metacognition, self-regulation and self-regulated learning. *Educational Psychology, 37*(9), 1125-1153. https://doi.org/10.1080/01443410.2017.1333575

Donovan, P. (2014) Closing the feedback loop: physics undergraduates' use of feedback comments on laboratory coursework, *Assessment & Evaluation in Higher Education*, 39(8), 1017-1029. DOI: 10.1080/02602938.2014.881979

Dörrenbächer, L., & Perels, F. (2016). Self-regulated learning profiles in college students: Their relationship to achievement, personality, and the effectiveness of an intervention to foster self-regulated learning. *Learning and Individual Differences,* 51, 229–241. doi: 10.1016/j.lindif.2016.09.015

Douglas, K., Barnett, T., Poletti, A., et al. (2016). Building reading resilience: re-thinking reading for the literary studies classroom. *Higher Education Research & Development*, 35(2), 254-266.

Dresel, M., Schmitz, B., Schober, B., Spiel, C., Ziegler, A., Engelschalk, T., Jöstl, G., Klug, J., Roth, A., Wimmer , B., & Steuer, G. (2015). Competencies for successful self-regulated learning in higher education: structural model and indications drawn from expert interviews, *Studies in Higher Education*, 40(3), 454-470. doi: 10.1080/03075079.2015.1004236

Dunlosky. J., Rawson, K. A., Marsh, E. J., Mitchell J. Nathan, M. J., & Willingham, D.T. (2013) Improving students' learning with effective learning techniques: promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest*, 14(1), 4– 58.

Du Toit, E. (2012). Constructive feedback as a learning tool to enhance students' self-regulation and performance in higher education. *Perspectives in Education*, 30(2), 32-40.

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist,* 41, 1040–1048.

Dweck, C. S. (2006). *Mindset: The new psychology of success.* New York, NY: Random House.

Efklides, A. (2002). Feelings and judgments as subjective evaluations of cognitive processing: How reliable are they? *Psychology,* 9, 163–184.

Efklides, A. (2006). Metacognition and affect: What can metacognitive experiences tell us about the learning process? *Education Research Review.*1, 3–14. doi: 10.1016/j.edurev. 2005.11.001

Efklides, A. (2011). Interactions of metacognition with motivation and affect in self-regulated learning: The MASRL Model, *Educational Psychologist*, 46(1), 6-25. doi: 10.1080/00461520.2011.538645

Ennis, R. H. (1987). A taxonomy of critical thinking dispositions and abilities. In J. B. Baron, & R. F. Sternberg (Eds.), *Teaching thinking skills: Theory and practice* (pp. 9–26). New York: Freeman.

Ericsson, K. A. (2006). Protocol analysis and expert thought: Concurrent verbalizations of thinking 'uring experts' performance on representative tasks. In K.A Ericsson, N. Charness, P.J Fektivich and R. Hoffman, (eds.) *Handbook of expertise and expert performance* (pp. 223–241). New York: Cambridge University Press.

Erlich, D.R., & Shaughnessy, A.F. (2014). Student–teacher education programme (STEP) by step: transforming medical students into competent, confident teachers. *Medical Teacher*, 36(4), 322-332.

Eva, K. W., & Regehr, G. (2011). Exploring the divergence between self-assessment and self-monitoring. *Advances in Health Science Education*, 16, 311–329. doi: 10.1007/s10459-010-9263-2.

Eva, K. W., & Regehr, G. (2013). Effective feedback for maintenance of competence: from data deliveryto trusting dialogues. *CMAJ*, 185(6), 463-464.

Eva, K.W., Bordage, G., Campbell, C., Galbraith, R., Ginsburg, S., Holmboe, E., & Regehr, G. (2016). Towards a program of assessment for health professionals: from training into practice, *Advances in Health Sciences Education,* 21(4), 897-913.

Evans, C. (2013). Making sense of assessment feedback in higher education. *Review of Educational Research,* 83(1), 70–120.

Evans, C. (2014). Exploring the use of a deep approach to learning with students in the process of learning to teach in D. Gijbels, V. Donche, J. T. E Richardson, and J. Vermunt. *Learning patterns in higher education. Dimensions and research perspectives* (pp. 187- 213).EARLI Book Series. London and New York: Routledge.

Evans, C. (2015a). Students' perspectives on the role of peer feedback in supporting learning. *Journal of Cognitive Education and Psychology*, 14(1), 110-125.

Evans, C. (2015b). Exploring students' emotions and emotional regulation of feedback in the context of learning to teach. In V. Donche, S. De Maeyer, D. Gijbels, H. van den Bergh (Eds.) *Methodological challenges in research on student learning* (pp. 107- 160). Garant: Antwerpen

Evans, C. (2016). *Enhancing assessment feedback practice in higher education: The EAT framework*. Southampton, UK: University of Southampton. Available at: https://eatframework.org.uk/

Evans, C. (2020a). EAT. Enhancing assessment feedback practice in higher education: The EAT Framework. Griffith University, Australia. *EXLNT* https://app.secure.griffith.edu.au/exlnt/entry/9549/view

Evans, C. (2020b). EAT. Enhancing assessment feedback practice in higher education (Abridged version): The EAT Framework. Griffith University, Australia.

Evans, C. (2021). The EAT Framework. ERASMUS Version. Cardiff, University of Cardiff.

Evans, C., & Bunescu, L. (2020). (Eds.). (2020, March). Student assessment: Thematic peer group report (Learning and Teaching Paper No. 10). European University Association. *EUA.*https://eua.eu/downloads/publications/eua%20report%20student%20assessment_web.pdf

Evans, C., Muijs, D., & Tomlinson, D. (2015). *Engaged student learning: high impact strategies to enhance student achievement.* Higher Education Academy. https://www.advance-he.ac.uk/knowledge-hub/engaged-student-learning-high-impact-strategies-enhance-student-achievement

Evans, C., & Waring M. (2020). Enhancing students' assessment feedback skills within higher education. In *Oxford Research Encyclopedia of Education*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190264093.013.932

Evans, C., Waring, M., & Christodoulou, A. (2017). Building teachers' research literacy: integrating practice and research, *Research Papers in Education*, 32(4), 403-42. doi: 10.1080/02671522.2017.1322357

Evans, C., Zhu, X., Chiorean, C., Chipulu, C., Fair, N., Ford, N., Gobbi, M., Grange, L., Harding, I., Harris, L., Lock, J., Lotti, E., Mashanovich, G., erisic, V., Pettit, S., Spencer, V., Telford, M., and Thorpe, K. (2018). Supporting student agency and success in higher education and beyond through the development of assessment feedback skills (the ability to self-monitor and self-evaluate). Experimental Innovations. Final Report. Office for Students, UK.

Evans, C., Zhu, X., Winstone, N., Balloo, K., Hughes, A., & Bright, C. (2019). Maximising student success through the development of self-regulation. Addressing Barriers to Student Success, Final Report No. L16). Office for Students.

Farley-Ripple, E., May, H., Karpyn, A., Tilley, K., & McDonugh, K. (2018). Rethinking connections between research and practice in education: a conceptual framework. *Educational Researcher, 47*(4), 235-245. https://doi.org/10.3102/0013189X18761042

Farrell, L., Bourgeois-Law, G., Ajjawi, R., & Regehr, G. (2017). An autoethnographic exploration of the use of goal oriented feedback to enhance brief clinical teaching encounters. *Adv Health Sci Educ Theory Pract.,* 22(1), 91-104. doi: 10.1007/s10459-016-9686-5.

Fielding, D. & Regehr, G. (2017) A Call for an Integrated Program of Assessment. *American Journal of Pharmaceutical Education,* 81(4), Article 77.

Fisher, R., Cavanagh, J., & Bowles, A. (2011). Assisting transition to university: using assessment as a formative learning tool. *Assessment & Evaluation in Higher Education,* 36(2), 225-237.

Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), *The nature of intelligence* (pp. 231-235). Hillsdale, NJ: Lawrence Erlbaum.

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American Psychologist, 34*(10), 906–911. https://doi.org/10.1037/0003-066X.34.10.906

Fontana, R. P., Milligan, C., Littlejohn, A., & Margaryan, A. (2015). Measuring self-regulated learning in the workplace, *International Journal of Training and Development,* 19(1), 32-52.

Fraile, J., Panadero, E., & Pardo, R. (2017). Co-creating rubrics: The effects on self-regulated learning, self-efficacy and performance of establishing assessment criteria with students. *Studies in Educational Evaluation*, 53, 69-76.

Fried, L. (2011). Teaching teachers about emotional regulation in the classroom. *Australian Journal of Teacher Education, 36*(3), 117-127.

Friedlander, M. J., Andrews, L., Armstrong, E. G., Aschenbrenner, C., Kass, J. S., Ogden, P., et al.(2011). What can medical education learn from the neurobiology of learning? *Academic Medicine: Journal of the Association of Medical Colleges*, 86(4), 415–420.

Fyfe, E. R., & Rittle-Johnson, B. (2016). Feedback both helps and hinders learning: The causal role of prior knowledge. *Journal of Educational Psychology, 108*(1), 82-97. https://doi.org/10.1037/edu0000053

García-Jiménez, E. (2015). La evaluación del aprendizaje: de la retroalimentación a la autorregulación. El papel de las tecnologías. *RELIEVE, 21* (2), art. M2. doiI: http://dx.doi.org/10.7203/relieve.21.2.7546

Gębka, B. (2014) Psychological determinants of university students' academic performance: An empirical study, *Journal of Further and Higher Education,* 38(6), 813-837. doi: 10.1080/0309877X.2013.765945

Gikandi, J. W., & Morrow, D. (2016). Designing and implementing peer informative feedback with online learning environments, *Technology, Pedagogy and Education*, 25(2), 153-170.

González De Sande, J. C., & Godino-Llorente, J.I. (2014). Peer assessment and self-assessment: effective learning tools in higher education. *International Journal of Engineering*, 30, 711-721.

Graesser, A. C., Chipman, P., Haynes, B. C., & Olney, A. (2005). Auto-Tutor: An intelligent tutoring system with mixed-initiative dialogue. *IEEE Transactions on Education, 48,* 612–618.

Graesser, A. C., Millis, K. K., & Zwaan, R. A. (1997). Discourse comprehension. *Annual Review of Psychology, 48,* 163–189. https://doi.org/10.1146/annurev.psych.48.1.163

Greene, A., & Azevedo, R. (2007). A theoretical review of Wi'ne and Hadwin's model of self-regulated learning: new perspectives and directions, *Review of Educational Research*, 77(3), 334-372.

Gross, J.J. (2001). Emotion regulation in adulthood: Timing is everything. *Current Directions in Psychological Science, 10*, 214-219.

Koole, S. (2009). The psychology of emotion regulation: An integrative view. *Cognition and Emotion, 23*, 4-41.

Guzmán-Simón, F., & García-Jiménez, E. (2015). La evaluación de la alfabetización académica. *RELIEVE, 21*(1), art. ME2. doi: 10.7203/relieve.21.1.5147

Hadwin, A. F., Järvelä, S., & Miller, M. (2011). Self-regulated, co-regulated, and socially shared regulation of learning," in B. J. Zimmerman and D. H. Schunk (eds.)*, Handbook of self-regulation of learning and performance*, (pp. 65–84) New York, NY: Routledge.

Hadwin, A., Järvelä, S., & Miller, M. (2017). Self-regulation, co-regulation, and shared regulation in collaborative learning environments. In D. H. Schunk & J. A. Greene (Eds.), *Handbook of self-regulation of learning and performance* (pp. 83–106), Routledge/Taylor & Francis Group.

Hadwin, A. F., & Winne, P. H. (2012). Promoting learning skills in undergraduate students. In J. R. Kirby & M. J. Lawson (Eds.), *Enhancing the quality of learning: Dispositions, instruction, and learning processes* (pp. 201–227), Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9781139048224.013

Harden RM, Sowden S, Dunn WR. 1984. Educational strategies in curriculum development: The SPICES model. *Medical Teacher*, 18, 284–289.

Hardin, C. J. (2008). Adult students in higher education: A portrait of transitions. *New Directions for Higher Education*, 144, 49-57.

Harwood, C.G. & Thrower, S.N. (2020) Chapter 9 - Motivational climate in youth sport groups, In Eds: M.W. Bruner, M.A. Eys, L.J. Martin, The Power of Groups in Youth Sport (145 – 163), Cambridge, MA., Academic Press.

Hattie, J., Biggs, J., & Purdie, N. (1996). Effects of learning skills interventions on student learning: a meta-analysis. *Review of Educational Research*, 66(2), 99-13.
Hattie, J., and Timperley, H. (2007). The power of feedback. *Reviews in Educational Research*. 77, 81–112. doi: 10.3102/003465430298487
Hawe, E., & Dixon, H. (2017). Assessment for learning: a catalyst for student self-regulation. *Assessment & Evaluation in Higher Education,* 42(8), 1181-1192.
Hodkinson, P., Biesta, G., & James, D. (2007). "Learning Cultures and a Cultural Theory of Learning." In Improving Learning Cultures in Further Education, edited by D. James and G. Biesta, 21–38. Oxon: Routledge.
Hong, E., & O'Neil, J. H. F. (2001). Construct validation of a trait self-regulation model. *International Journal of Psychology,* 36, 186–194.
Ifenthaler, D. (2017). Are higher education institutions prepared for learning analytics? *Tech Trends, 61*, 366-371.
Ikeda, K., Jiang, J., Kakinuma, K., & Tanaka, A. (2021). Achievement goals affect memory encoding. *Contemporary Educational Psychology*, 65, 101945. doi.org/10.1016/j.cedpsych.2021.101945
Isohätälä, J., Järvenoja, H., & Järvelä, S. (2017). Socially shared regulation of learning and participation in social interaction in collaborative learning. *International Journal of Educational Research*, 81:11-24
James, D. (2014). Investigating the curriculum and knowledge in higher education: the value of a lea'ning cultures' approach. *Higher Education,* 67(2), 155-169. https://www.jstor.org/stable/43648644
James, D., & Biesta, G. (2007). Improving learning cultures in further education. London: Routledge.
Jansen, R. S., van Leeuwen, A., Janssen, J., Jak, S., & Kester, L. (2019). Self-regulated learning partially mediates the effect of self-regulated learning interventions on achievement in higher education: A meta-analysis. *Educational Research Review*, 28, 1-20.
Järvelä, S., & Hadwin, A. F. (2013). New frontiers: regulating learning in CSCL. *Educational Psychologist,* 48, 25–39. doi: 10.1080/00461520.2012.748006
Jones, I., & Alcock, A. (2014). Peer assessment without assessment criteria. Studies in Higher Education, 39(10), 1774-1787. doi: 10.1080/03075079.2013.821974
Jones, L., Allen, B., Dunn, P. & Brooker, L. (2017). Demystifying the rubric: a five-step pedagogy to improve student understanding and utilisation of marking criteria. *Higher Education Research & Development*, 36(1), 129-142.
Kapur, M. (2008) Productive Failure. *Cognition and Instruction*, 26(3), 379-424. doi: 10.1080/07370000802212669
Kelly, R., McLoughlin, E., & Finlayson, O. E. (2016). Analysing student written solutions to investigate if problem- solving processes are evident throughout. *International Journal of Science Education*, 38(11), 1766-1784.
Khan, R., Payne, M.W., & Chahine, S. (2017). Peer assessment in the objective structured clinical examination: a scoping review. *Medical Teacher,* 39(7), 745-756. https://doi.org/10.1080/0142159X.2017.1309375
Khan-Galaria, M. (2017) Self-regulated learning and its implications for edtech design and implementation. European EdTech Network. Available at: https://eetn.eu/dam/jcr:701ae035-bb0a-4d25-ba0c-c030d5c5842b/EETN_Case_study_Self-Regulated_Learning.pdf (accessed 29/11/21)
Prusty, G.B., Ford, R.A.J., Marcus, N., & Russell, C. (2013). Can more become less? Effects of an intensive assessment environment on students' learning performance. *European Journal of Engineering Education*, 38(6), 631-65., DOI:10.1080/03043797.2013.834295
Kim, A. S. N., & Shakory, S. (2017). Early, but not intermediate, evaluative feedback predicts cumulative exam scores in large lecture-style post-secondary education classrooms. *Scholarship of Teaching and Learning in Psychology, 3*(2), 141–150. https://doi.org/10.1037/stl0000086
Kintsch, W. (1998). *Comprehension: A paradigm for cognition.* Cambridge: Cambridge University Press.

Kirkpatrick, D.L. (1959). Techniques for evaluating training programs. *J Am Soc Training Directors (Training and Development Journal*), 13(11), 3–9.

Kirshner, P., & Van Merrienboer, J. J. G. (2012). Chapter 26, Ten steps to complex learning: A new approach to instruction and instructional design in J. J. G Van Merrienboer, P. Kirschner *Ten steps to complex learning, A systematic approach to four-component instructional design*. London: Routledge.

Koole, S. (2009). The psychology of emotion regulation: An integrative view. *Cognition and Emotion, 23*, 4-41.

Kozhevnikov, M. (2007). Cognitive styles in the context of modern psychology: Toward an integrated framework of cognitive style. *Psychological Bulletin*, 133, 464–481.

Kozhevnikov, M., Evans, C., & Kosslyn, S. (2014). Cognitive style as environmentally sensitive individual differences in cognition: a modern synthesis and applications in education, business and management. *Psychological Science in the Public Interest,* 15(1), 3-33. https://doi.org/10.1177/1529100614525555

Krause, K. L., & Coates, H. (2008). Students' engagement in first-year university. *Assessment & Evaluation in Higher Education* 33(5), 493-505.

Krause, U.-M., Stark, R., & Mandl, H. (2009). The effects of cooperative learning and feedback on e-learning in statistics. *Learning and Instruction*, 19, 158 –170. http://dx.doi.org/10.1016/j.learninstruc.2008.03.003

Kuhl, J. (1985). Volitional mediators of cognition-behavior consistency: Self-regulatory processes and action versus state orientation, In J Kuhl, *Action control* (pp. 101-128), Berlin, Heidelberg: Springer. Kuhl, J., & Beckmann, J. (1985). *Action control: From cognition to behavior*. Heidelberg, Berlin, New York: Springer.

Kumar, R., Zusho, A., & Bondie, R. (2018). Weaving cultural relevance and achievement motivation into inclusive classroom cultures. *Educational Psychologist, 53*(2), 78–96. https://doi.org/10.1080/00461520.2018.1432361

Kyndt, E., Dochy, F., Struyven, K., & Cascalar, E. (2011). The direct and indirect effect of motivation for learning on students' approaches to learning through the perceptions of workload and task complexity.Higher Education Research and Development 30(2):135-15010.1080/07294360.2010.501329

Langer, E. J. (1989). *Mindfulness.* Addison-Wesley/Addison Wesley Longman.

Larsen, D.P., Naismith, R.T, & Margolis, M. (2017). High-frequency learning goals: using self-regulated learning to influence day-to-day practice in clinical education. *Teaching and learning in Medicine*, 29(1), 93-100.

Lazarus R. S., & Folkman S. (1984). *Stress, Appraisal and Coping*. New York: Springer

Li, L., Liu, X. & Zhou, Y. (2012). Give and take: A re-analysis of assessor and assessee's roles in technology-facilitated peer assessment. *British Journal of Educational Technology*, 43(3), 376-384.

Lin, J.-W., Lai, Y.-C., Szu, Y.-C., Lai, C.-N., Chuang, Y.-S., & Chen, Y.-H. (2014). Development and evaluation of across-unit diagnostic feedback mechanism for online learning. *Educational Technology & Society*, *17* (3), 138–153.

Liu, W.C. (2021) Implicit Theories of Intelligence and Achievement Goals: A Look at Students' Intrinsic Motivation and Achievement in Mathematics. *Frontiers in Psychology, 12, 593715. doi: 10.3389/fpsyg.2021.593715*

Lowe, H. & Cook, A. (2003). Mind the Gap: are students prepared for Higher Education? *Journal of Further and Higher Education* 27(1), 53-76.

Lozano-Jiménez, E. J., Huéscar, E., & Moreno-Murcia A. (2021). From autonomy support and grit to satisfaction with life through self-determined motivation and group cohesion in higher education*. Frontiers in Psychology, 8 January 2021.* https://doi.org/10.3389/fpsyg.2020.579492

MacNamara, A., & Collins, D. (2010). The role of psychological characteristics in managing the transition to university. *Psychology of Sport and Exercise,* 11(5), 353-362.

Magno, C. (2010). The role of metacognitive skills in developing critical thinking. Metacognition and Learning, 5(2), 137-156.
Marton, F., Dall'Alba, G., & Beaty, E. (1993). Conceptions of learning. *International Journal of Educational Research, 19*, 277−300.
Marton, F., & Saljo, R. (1976). On qualitative differences in learning: I. Outcome and process. British *Journal of Educational Psychology*, 46(1), 4–11.
Matheson, R. (2018). Transition through the student lifecycle. In: R. Matheson, S. Tangney, and M. Sutcliffe (eds.), *Transition in, through, and out of Higher* Education (pp. 5-16). Abingdon: Routledge.
Matheson, R., & Sutcliffe, M. (2018). Developing belonging, community and creating professional identity. In: Matheson, R., Tangney, S. and Sutcliffe, M. (eds.) *Transition in, through, and out of Higher Education* (pp. 31-45). Abingdon: Routledge.
Mays, K.A., & Branch-Mays, G. L. (2016). A systematic review of the use of self-assessment in preclinical and clinical dental education. *Journal of Dental Education*, 80(8), 902-913. https://pubmed.ncbi.nlm.nih.gov/27480701/
McCaslin, M. (2009). Co-regulation of student motivation and emergent identity. *Educational Psychologist*, 44(2), 137–146, 10.1080/00461520902832384
McCune, V., & Entwistle, N. (2011). Cultivating the disposition to understand [de]rstand in 21st century university education. *Learning and Individual Differences, 21*(3), 303–310.
McMahon, M. & Luca, J. (2001). Assessing student's self-regulatory skills. In Meeting at the crossroads. Proceed[in]gs of the 18th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education. Melbourne, Australia, 9-12. Available from: https://www.researchgate.net/publication/49279146_Assessing_student's_self-regulatory_skills
Meece, J. L., Anderman, E. M., & Anderman, L. H. (2006). Classroom goal structure, student motivation, and academic achievement. Annu. Rev. Psychol., 57, 487–503. doi: 10.1146/annurev.psych.56.091103.070258
Messick, S. (1989). Validity. In R. L. Linn (Ed.), *Educational Measurement* (3rd ed., pp. 13-104). New York: American Council on Education and Macmillan.
Meyer, J.H. F., & Land, R. (2005). "Threshold concepts and troublesome knowledge (2): epistemological considerations and a conceptual framework for teaching and learning." *Higher Education: The International Journal of Higher Education and Educational Planning,* 49 (3), 373–388.
Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review, 63*(2), 81–97. https://doi.org/10.1037/h0043158
Molden, D.C. Hui, C.M. Scholer, A.A. (201–). Chapter 20 - Understanding Self-Regulation Failure: A Motivated Effort-Allocation Account. In (Eds) E.R. Hirt, J.J. Clarkson, & L. Jia: *Self-regulation and ego control* (pp. 425-459) Cambridge, MA., Academic Press.
Moore, G. F., Audrey, S., Barker, M., Bond, L., Bonell, C., Hardemann, W., Moore, L., O'Cathain, A., Tinati, T., Wight, D., & Baird, J. (2015). Process evaluation of complex interventions: Medical Research Council guidance. BMJ 350:h1258. doi:10.1136/bmj.h1258
Muijs, D. & Bokhove, C. (2020). *Metacognition and self-regulation: Evidence review*. Education Endowment Foundation. The report is available from: https://educationendowmentfoundation.org.uk/evidence-summaries/evidence-reviews/metacognition-and-self-regulation-review/; https://educationendowmentfoundation.org.uk/tools/guidance-reports/metacognition-and-self-regulated-learning/
Nicol, D. (2009). Assessment for learner self-regulation: enhancing achievement in the first year using learning technologies. *Assessment & Evaluation in Higher Education, 34* (3), 335-352.
Nicol, D. (2010). From monologue to dialogue: improving written feedback processes in mass higher education, *Assessment & Evaluation in Higher Education*, 35(5), 501-517.
Nicol, D. (2013). "Resituating Feedback from the Reactive to the Proactive." In *Feedback in Higher and Professional Education*, edited by D. Boud and E. Molloy (pp.34–49). London: Routledge.

Nicol, D. J., & Macfarlane-Dick, D. (2006). Assessment and self-regulated learning: a model and seven principles of good feedback practice, Studi*es in Higher Education*, 31(2), 199-218, doi: 10.1080/03075070600572090

Nicol, D., Thomson, A., & Breslin, C. (2014). Rethinking feedback practices in higher education: a peer review perspective. *Assessment & Evaluation in Higher Education*, 39(1), 102-122.

O'Donovan, B. (2017). How student beliefs about knowledge and knowing influence their satisfaction with assessment and feedback. *Higher Education,* 74(4), 617-633.

Orsmond, P., Merry, S., & Reiling, K. (1996). The importance of marking criteria in the use of peer assessment. *Assessment and Evaluation in Higher Education,* 21, 239–50.

Orsmond, P., Merry, S., & Reiling, K. (2000). The use of student derived marking criteria in peer and self-assessment. *Assessment and Evaluation in Higher Education,* 25, 23–38.Panadero, E. (2017). A review of self-regulated learning: six models and four directions for research. *Frontiers Psychology, 8*, 422. https://doi.org/10.3389/fpsyg.2017.00422

Panadero, E., & Alonso-Tapia, J. (2013). Self-assessment: Theoretical and practical connotations. When it happens, how is it acquired and what to do to develop it in our students, *Electronic Journal of Research in Educational* Psychology, 11(2), 551–576. https://doi.org/10.14204/ejrep.30.12200

Panadero, E., Brown, G.T., & Strijbos, J. (2016). The future of student self-assessment: a review of known unknowns and potential directions. *Educational Psychology Review, 28*, 803-830. https://doi.org/10.1007/s10648-015-9350-2

Panadero, E., Jonsson, A., & Botella, J. (2017). Effects of self-assessment on self-regulated learning and self-efficacy: four meta-analyses. *Educational Research Review*, 22, 74-98. https://doi.org/10.1016/j.edurev.2017.08.004

Panadero, E., Jonsson, A., & Strijbos, J-W. (2016). Chapter 18. Scaffolding self-regulated learning through self-assessment and peer assessment: guidelines for classroom implementation. In: D. Laveault & L. Allal (eds.), (2016). *Assessment for learning: meeting the challenge of implementation* (pp. 311-326). Dordrecht, Netherlands: Springer.

Panadero, E. & Romero, M. (2014).To rubric or not to rubric? The effects of self-assessment on self-regulation, performance and self-efficacy, *Assessment in Education: Principles, Policy & Practice*, 21(2), 133-148, DOI: 10.1080/0969594X.2013.877872

Parker, J.M., Anderson, C.W., Heidemann, M., Merrill, J., Merritt, B., Richmond, G., & Urban-Lurain, M., (2012). Exploring undergraduates' understanding of photosynthesis using diagnostic question clusters. *CBE-Life Sciences Education*, 11(1), 47-57.

Peeters, J., De Backer, F., Kindekens, A., Triquet, K., & Lombaerts, K. (2016). Teacher differences in prom'ting students' self-regulated learning: Exploring the role of student characteristics. *Learning and Individual Differences*, *52*, 88-96. https://doi.org/10.1016/j.lindif.2016.10.014

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review, 18*, 315–341.

Pekrun, R., Goetz, T., Wolfram, T., & Perry, R.P. (2002). Academic emotions in students' self-regulated learning and achievement: a program of qualitative and quantitative research, *Educational* Psychologist, 37(2), 91-105, DOI: 10.1207/S15326985EP3702_4

Pekrun, R., Elliot, A., & Maier, M. A. (2006). Achievement goals and discrete achievement emotions: A theoretical model and prospective test. *Journal of Educational Psychology,* 98, 583-597.

Pekrun, R., Frenzel, A.C., Goetz, T., & Perry R.P. (2007). The control-value theory of achievement emotions: an integrative approach emotions in education. In P. A Schutz and R. Pekrun *Emotion in Education*, Amsterdam: Academic Press.

Perkins, D. N., & Tishman, S. (2001). Dispositional aspects of intelligence in J.M. Collis, S. Messick (Eds.): Intelligence and personality: Bridging the gap in theory and measurement (pp. 233-257), New Jersey: Lawrence Erlbauam Associates Publishers.

Pintrich, P.R. (1989). The dynamic interplay of student motivation and cognition in the college classroom. In C. Ames & M. Maehr (Eds.), *Advances in motivation and achievement: Motivating enhancing environments (*Vol. 6, pp. 117-160). Greenwich, Ct: JAI Press

Pintrich, P. R. (2002).The role of metacognitive knowledge in learning, teaching, and assessing, *Theory into Practice*, 41(4), 219-225. doi: 10.1207/s15430421tip4104_3

Pintrich P. R. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review, 16*(4), 385–407.

Pintrich, P., Smith, D., Garcia, T., & McKeachie, W. (1991). *A manual for the use of the motivated strategies for learning questionnaire (MSLQ)*. University of Michigan, National Center for Research to Improve Postsecondary Teaching and Learning: Ann Arbor.

Pintrich, P.R., Smith, D.A.F., Garcia T., & Mckeachie, W.J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (Mslq). *Educational and Psychological Measurement*, 53(3):801-813. doi:10.1177/0013164493053003024

Playford, D., Kirke, A., Maley, M. & Worthington, R. (2013). Longitudinal assessment in an undergraduate longitudinal integrated clerkship: The mini Clinical Evaluation Exercise (mCEX) profile. *Medical teacher*, 35. doi:10.3109/0142159X.2013.778392.

Price, M., Handley, K. & Millar, J. (2011). Feedback: focusing attention on engagement, *Studies in Higher Education*, 36(8), 879-896. doi: 10.1080/03075079.2010.483513

Price, M., & B. O'Donovan. (2006). "Improving Student Performance through Enhanced Student Understanding of Criteria and Feedback." In *Innovative assessment in higher education*, edited by C. Bryan & K. Clegg (pp.100–109). London: Routledge.

Puustinen, M., & Pulkkinen, L. (2001). Models of self-regulated learning: a review. *Scand. J. Educ. Res.* 45, 269–286. doi: 10.1080/00313830120074206

Reay, D. (2002). Class, authenticity and the transition to higher education for mature students. *The Sociological Review,* 50(3), 398-418.

Reeve, M. (2013). How students create motivationally supportive learning. The concept of agentic engagement. *Journal of Educational Psychology,* 105(3), 579–595. https://doi.org/10.1037/a0032690

Redish, E.F. (1994). The implications for cognitive studies for teaching physics. *Am J Phys, 62*, 796–803.

Reeve, J.M., Deci, E. & Ryan, R. (2004). Self-determination theory: A dialectical framework for understanding sociocultural influences on student motivation. *Big Theories Revised*. 31-60.

Richardson M, Abraham C., & Bond R. (2012). Psychological correlates of university students' academic performance: a systematic review and meta-analysis. *Psychol Bull,* 138(2), 353-87. doi: 10.1037/a0026838. PMID: 22352812.

Rutherford, S. M. (2019). *'Flying the nest': An analysis of the development of self-regulated learning during the transition to Higher Education.* University of Reading. Ed.D Thesis.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78.

Ryan, R. M., & Deci, E. L. (2002). Overview of self-determination theory: An organismic-dialectical perspective. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 3–33). University of Rochester Press.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York: Guilford Publications.

Sadler, D. R. (1989). Formative assessment and the design of instructional systems. *Instructional Science*, 18, 119–144. https://doi.org/10.1007/BF00117714

Sadler, D. R. (2009a). "Grade Integrity and the Representation of Academic Achievement." *Studies in Higher Education* 34 (7): 807–826. doi:10.1080/03075070802706553.

Sadler, D. R. (2009b). "Transforming Holistic Assessment and Grading into a Vehicle for Complex Learning." In *Assessment, Learning and Judgement in Higher Education*, edited by G. Joughin, 45–63. Dordrecht: Springer.

Sadler, D. R. (2010). Beyond feedback: Developing student capability in complex appraisal. *Assessment and Evaluation in Higher Education*, 35, 535–550. https://doi.org/10.1080/02602930903541015

Sadler, D. R. (2013). Opening up feedback: Teaching learners to see. In S. Merry, M. Price, D. Carless, & M. Taras (Eds.), *Reconceptualising feedback in higher education: Developing dialogue with students* (pp. 54–63). Routledge.

Sadler, D. R. (2017). Academic achievement standards and quality assurance. *Quality in Higher Education*, 23(2), 81–99. https://doi.org/10.1080/13538322.2017.1356614

Sadler-Smith, E. (2012). Metacognition and styles, in L-f Zhang, R. J. Sternberg, & S. Rayner. (2012). Handbook of intellectual styles. *Preferences in cognition, learning and teaching* (pp. 153-172) New York: Springer.

Schmidt, H. G., & Rikers, R.M. J. P. (2007). How expertise develops in medicine: knowledge encapsulation and illness script formation. *Medical Education*, 41(12), 1133–1139. https://doi.org/10.1111/j.1365- 2923.2007.02915.x.

Schneider, M., & Preckel, F. (2017). Variables associated with achievement in higher education: A systematic review of meta-analyses. *Psychol Bull,* 143(6), 565-600. doi: 10.1037/bul0000098

Schoor, C., Narciss, S., & Körndle, H. (2015). Regulation during cooperative and collaborative learning: A theory-based review of terms and concepts. *Educational Psychologist, 50*(2), 97–119. https://doi.org/10.1080/00461520.2015.1038540

Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology* 19(4), 460–475.

Schutz, P. A., Y. Hong J. Y., Cross, D. I., & Osbon, J. N. (2006). Reflections on investigating emotion in educational activity settings. *Educational Psychology Review, 18*, 343–360.

Schuwirth, L.W., & Van der Vleuten, C.P. (2011). Programmatic assessment: From assessment of learning to assessment for learning. *Med Teach,* 33, 478–485.

Scott, D., Hughes, G., Evans, C., Burke, P. J., Walter, C., & Watson, D. (2014). *Learning transitions in higher education*. Basingstoke, UK: Palgrave Macmillan.

Shattuck, P., Narendorf, S., Cooper, B., Sterzing, P., Wagner, M., & Taylor, J. (2012). Postsecondary education and employment among youth with an Autism Spectrum Disorder. *Pediatrics,* 129(6), 1042-1049

Shell, D. F., & Husman, J. (2008). Control, motivation, affect, and strategic self-regulation in the college classroom: A multidimensional phenomenon. *Journal of Educational Psychology, 100*(2), 443–459. https://doi.org/10.1037/0022-0663.100.2.443

Seifert, T. (2004). Understanding student motivation. *Educational Research, 46*(2), 137–149.

Seifert, T.A., Gillig, B., Hanson, J.M., Pascarella, E.T., & Blaich, C.F. (2014). The conditional nature of high impact/good practices on student learning outcomes. *The Journal of Higher Education*, 85(4), 531–564.

Seufert, T. (2018). The interplay between self-regulation in learning and cognitive load, *Educational Research Review*, 24, 116–129. https://doi.org/10.1016/j.edurev.2018.03.004

Singh, G. (2009). *Black and minority ethnic (BME) students' participation in higher education: improving retention and success*. Hiigher Education Academy.

Smith, M.K., Wood, W.B., Adams, W.K., Wieman, C., Knight, J.K., Guild, & N., Su, T.T. (2009). Why peer discussion improves student performance on in-class concept questions. *Science, 323*(5910), 122–124.

Sweller, J. (2011). Cognitive load theory. In J. P. Mestre & B. H. Ross (Eds.), *The psychology of learning and motivation: Cognition in education* (pp. 37–76). Elsevier Academic Press. https://doi.org/10.1016/B978-0-12-387691-1.00002-8

Sweller, J., Ayres, P., & Kalyuga S. (2011). *Cognitive load theory*. New York: Springer.

Tai, J., Ajjawi, R., Boud, D., Dawson, P., & Panadero, E. (2018). Developing evaluative judgement: enabling students to make decisions about the quality of work. *Higher Education,* 76, 467-481. https://doi.org/10.1007/s10734-017-0220-3

Tai, J., Canny, B. J., Haines, T. P., & Molloy, E. K. (2016). The role of peer-assisted learning in building evaluative judgement: opportunities in clinical medical education. *Advances in Health Sciences Education*, 21(3), 659. https://doi.org/10.1007/s10459-015-9659-0.

Thurstone, L.L. (1927). A law of comparative judgment. *Psychological Review,* 34, 273–286.

Toering, T., Elferink-Gemser, M. T., Jonker, L., van Heuvelen, M. J. G., & Visscher, C. (2012). Measuring self-regulation in a learning context: reliability and validity of the self-regulation of learning self-report scale (SRL-SRS). *International Journal of Sport and Exercise Psychology,* 10(1), 24-38.

Topping, K. J. (2003). Self and peer assessment in school and university: reliability, validity and utility. In: M. S. R. Segers, , F. J. R. C. Dochy, & E. C. Cascallar (Eds.), *Optimizing new modes of assessment: In search of qualities and standards.* Dordrecht: Kluwer Academic Publishers.

Tulis, M., Steuer, G., & Dresel, M. (2016). Learning from errors: A model of individual processes. *Frontline Learning Research*, 4(2), 12-26.

Van Heerden, M., Clarence, S., & Bharuthram, S. (2017). What lies beneath: exploring the deeper purposes of feedback on student writing through considering disciplinary knowledge and knowers, *Assessment & Evaluation in Higher Education*, 42(6), 967-977. DOI: 10.1080/02602938.2016.1212985

Van Merrienboer, J. J. G., & de Bruin, A, B, H. (2019). Cue-based facilitation of self-regulated learning: A discussion of multidisciplinary innovations and technologies. *Computers in Education*, 100, 384-391.

Van der Vleuten, C.P. (1996). The assessment of professional competence: Developments, research and practical implications. *Advances in Health Sciences Education*, 1, 41-67.

Van der Vleuten, C.P., & Schuwirth, L.W. (2005). Assessing professional competence: From methods to programmes. *Medical Education,* 39(3), 309-317.

Van der Vleuten,C.P.M., Schuwirth, L.W.T., Driessen, E.W., et al. (2012). A model for programmatic assessment fit for purpose, *Medical Teacher,* 34(3), 205-214.

Van der Vleuten, C.P.M., Schuwirth, L.W.T., Driessen, E.W., et al. (2014). 12 Tips for programmatic assessment. *Early Online*, 1-6.

Van der Zanden, P. J. A. C., Denessen, E., Cillessen, A. H. N., & Meijer, P. C. (2019). Patterns of success: first-year student success in multiple domains. *Studies in Higher Education*, 44(11), 2081-2095. https://doi.org/10.1080/03075079.2018.1493097

Van der Zwet et al. (2011). Workplace learning from a socio-cultural perspective: creating developmental space during the general practice clerkship. *Advances in Health Sci Education*, 16, 359-373.

van Merriënboer, J. J. G., & Kirschner, P. A. (2007). Ten steps to complex learning: A systematic approach to four-component instructional design. Mahwah, NJ, Lawrence Erlbaum Associates.

Vermeer, H., Boekaerts, M., & Seegers, G. (2001). Motivational and gender differences: sixth-grade students' mathematical problem-solving behavior. *J. Educ. Psychol.,* 92, 308–315. doi: 10.1037/0022-0663.92.2.308

Vermunt, J. D., & Donche, V. (2017). A learning patterns perspective on student learning in higher education: state of the art and moving forward. *Educational Psychology Review*, *29*(2), 269-299. DOI: 10.1007/s10648-017-9414-6

Vermunt, J. D., & Verloop, N. (1999). Congruence and friction between learning and teaching. *Learning and Instruction,* 9(3), 257–280. https://doi.org/10.1016/S0959-4752(98)00028-0

Vossensteyn, H., Kottmann, A., Jongbloed, B., Kaiser, F., Cremonini, L., Stensaker, B., Hovdhaugen, E., & Wollscheid, S. (2015). Dropout and completion in higher education in Europe. Main report. European Commission. Center for Higher Education Policy Studies and Nordic Institute for Studies in Innovation Research and Education. Retrieved from http://supporthere.org/sites/default/files/dropout-completion-he_en.pdf

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Massachusetts: Harvard University Press.

Wang, T. H. (2011). Developing web-based assessment strategies for facilitating junior high school students to perform self-regulated learning in an e-learning environment. *Computers & Education*, 57(2), 1801-1812.

Waring, M., & Evans, C., (2015). Making Sense of Styles (5), and Application of Styles (6) in M. Waring and C. Evans (2015). *Understanding pedagogy, Developing a critical approach to teaching and learning*. London: Routledge.

Warr, P., & Downing, J. (2000). Learning strategies, learning anxiety and knowledge acquisition. *British Journal of Psychology,* 91, 311–333.
Weick, K. E., Sutcliffe, K.M., & Obstfeld, K. (2005). Organizing and the Process of Sensemaking. *Organization Science*, 16(4), 409–421.
Weinstein, C. E., Palmer, D. R., & Acee, T. W. (2016). *User's Manual: Learning and Study Strategies Inventory*. 3rd ed. Clearwater, FL: H&H Publishing Company.
Weinstein, C. E., Schulte, A., & Palmer, D. R. (1987). *The Learning and Study Strategies Inventory*. Clearwater, FL: H & H Publishing.
Wenger, E. (2000). Communities of practice and social learning systems. *Organization*, 7(2), 225–246.
Williams, J. (2017). Addressing the completion challenge in Portuguese Higher Education. M-RCBG Associate Working Paper Series 8: Mossavar-Rahmani Center for Business & Government, Harvard Kennedy School.
Winne, P. H. (1996). A metacognitive view of individual differences in self-regulated learning. *Learn. Individ. Differ*., 8, 327–353. doi: 10.1016/S1041- 6080(96)90022-9
Winne, P. H. (2001). Self-regulated learning viewed from models of information processing. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (pp. 153–189). New York: NY: Lawrence Erlbaum Associates.
Winne, P. H. (2015). Self-regulated learning. In: *International Encyclopedia of the Social & Behavioral Sciences*. pp. 535-540.
Winne, P. H. (2019). Paradigmatic dimensions of instrumentation and analytic methods in research on self-regulated learning. *Computers in Human Behavior,* 96, 285-289.
Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated learning. In: Hacker, D.J., Dunlosky, J. and Graesser, A.C. (eds.) *Metacognition in educational theory and practice* (pp. 277–304). Mahwah: Lawrence Erlbaum Associates Publishers.
Winne, P., & Perry, N. (2000). Measuring self-regulated learning. In: Boekaerts, M., Pintrich, P.R. and Zeidner, M. (eds.) *Handbook of self-regulation*. New York: Academic Press, pp. 531-566.
Yang, M. & Carless, D. (2013). The feedback triangle and the enhancement of dialogic feedback processes. *Teaching in Higher Education*, 18(3), 285 297.
Yee, A. (2016). The Unwritten rules of engagement: social class differences in undergraduates' academic strategies, *Journal of Higher Education*, 87(6), 831-858
Zeidner, M., Boekaerts, M., & Pintrich, P. R. (2000). Self-regulation: Directions and challenges for future research. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (eds.), *Handbook of self-regulation* (pp. 749–768). Academic Press. https://doi.org/10.1016/B978-012109890-2/50052-4
Zhang, L-f. (2013). *The malleability of intellectual styles*. Cambridge.
Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *J. Educ. Psychol*., 81, 329–339. doi: 10.1037/0022-0663.81.3.329
Zimmerman, B. J. (2000). Attainment of self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.). *Handbook of self-regulation* (pp. 13–39). San Diego, CA: Academic Press. https://doi.org/10.1016/B978-012109890-2/50031-7
Zimmerman, B. J. (2001). Theories of self-regulated learning and academic achievement: An overview and analysis. In B. J. Zimmerman & D. H. Schunk (eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (pp. 1–37). Lawrence Erlbaum Associates Publishers.
Zimmerman, B. J. (2002). Becoming a self-regulated learner: an overview, theory into practice, 41(2), 64-70.doi: 10.1207/s15430421tip4102_2
Zimmerman, B.J. (2008). Investigating self-regulation and motivation: historical background, methodological developments, and future prospects. *American Educational Research Journal*, 45(1), 166-183. doi:10.3102/0002831207312909
Zimmerman, B. J. (2011). Motivational sources and outcomes of self-regulated learning and performance. In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 49–64). New York: Routledge/Taylor & Francis Group.

Zimmerman, B.J. (2013). From cognitive modeling to self-regulation: a social cognitive career path. *Educational Psychologist*, *48*(3), 135–147.
Zimmerman, B. J., & Campillo, M. (2003). "Motivating self-regulated problem solvers," in J. E. Davidson and R. J. Sternberg (eds.) *The Nature of Problem Solving* (pp. 233–262),New York, NY: Cambridge University Press.
Zimmerman, B. J., & Cleary, T. J. (2009). Motives to self-regulate learning: A social cognitive account. In K. R. Wenzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 247–264), New York: Routledge/Taylor & Francis Group.
Zimmerman, B. J., & Kitsantas, A. (2002). Acquiring writing revision and self-regulatory skill through observation and emulation. *J. Educ. Psychol*., 94, 660–668. doi: 10.1037/0022-0663.94.4.660
Zimmerman, B. J., & Kitsantas, A. (2005). The hidden dimension of personal competence: self-regulated learning and practice, in A. J. Elliot and C. S. Dweck (eds.) *Handbook of Competence and Motivation* (509–526), New York, NY: Guilford Press.
Zimmerman, B. J., and Kitsantas, A. (2007). Reliability and validity of self-efficacy for learning form (self) scores of college students, *Psychol.,* 215, 157–163. doi: 10.1027/0044-3409.215.3.157
Zimmerman, B. J., & Martinez-Pons, M. (1986). Development of a structured interview for assessing student use of self-regulated learning-strategies, *Am. Educ. Res.* J., 23, 614–628. doi: 10.3102/00028312023004614
Zimmerman, B. J., & Martinez-Pons, M. (1988). Construct validation of a strategymodel of students' self-regulated learning, *Journal of Educational Psychology* ,80(3),284–290.
Zimmerman, B. J., & Moylan, A. R. (2009). Self-regulation: Where metacognition and motivation intersect. In D. J. Hacker, J. Dunlosky & A. C. Graesser (Eds.), *Handbook of metacognition in education* (pp. 299–315). New York: Routledge
Zimmerman, B. J., Moylan, A. R., Hudesman, J., White, N., & Flugman, B. (2011). Enhancing self-reflection and mathematics achievement of at risk urban technical college students. *Psychol. Test Assess. Model*, 53, 141–160.
Zimmerman, B. J., & Schunk, D. H. (Eds.). (2011). *Handbook of self-regulation of learning and performance* New York, NY: Routledge.

APPENDICES

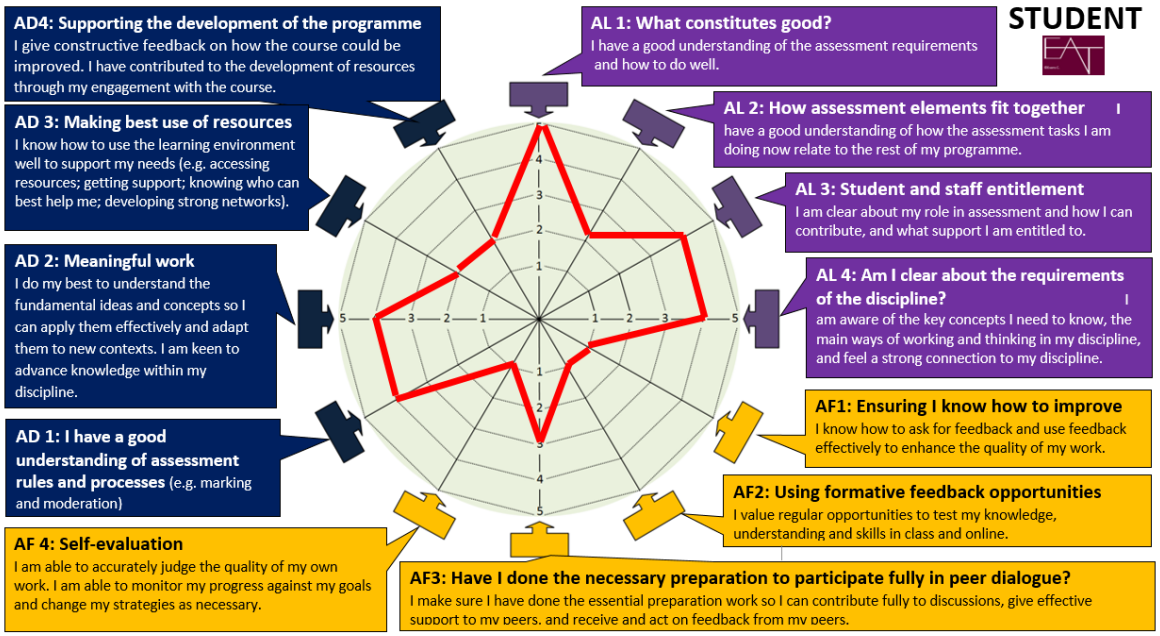
Selected appendices from the EAT Framework have been included in this report. To adapt the EAT Wheel/Web go to the ERASMUS Version of the Framework using the hyperlink or go to **eatframework.com** to access all versions.

Notes on using the EAT Wheel/Web to assess student and educator views on engagement in assessment.

(i) Appendices B and C include educator and student versions of the framework.
(ii) Appendix F can be used with educators to consider the different ways in which student engagement is encouraged through assessment design.
(iii) The EAT Wheel/Web diagrammatically illustrates 12 sub-dimensions of assessment and feedback practice.
Using the EAT Survey Scale (EAT-SS) Students can be asked to assess their level of engagement with assessment in each of these 12 sub-dimensions on a scale of 1 – 5 (1 = minimal engagement to 5 = full engagement).
This activity can be undertaken at various points during the academic year to support understandings of assessment processes and roles in assessment, and to explore the relationship between perceptions of engagement and outcomes, and for different groups.

Educators can use the Framework to assess the quality of curriculum design (and extent to which it enables students to self-regulate) in attending to each of the 12 sub-dimensions. It is possible to focus on 1 key area and relate to the other 11 areas –in looking to ensure integration of all activities.

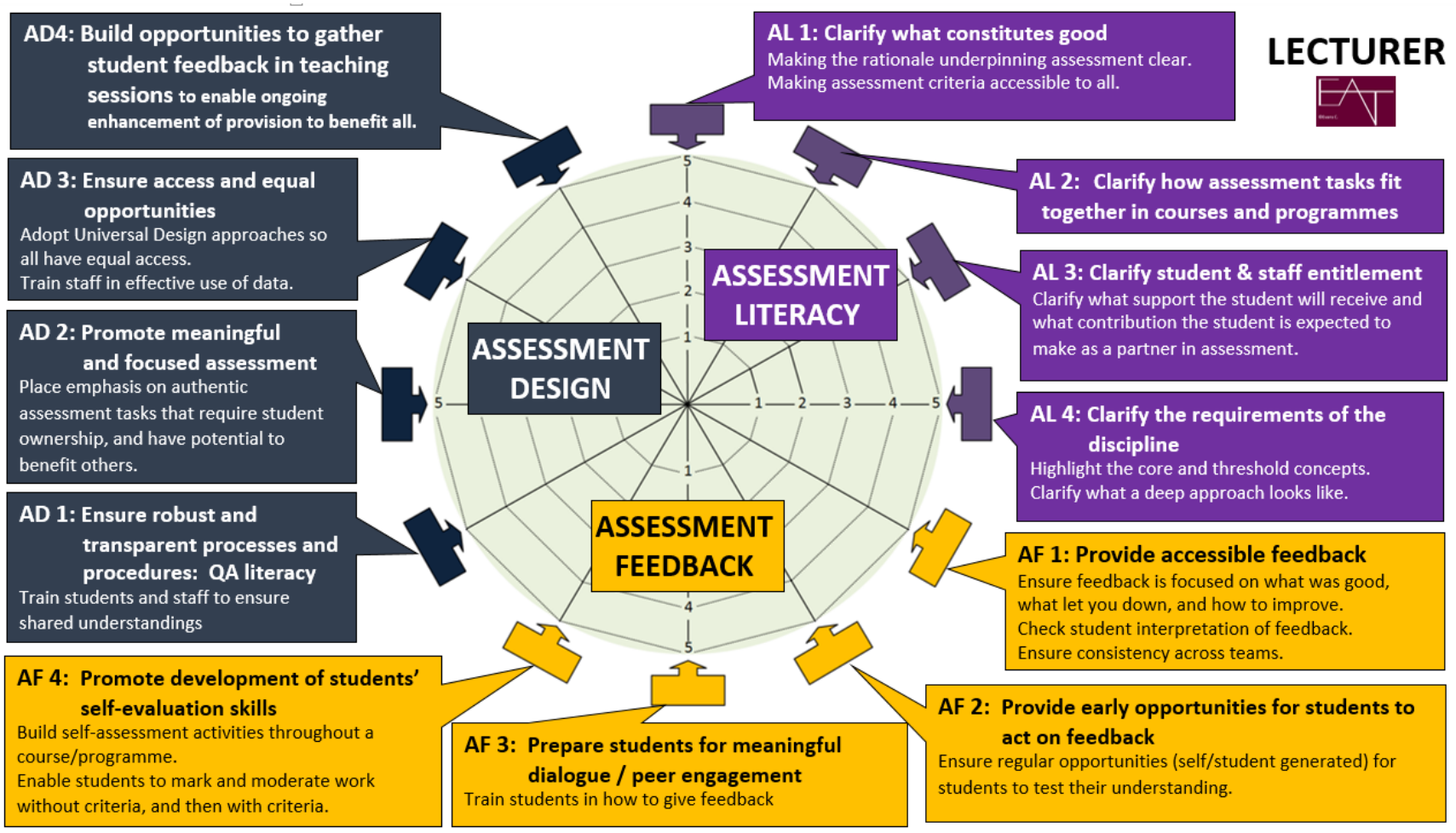
(iv) Appendix I can be used to look at facilitators and barriers to engagement with assessment. Post it notes/ clickers/online polls can collate this information. Changes in students concerns across a module can be mapped to inform targeted support.



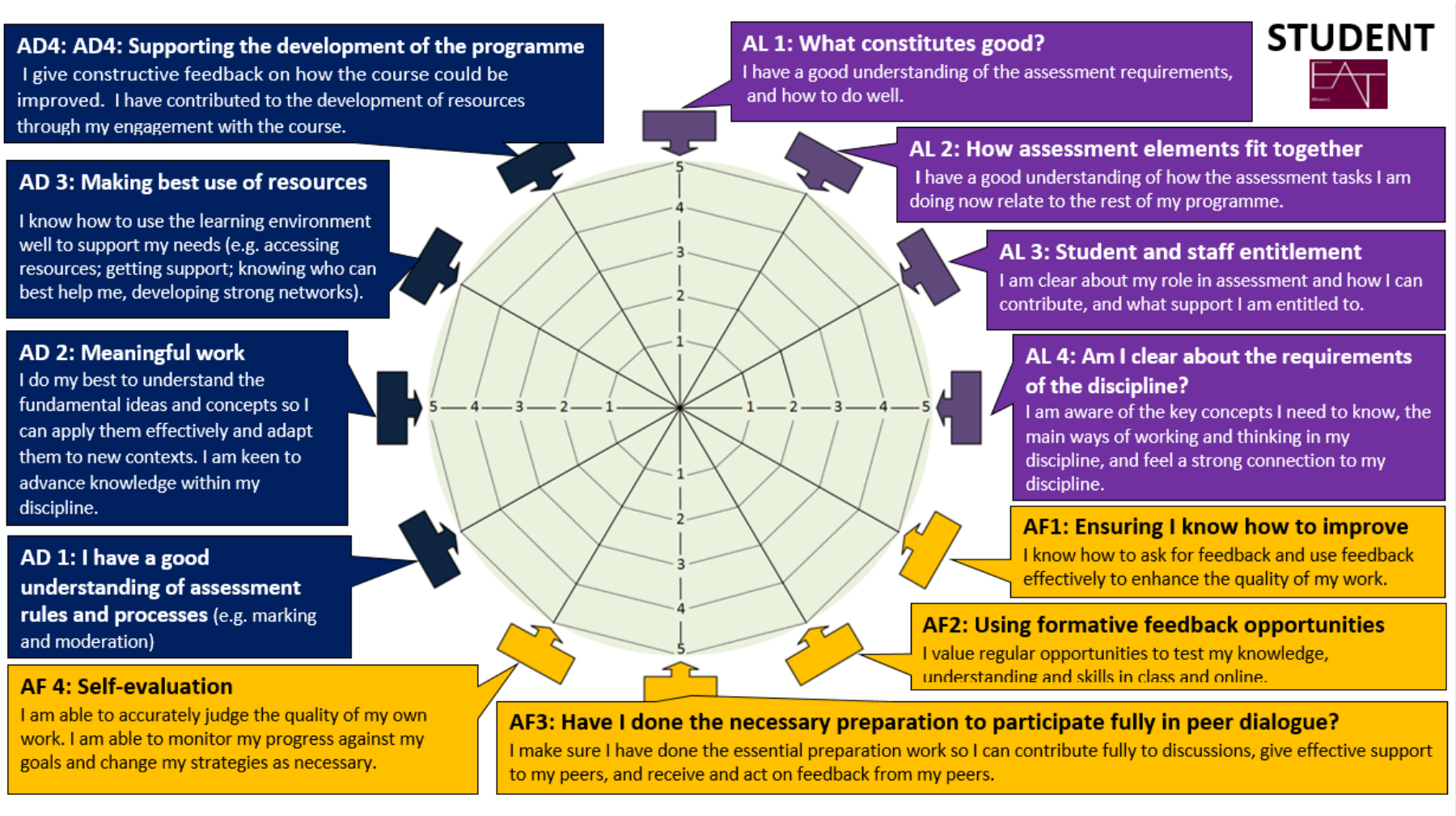
Scoring EAT

Recapping on use of EAT-SS

- Use to assess students' attitudes to engagement at the beginning of a course.
- Use to assess changes in students' attitudes to their engagement in assessment throughout a course/programme.
- Use with educators to examine strengths and weaknesses in course design.
- Compare educators' perceptions of their courses in enabling engagement.
- Compare student and educator perceptions of engagement opportunities.
- Consider levels of student engagement and impact on outcomes.
- Consider levels of educator engagement and student outcomes



Appendix B: Lecturer Version (from EAT, 2021)



Appendix C: Student Version (from EAT, 2021)

EAT Appendix F: Developing Student Engagement in Assessment (EAT, 2020, 2021)

Transactional	*Identify your position*					Transformational
Assessment Literacy	**1**	**2**	**3**	**4**	**5**	
Telling - one directional guidance on assessment criteria - lecturer to student.						Explaining / discussing requirements with students.
Teacher driven rubrics.						Student generated rubrics.
Provision of exemplars.						Student development of exemplars.
Provision of assessment criteria.						Student creating assessment criteria.
Provision of glossaries.						Student generated glossaries.
Given assessment regulations.						Students contributing to development of regulations.
Assessment Feedback	**1**	**2**	**3**	**4**	**5**	**Transformational**
Reliance on the teacher for feedback.						Reliance on range of sources – emphasis on developing student self-assessment.
Corrective feedback – one directional from teacher to student – work corrected.						Examples of how to correct with the responsibility on the student to apply the approach.
Provision of guidance on how to improve.						Student responsibility for developing action plan based on feedback on how to improve.
Asks students to reflect on their feedback.						Provides frameworks to support students in reflection involving dialogic practices and focused application to demonstrate understanding rather than reflection alone.
Directive. Solutions provided.						Challenges the student to find solutions.
Focus on the immediate requirements of the module task						Focus on application of learning within and beyond the course.
Assessment Design	**1**	**2**	**3**	**4**	**5**	**Transformational**
Assessment tasks designed *for* students.						Assessment tasks designed *with & by* students.
Teacher summative assessment.						Student and teacher summative assessment.
Teacher ownership of assessment tasks.						Student ownership of assessment tasks.
Tasks designed exclusively to meet specific learning outcomes.						Tasks designed to meet learning outcomes and to go beyond.
Strongly scaffolded learning tasks- students regulated and told what to do.						Students taught to self-regulate as part of course design.
Resources to support learning provided but relationship between them not made explicit.						All key resources available from the outset to enable student control of learning & signposted in relation to tasks and key crunch points. Clear links to resources provided.
Guidance mainly provided by teacher.						Students supported to build networks and to identify guidance from range of sources.
Resources provided for students.						Students/teachers generate resources.
Limited opportunities for self-assessment.						Ongoing aligned opportunities for self-assessment from start to finish.
Limited opportunities to explore assessment holistically and to explore potential issues. Teacher directs solution-finding.						Key threshold concepts identified from the outset. Students encouraged to provide resources to support understanding in areas seen as difficult, and to find own solutions.

Appendix I: Facilitators and barriers impacting my learning Student Version

Identify what factors impact your ability to do well in assessment in your module/course

A. Institutional Factors: How does the way the course is organised help or hinder you?

e. g., How well is assessment organised within your module? Is it clear what the assessments are? Do you know what to do in order to do well? Is the nature of assessment appropriate etc.

In the space below, please list the things that help and hinder you most. Please list the **three** most important things under each of the headings below

Course things that help me with assessment	Course things that hinder me
e. g. Really useful and clear guidance	e.g. Assessment deadlines are too close together
1. 2. 3.	1. 2. 3.

B. **Personal Factors:** How does your state of mind influence your engagement in assessment activities (e.g. commitment to your studies, ability to self-assess; ability to manage learning tasks; support of peers, tutors; response to feedback; contributions in sessions etc.)
Again, please rank in order the things about yourself that most impact your access to, and use of, assessment

Things about me that help with assessment	Things about me that hinder me with assessment
e.g. my ability to seek useful feedback	e.g. I only focus on the negative things when given feedback
1. 2. 3.	1. 2. 3.

Derived from Developmental Space concept Van der Zwet et al. (2011)

Facilitators and Barriers to Assessment Educator Version

What institutional factors enable and also hinder your design and delivery of assessment

Institution Factors: This can include factors at discipline, faculty and university levels as well as external factors related to your discipline and more broadly. It can also include networks you are part of that extend beyond your institution, and could include student related issues.

Please identify the **three most important factors** that impact you positively and negatively when trying to develop your assessment practice

things that help me with assessment	**things that hinder me**
e.g. support from line manager	e.g. finding time to meet with colleagues
1. 2. 3.	1. 2. 3.

What personal factors impact your ability to design and deliver assessment practices as you would like to

Things about me that help with assessment	**Things about me that hinder me with assessment**
e. g. willingness to try new ideas	e.g. take criticism of my approaches badly
1. 2. 3.	1. 2. 3.