

# **TRAINERR-MAX' WEEKLY LEARNING FRAMEWORK AND 'SUPER-SMART STUDY TIPS COLLECTION', FOR WHEN STUDENTS SAY, "WE DON'T KNOW HOW TO LEARN, CAN YOU TEACH US HOW TO LEARN?"**

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## **ABSTRACT**

*Quality research into effective learning methodology abounds in education (Hattie, 2019). The need for educators to train and develop students in their capacity to learn is widely recognised (Rickards et al., 2021), pacing with and even outpacing the importance of teaching content (Crocket et al. 2011). However, evidence suggests that many educators and educational institutions lack appropriate resources to meet the learning needs of their students (Goodwin et al., 2020; Pomerance et al. 2016; Rickards et al., 2021).*

*From investigating a wide range of resources, a curated selection of approaches that could support students in their independent learning activities was developed. From this selection, first focussing on what could support my students, then later considering what could support any student, the 'TRAIInERR-MAX Weekly Learning Framework' and 'Super-Smart Study Tips Collection' were developed.*

*While the benefits of applying them through this framework have not been formally assessed, each component of the materials presented is evidence-based to support learning attainment. Hattie(2019) argues that it is not so much further research and development of new strategies that support learning attainment that are critical, but rather support of their implementation that is now required. Prepared inside this argument, this paper intends to facilitate educators' access to and implementation of a range of strategies by synthesising them into a simple, engaging resource. 'User's Guide' style notes were also developed.*

*The materials presented here are not intended to present the definitive answer of to how to learn. They could, however, be part of the solution.*

## **KEYWORDS**

*Learning methods, metacognition, implementation, engagement.*

## **1. INTRODUCTION**

*'We don't know how to learn. Can you teach us how to learn?'* This is a question that can be presented by students in any subject, anywhere, and is one all educators can be expected to answer (Rickards et al., 2021). The answer given can either be one full of potential or one that misses an opportunity. Either way, the impact of our responses can be long-lasting.

For many years when my students asked for help with how to learn, paired with a big encouraging smile, my well-intentioned response was; *"Summarise your notes, do your practice*

*questions, and please ask me if you have any questions*". Summarising, doing practice questions, asking for help all seemed fitting enough, but the students weren't necessarily forthcoming with questions. Further reflecting the question back to the students, asking them what they thought they could do curiously only ever brought one response. It even had the same body language; deep breath in, slumping breath out, eyes downcast, "*I guess I just need to work harder.*" Asking further what that would look like, of course many of the students acknowledged that less time being distracted by any number of things, or simply doing the work when they should instead of putting it off or not doing it at all would help. What caught my interest was the number of students who were unable to suggest any specific actions at all for what they could do, for whom the words *working harder* was all they had.

While there is nothing wrong with what either I or they had offered, these conversations often left me with a sense of something missing. It seemed there should have been something that could give the students a sense of inspiration or specific insight into actions that could more directly or more effectively help them achieve their goals in learning. The reading outlined below uncovered both the limitations of the advice I had been offering as well as a valuable collection of strategies that could be offered capable of support learning effectiveness beyond my own area of Biology and potentially into any discipline.

We are teaching in a world where the importance of learning how to learn is pacing with and even outpacing the learning of content (Crockett et al., 2011), a phenomenon that only seems to be setting in more strongly as time progresses (Goodwin et al., 2020; Hattie, 2019; Rickards et al., 2021). Goodwin (2014) states that if educators are to achieve this teaching of how to learn, we, "*need to have as much knowledge of cognition and learning as personal trainers have of physiology (if not more)*" (p. 78). The value of supporting confidence, self-efficacy, and motivation in helping students achieve current (Bone and Reid, 2013; Goodwin and Hein, 2016; Jensen, 2008) and future study and career success (Breckler et al., 2011) is likewise well acknowledged. Developments in our understanding of brain function and learning are enhancing our ability to influence these levers with our students (Caine et al., 2015). Even so, evidence suggests that many educators and educational institutions lack appropriate resources to meet these needs of students (Goodwin et al., 2020; Pomerance et al. 2016; Rickards et al., 2021).

While there are numerous books on how learning works (e.g., Boser, 2017; Jensen, 2008; Oakley and Sejnowski, 2018), educators or students don't always know about them, have access to them, or have sufficient time to investigate them carefully for the benefits they can offer. Some colleges and universities provide lists of study ideas for students on their websites (e.g., Cherry, 2018; Fazzino, 2017; Leyden, 2019), aiming to support student access to these strategies. Whether this method of provision resulted in any significant uptake and /or learning gain was not presented. Some colleges offer additional courses to teach study skills and improve student attitude in their attempt to solve this problem (e.g., Belzer et al., 2003). While teaching these skills is so critically important (Rickards et al., 2021), the logistics of running an extra course to achieve this outcome might preclude this as a viable solution for many institutions.

Acknowledging the range of resources available and the limitations on their accessibility to educators, educational organisations, and students alike, it was considered if strategies and approaches could be collated and synthesised into a simple format that could be shared by teachers of any discipline, empowering students anywhere in answering their question of how to learn. This became the aim of the investigation and synthesis documented here.

## 2. METHODOLOGY

### 2.1. Developing Context and Collecting Content

The methodology outlined here relates to the research, development and synthesis of the two products, the 'TRAI<sup>n</sup>ERR-Max weekly learning framework' and the 'Super-smart Study Tip Collection'. It outlines the process of identifying and collecting the included strategies as well as the process of crafting the strategies into these two products. Consistent with Hattie (2019), this body of work was developed to support access to and uptake of a range of already proven supportive strategies for independent learning by students. While research may be undertaken to investigate any specific gains from presenting the strategies in the formats presented here, that is beyond the scope of this document.

Sharing the methodology is intended to provide insight into and understanding of the synthesis process such that educators can understand the benefits and limitations of the product as well as potentially having insights into potentially developing their own. It is not intended that the TRAI<sup>n</sup>ERR-Max weekly framework for learning and the Super-Smart Study Tip Collection be considered as definitive and complete representations of all recognised strategies. Rather, they are a good collection, supporting access to a range of quality insights and advice as to approaches that can support learning attainment in settings across disciplines and across cultures.

A broad range of texts and research articles to source evidence-based strategies that support learning and engagement were examined. Selected items were gradually identified, collected, and shared with students over years. Each element that gained positive responses from students was retained and added to a growing collection. The collection was collated, applied, and eventually developed into two prototype products: a weekly working pattern in the form of a checklist for actions and an accompanying list of simple, helpful approaches to support learning. The weekly pattern outlined strategies for *what* to do to support learning outside of the classroom environment while the dot-point list suggested strategies for *how* to do it. These prototypes were later developed into the 'TRAI<sup>n</sup>ERR-MAX Weekly Learning Framework' (Figure 1) and 'Super-smart Study tips Collection' (Figure 2) through processes outlined below. References for the components of these products are listed in the User's Guides presented in the Results section of this document.

Presenting these two products as a framework and a collection rather than as a model is to communicate and recognise that they are not and do not intend to be considered as a comprehensive plan for students' independent study. While the framework and study tip collection can work as they are presented here, it is intended that individuals have scope to apply and independently develop the strategy collections further as best suits their own needs and interests.

### 2.2. Developing the Acronym and Graphics

Applying the methodology of Heath and Heath (2008) in their 'SUCCES' model for communications that stick, the word '*trainer*' was identified as able and suitable to form the basis for an acronym and mnemonic for the checklist prototype. This device is intended to support communication and uptake of the elements of the framework beyond its representation as a checklist alone while also communicating something of its ethos. The insight to write the key term of, 'Forty-eight hours' from point one of the checklist (the optimal time for revision as articulated by Medina, 2014) instead as 'Two days', allowed use of a word started with T for the mnemonic that where a search for words starting with 'F' did not yield a suitable candidate.

Adjusting the spelling from ‘trainer’ to ‘trainerr’ allowed the word to accommodate the main points of the framework.

It was found the final framework component, ‘*microstudies*’, could not be communicated by the word, ‘trainer’ alone. Adding the suffix of ‘MAX’ solved this challenge, providing a place for this component in the mnemonic while also playing on the opposition of ‘*micro*’ and ‘*max*’ with the intention to help enhance engagement with the framework. The term ‘*microstudies*’ was invented here to communicate the action of this final component in a way that might be enticing to students, applying from principles of marketing and branding (e.g., Pink, 2014).

Developing the graphic representations for the framework and the study tip collection beyond the original prototype products applied a principle from the work of Pomerance et al. (2016), that pairing text with graphics has greater impact and effectiveness than text alone. Both graphics presented here are intended to be clear, simple, positive, and uplifting to help support engagement.

Employing the imagery of balloons overlaid with a range of fonts and some simple graphics to present the ‘Super-smart study tip collection’ is likewise intended to support these intentions around ethos and engagement. Locating the study tip of ‘*Be Curious*’ at the origin of the balloon strings on the graphic reflects the subtending and contextual influence of this tip to all the others provided. Leaving three balloons blank and leaving space under ‘*Be Curious*’ on the banner is to invite further curiosity as to what other tips individuals might include, intending this to provide an opportunity to personalise and add to the collection (applied from Block, 2008; Heath and Heath, 2008; and Goodwin et al., 2020). Writing in the first person is intended to support ownership by users through self-reference. Branding the ‘*Super-Smart Study Tip Collection*’ using alliteration and encouraging phrasing is further intended to support student connection and engagement with the collection itself (Pink, 2014).

### 3. RESULTS

Info graphics for ‘TRAINERR-MAX Weekly Learning Framework’ (Figure 1) and ‘Super-Smart Study Tip Collection’ (Figure 2), the student interface documents, are presented here as the results of this synthesis. The User’s Guides section provides further expansion in the manner of teachers notes to support engaging and training students in the framework components along with references for each component. Presenting these notes collated in the format of User’s Guides is intended to support educators in implementing the strategies with students. While the framework and use of the infographic devices to deliver the content presented here have not been investigated under experimental conditions, each component and the principles employed in their synthesis is evidence-based and shown to support learning attainment. Each is acknowledged through the authors and their materials being referenced where used.

Many of the points included in the framework and study tip collection come from further understanding of how the brain and learning work (e.g., Brown, et al., 2014; Jensen, 2008; Medina, 2014). They use embedding of actions to support building of intrinsic motivation (Pink, 2009). Autonomy in selection of specific detailed action supports likelihood of uptake and engagement (Block, 2000; Caine et al., 2016; Duckworth, 2017). They respect discipline and educator differences, allowing tailoring of actions to best need their subject and topic needs. These principles function to help support students’ ability to achieve their own learning goals (Goodwin et al., 2020) and build their self-efficacy in learning (Hattie, 2009), strong levers on present and future learning attainment that are so important for educators to provide (Hattie, 2019; Rickards et al., 2021). They are all independent of topic and discipline, supporting the potential for contribution to learning across disciplines.

### 3.1. User's Guide: 'Trainerr-MaxWeekly Learning Framework'

**'T': Two days.** The optimum time for the first review after receiving new information or after a class is 48 hours (Medina, 2014). Benefits of this are achievable simply by scheduling the initial review of materials within this time. This review entails the next steps from the framework: Reflect, make A mindmap, in detail, now Expand.

**'R': Reflect.** Reflecting on what was interesting, surprising, important etc. sparks interest (Medina, 2014). It uses emotional valence to capture attention; a critical first step in effective engagement and learning (Goodwin et al., 2020). Additionally reflecting on and identifying self-talk about the topic can also shift a barrier that might otherwise stay in place and impede the potential for learning. If the self-talk regarding the topic to be studied is recognised as not conducive, students are suggested to try replacing it with alternative self-talk that is more conducive and supportive towards achieving the outcome of learning. These two components of reflection combine to prime the brain and reduce the potential stresses related to learning (Caine et al., 2016; Dweck, 2016; Goodwin, 2014; Medina, 2014).

**'A': Make A mindmap.** Mindmaps are considered '*one of the most effective learning methods for the sciences*' (Cherry, 2019). This starts with retrieval from memory without reference to notes. This offers students a chance to test themselves, an action based on that combining self-testing with study enhances learning achievement further than what is achieved through study alone (Roediger & Karpicke, 2006). Through mind maps, students make connections within the topic and across other topics or even subjects. Annotate connection lines with notes further enhances the quality of potential learning. Once complete, students benefit from then checking their mindmap against their notes or texts and then amending as necessary (Boser, 2017; Jensen, 2008; Trifone, 2006).

**'inE': in detail now, EXPAND.** This is for selection of specific actions that match the particular needs of the student and subject. It can include detailed reading and notes using various formats and explore use of lists, flowcharts, practice questions, flash cards, models etc., chosen as appropriate. Applying different methods at times is better than using the same method all the time, often allowing surprising insight and learning opportunities simply from re-formatting information. It also maintains brain stimulation and engagement beyond what is possible from maintaining the same course of action (Aronin and Haynes-Smith, 2014; Boser, 2017; Caine et al., 2016; Race, 2003).

**'R': Repeat.** Two to three days after the initial review, repeat the first review pattern: Reflect, make A mindmap, in detail, now Expand. This suggestion for repetition is based on that increased exposure and frequency of exposure strengthens learning attainment. It allows for some forgetting which can then support learning when the forgetting is quickly identified (Bjork and Bjork, 1992). When students can compare and contrast their initial and subsequent reviews, for example between a first and second mindmap, noting whether gains or losses in what is recalled are shown, also supports learning (Bain, 2012; Brown et al., 2014; Carey, 2015; Medina, 2014; Race, 2003).

**'R': Reflect.** This is different from the first 'Reflect' in the framework, focussing on the study styles being used and their helpfulness and effectiveness. Students are suggested to consider, select, and adjust where appropriate their study styles, approaches and mindsets. This supports development of valuable reflective and metacognitive skills and enhancing the quality of learning outcomes (Boser, 2017; Caine et al., 2016). Reflecting on what was most helpful in a learning process has been proposed as the point in which the phenomenon of learning occurs (Bungay

Stanier, 2016), further enhancing the recommendation to include this step in a metacognitive practice.

**‘MAX’: To MAXimise results, even on days when you are focussed more on other subjects, domicrostudies.** The concept of microstudies describes a short period of time, 5-15 minutes, with a small area of focus. While students may express concern that such small timeframes of effort will not produce value in potential learning attainment, this action is based in evidence to the contrary. The principal design involves students selecting an area of focus such as one learning outcomes, then undertaking an action to support those outcomes, for example one to three short questions. This may be inside of a subject area already being studied by the student at that point time, or it may be a topic studied earlier than the focus of study being undertaken at the time. It may also be in another subject from that being studied in that time or undertaken in a moment in time when the student is not undertaking other study of any kind. Evidence suggests that in any of these scenarios, small, targeted study as part of a more traditional study program enhances its potential gains. One contributing factor to this is the increased frequency of exposure the practice offers. (Bain, 2012;Brown et al., 2014;Carey, 2015; Goodwin et al., 2020; Kornell and Bjork, 2008; Taylor and Rohrer, 2010).

Even if students do not engage with the full weekly program outlined here, uptake of any of its components can provide benefits to their learning and as such, can be encouraged.

### **3.2. User’s Guide: ‘Super-Smart Study Tip Collection’**

This study tip collection (Figure 2) is presented as a vehicle to share a range of approaches that all contribute to learning attainment. The tips are listed here in alphabetical order and rather than any inferred order of potential benefit.

**Ask “Why?” a lot.** This form of questioning functions to deepen learning from rote to dynamic memory (Caine et al., 2016) and to foster curiosity (Goodwin, 2018). It further supports individuals in finding and making meaning, a phenomenon on which brains thrive (Boser, 2017).

**Be Curious.** Curiosity is a phenomenon of engagement and joyful learning (Goodwin et al., 2020). It primes the brain for learning and has a stronger influence on student outcomes than I.Q.alone (Goodwin, 2018).

**Check, can I speakit, or can I writeit?** Speaking out loud (with another person or on their own) and writing both exercise the neural pathways required to get the information out of the students’ heads. This serves as a simple indicator for if content is known by the individual or not as well as to strengthen that learning beyond that which is likely to be achieved by reading and recognition of content alone (Race, 2014).

**Choose my strategy – mix it up.** Students are suggested to identify a strategy to suit the task and intended outcome. If students are struggling to identify an approach that can work for the task at hand, they may benefit from identifying another area where they experience success. Considering what from their approach in that area may be applied to the current area of need can provide that access to a strategy that supports them while additionally reinforcing their own strengths (Heath and Heath, 2010). Students will also benefit from review the effectiveness of their actions and continue/adjust accordingly through their metacognitive practice (Boser, 2017;Brown et al., 2014;Caine et al., 2016;Goodwin et al., 2020;Heath and Heath, 2013).

**Create clear goals.** Creating clear, specific goals for each study session supports achieving the outcome through bringing intentionality to the study session. Students benefit from an approach in which they play full-out to achieve them. Evaluating if goals were achieved or not and celebrating the achievement or crafting a new plan for what was not yet achieved develops an achievement mindset along with resilience and ability to design and implement realistic plans (Beesley and Apthorp, 2010; Goodwin, 2014; Jensen, 2008; Medina, 2014; Race, 2003).

**Find or make stories.** Deployment of stories as a learning device uses the evolutionary development of human brains responsiveness to stories as a vehicle to support information uptake and learning attainment. Stories may be real-world examples that provide engagement opportunities. Students may also make up their own stories as a memory device. Even presenting technical information in the style of telling a story can support learning through by-passing what can occur as a stressful or difficult topic for the students to engage with (Caine et al., 2016; Heath and Heath, 2008).

**Make notes not Take notes.** Most students start with taking notes, writing what the educator or resource states. Enhancing this by adding their own questions and connections, writing in your own words (*making* notes) supports ownership and effective learning by the student (Race, 2014). Investigation into the manner of note taking and making showed that writing notes by hand had significantly better effect on learning attainment than typing the same information (Goodwin et al., 2020).

**Nurture my health.** For a number of students, taking care of their health is not a factor they consider when designing their approach for best learning attainment. Taking care of the basics, getting enough sleep, eating well, drinking enough water all directly support optimal brain function. 150 minutes (e.g., 5x30 minutes) moderate exercise per week minimum has also been shown to directly support gains in learning attainment (Bain, 2012; Goodwin, 2014; Jensen, 2008; Medina, 2014; Race, 2003). Students can also benefit from engaging with topics that occur as more challenging if they do so within 45 minutes of having undertaken a period of exercise. The topic or task will often seem more readily achievable due to the positive influences of exercise on brain capacity (Medina, 2014).

**Play – invent my learning as a game.** Students can benefit from gamifying their study. The mindset, perception and design of study as a game that they then have fun with can support learning attainment. Distinguishing that play in this context does not mean a student is not taking their study seriously may be required. Showing them that through playing, they are exercising their commitment to achieving the outcome may be of benefit (Race, 2003).

**Re-format my information.** Reformatting information from its initial presentation format can help students find different patterns or meaning, supporting improvements in learning (Goodwin et al., 2020). Examples may include converting paragraphs to tables, tables to flow-charts, building mind maps to include notes, questions, and connections from text (Ambrose et al., 2010; Benjamin and Bjork, 2000; Brown et al., 2014; Caine et al., 2016; Carey, 2015).

**Study “interval-style”.** Increased understanding of brain and neurotransmitter function indicate that taking short breaks between higher intensity shorter study times. For example, studying for forty-five minutes maximum followed by a break of five to ten minutes maximum gives better productivity and longevity to study compared with a more ‘long-haul’ approach with few breaks in study sessions of greater than one hour. This work pattern is very similar to that employed in interval-training for sports. The more frequent, short breaks allow neurotransmitters in the brain to recharge, supporting quality function to better continue over time. Therefore, when planning a

study program, students are also advised plan their breaks (Caine et al., 2016; Carey, 2015; Goodwin et al., 2020; Jensen, 2008; Race, 2003).

**Study in different places.** Students who have at least two different locations in which they study tend to perform better than those that use only one location. The two locations do not need to be substantially different. It can be as simple as sometimes studying at a desk and other times studying on the floor. This is an example of the brain perform better with diversity of input (Carey, 2015; Jensen, 2008; Race, 2003; Smith et al., 1978).

**Use different voices.** This is a further example of the brain responding to diversity. Singing what they learn, acting it, and sometimes using silly voices are approaches that can benefit students in their learning when compared with using an invariant voice. This technique of varying voice use is also a technique employed by actors to support them in learning scripts (Jensen, 2008).

**Use pictures.** Illustrations supporting memory and learning. They further support believability of material presented which itself supports learning. Used along with text, students may benefit from find illustrations that help one or from drawing their own (Medina, 2014; Pomerance et al., 2016).

## 4. DISCUSSION

Potential for application of the materials outlined above by teachers (including personal reflection) and students, cross-cultural suitability, and potential to contribute to educational equity are discussed. Informal feedback from students and educators is also shared.

### 4.1. Potential for Teachers

Christen and Murphy (1985) posed that as educators we cannot assume that students know how to learn or what is important. As such we are beholden to teach them how to learn with the same rigour and care that we bring to teaching them our disciplines. Similarly, and more recently, Goodwin et al. (2020) further reinforce that increasing attention on what students should be doing or thinking in their learning processes is necessary in our profession. Rickards et al. (2021) discuss that this need to teach students how to learn has always been the case and will always continue to be. This makes the support of learning approaches a place where educators not only can always have something to contribute, but arguably must. Hattie (2019) posed that for supporting educators to teach students strategies of learning is one of the greatest investment needs in education at this time, along with enabling students in largely becoming their own teacher through regulating their own learning (Rickards et al., 2021). Pomerance et al. (2016) pose through their meta-analyses that many educators and educational organisations (including those that train the educators) are missing suitable resources that could help meet these needs. The products presented here are intended to help meet these well documented and well recognised needs. The products are also designed to be consistent with Australian Secondary (AITSL, 2018; OECD, 2015) and Tertiary Education Policy (Marginson, 2013).

Levering on areas of motivation, efficacy, and confidence (Goodwin, 2016; Jensen, 2008) and actively reducing some of the unnecessary stressors in learning together contribute to achieving learning attainment and heightening overall student satisfaction (Erlauer, 2003; Goodwin et al., 2020). They also serve to equip students towards lifelong learning, a necessary skill in times where one of the few constants will be the increasing rate of change. Even simply helping students feel good about themselves can help them learn better (Rickards et al., 2021). The frameworks presented here are designed to work consistent with these areas by providing



strategies that work in a positive and encouraging manner, thus helping achieve these goals. Beyond direct instruction in the techniques presented, educators can further support their uptake and ongoing use by students through embedding and modelling practices in their classes (Hattie, 2019; Quinnell et al., 2011).

Perhaps overarching the potential gains from employing a framework such as that presented here is the benefit on developing executive function; a skill highly valued in the workforce as well as for life in general (Medina, 2014). At least two of the three core components of executive function; updating and monitoring of working memory representations, and shifting between tasks and mindsets (Miyake et al., 2000) are directly levered on by the components of the framework presented. Inclusion of factors that address health (e.g., Bain, 2012), including breaks (e.g., Jensen, 2008) and crafting positive mindsets (e.g., Dweck, 2016) contributes to developing the wellbeing of the student as an integral component of their ability to learn and achieve (Rickards et al., 2021) while simultaneously contributing to developing executive function. With executive function being a stronger predictor of grades than I.Q. (Medina, 2014), anything that supports development of executive function can therefore also benefit students.

Reflecting on the advice I had given my students for my first many years as an educator when they asked for guidance on how to learn, I had assumed the response of, “*Summarise your notes, do your practice questions and ask me if you need help*”, was both effective and sufficient. Discovering that, when given on its own and compared to other advice that could be provided, this was among the lowest of potential to support learning attainment (Brown et al., 2014), was both unexpected and jarring. To some extent, this answered that sense of something missing that the conversations in those times about how to learn had often been left with. It also served to further fuel a drive to find something better.

The experience that that this limitation was compounding further when applied to international students, predominantly from South-East Asian cultures with their tendencies already towards not bringing questions to their teachers, was similarly recognised in studies by Bannink (2010) and Li (2012). Similarly, these students’ response for what they could do to improve their learning of ‘*just work harder*’ also matched the observations of Li (2012). While appropriate to their cultures and as such important to be acknowledged, this statement of ‘*just work harder*’ by itself often seemed unable to shed any light on specific actions the students could take to help their learning. As such, it comes back to being incumbent on the educator to provide suitable openings for action (Pomerance et al., 2016; Rickards et al. 2021). The approaches offered here were built to offer a range of solutions appropriate to and potentially effective inside of this cultural environment while not being limited to it. Discussion with the students directly can help with co-composition and engagement of students in a course of action, tailoring it to suit their needs.

#### **4.2. Potential for Students**

Students everywhere face challenges in learning. Each year of progression in learning combines demands for increasing independence, individual responsibility, capacity, and strategy to continue to achieve as the years advance, regardless of location, discipline, or culture (Brown et al., 2014; Hattie, 2009; Hattie, 2019; Norton, 2016). While there are specific skills and aptitudes that are developed as students progress through different levels of education, there are still some basic patterns that support learning that remain applicable independent of level. The products presented here are intended to provide something of that basic pattern of learning that could be adopted or adapted to any level of learning.

### **4.3. Potential for International Students in a Western Learning Environment**

International education is a common and increasing phenomenon worldwide. It is not without its challenges for even the most apt students. Moving overseas to study, away from family, into a different culture, language and teaching and learning styles along with their transition from secondary to tertiary education can combine, posing potentially complex challenges for those studying away from home (Norton, 2016). International students often report that the learning styles and patterns developed in their home countries no longer work for what they need in their new country's education system (Bannink, 2010; Smith and Hu, 2013; Wu and Tarc, 2016). As such, specifically acknowledging and addressing this need and being able to provide practical and appropriate solutions is important for those teaching in this environment.

### **4.4. Cross-cultural Suitability**

As a global community of educators, we span a world of cultures and ethos. Many of our classrooms can contain their own microcosms of cultural diversity and as such contain broad ranges of influences on our students and their learning. While the elements of the weekly learning framework and study tips collection presented here are more overtly Western in their origins, extensive reading was unable to uncover any evidence to suggest any aspects of the framework or the framework itself would be contra to any culture's ethos, principles, or practices. For example, they can directly synergise with Confucian / Eastern ethos of cultivating a desire to learn, being one's best, applying diligence and valuing knowledge and practices that are gained (Li, 2012), thus supporting their potential for uptake by students of these backgrounds. While the framework itself can be applied cross-culturally, it will be important that educators devise further approaches that are culturally appropriate to support their uptake (Li, 2012; Smith and Hu, 2013).

### **4.5. Socioeconomic Status and Educational Equity**

Socioeconomic status heavily influences the potential for student learning, let alone potential economic attainment (Rickards et al., 2021). Such inequality is behind many social ills (Wilkinson and Pickett, 2011). Additionally, we might consider how many students around the world give up on their potential every year, thinking they can't learn when it is not them but their approach that doesn't work? What impact does that decision have on them? What debts do they incur for qualifications never completed because their approach did not work? What limitations on job prospects and future quality of life for them, their families and their communities are decided by students simply not knowing how to learn? While the phenomenon of attainment in life is extremely complex, one possible lever to help reduce this inequality can be through supporting learning attainment (Stroh, 2015). Devising the constituent parts and the framework presented here to be technology-independent and achievable through approach or mindset alone is intended to support their accessibility and potential for gain irrespective of socioeconomic situation, potentially supporting a reduction in this inequity.

### **4.6. Student and Educator Feedback**

Feedback from students who have used the framework includes saying it improved their learning. Some of them said they were so excited just hearing about it, they wanted to start using it straight away. Speaking with one student who had not done as well as they'd expected on an exam about what had happened, they said, *"That framework you gave us, when I used it, my grades went up. But I stopped using it and my grades went down. I think it's because I stopped using it."* Enquiring as to why the student had stopped using the framework showed a further learning opportunity and potentially valuable life lesson; how to maintain productive engagement across

all subjects when the demands of one or two of them seem to over-take the time available at the exclusion of others. Showing the framework and study tip collection to some past students who have since completed their tertiary studies for their feedback, they said, “*We wish we had this when we went to university. We needed it and we didn’t know it.*” When shown the framework, other educators have also expressed support of it and its potential for benefit to students across different disciplines and age levels. While this feedback is informal, it still suggested that the products presented here were providing something and as such, supporting an interest to share them with the wider educator community.

#### **4.7. Recommendations**

It is recommended that educators consider the materials presented here as a supportive tool in having access to a collection of evidence approaches that support independent learning by students. They are not intended to address in-class learning strategies as these require different strategies and approaches. Further reading by any educator is recommended to best meet both in- and out-of-class learning potential for their students as well as for practices that support optimal, targeted revision leading into an assessment.

#### **4.8. Limitations**

The framework presented here has not been subject to direct research. In light of the intention within which it was developed, being to facilitate access to materials when access may be challenging, it has not considered necessary that the framework itself be verified for efficacy at this stage. The verification of efficacy of each component as presented through the referenced materials by the originating authors is considered to be sufficient in meeting the intent of the product.

### **5. CONCLUSION**

In his Oration opening the final morning of the Australian Council for Educational Leaders conference of 2018, Professor John Hattie asserted that there has been more than enough material developed that we know works to support learning, implementation must now be our focus (Hattie, 2019). Given our imperative to answer our students’ question of, ‘*Can you teach us how to learn?*’, the position we are in from which real and lasting differences can be made (Rickards et al., 2021) and the potentially life-long repercussions of our responses, giving the best quality answers we can is critical. The ‘*TRAI*nERR-MAX Weekly Learning Framework’ and ‘*Super-smart Study Tips Collection*’ are far from being the definitive answer for how to learn. They could, however, be part of the solution.

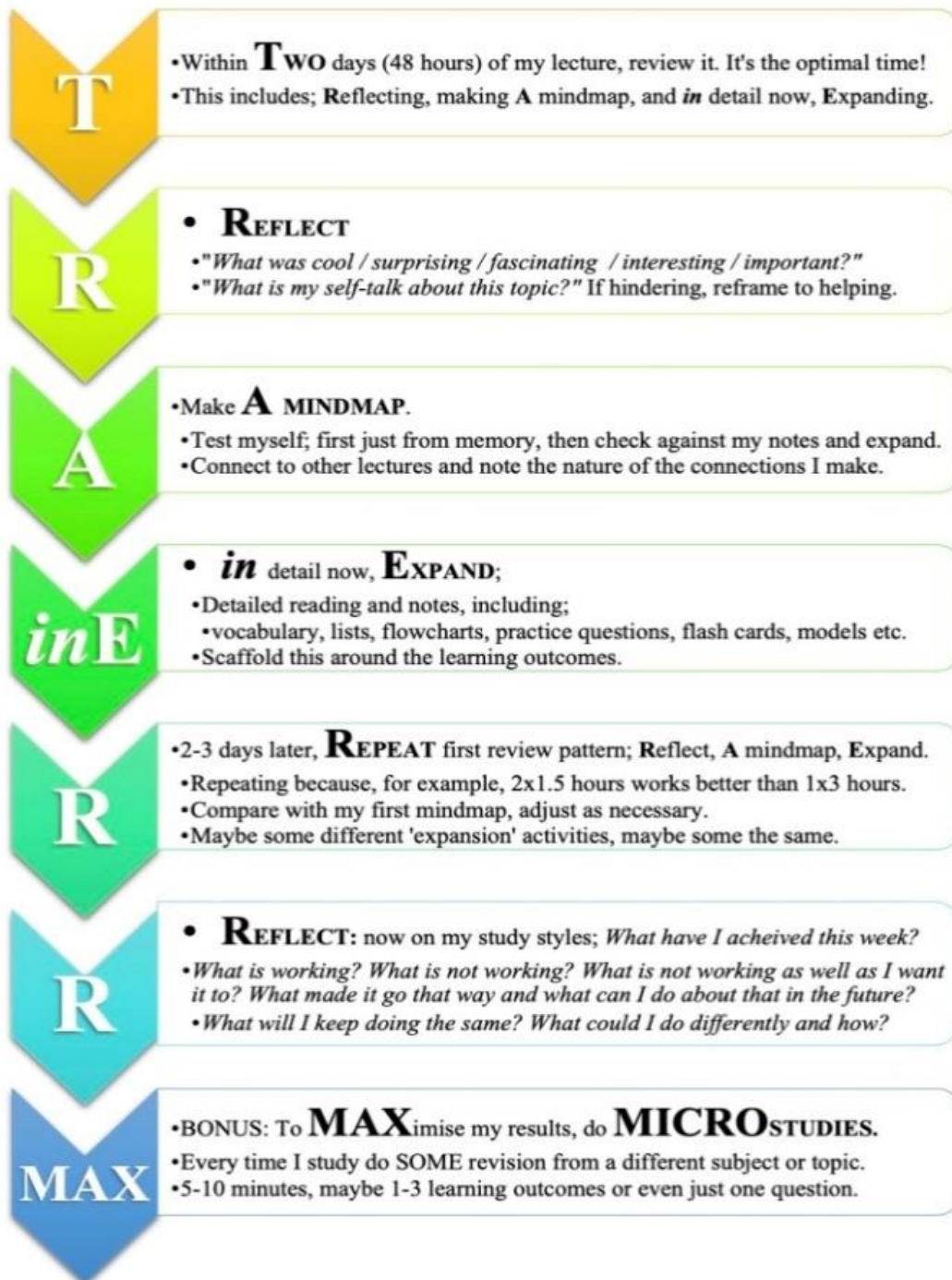


Figure 1: The 'TrainERR-MAX Weekly Learning Framework'



Figure 2: The 'Super-Smart Study Tip Collection'

## REFERENCES

- [1] Ambrose, S., Bridges, M., Dipietro, M., Lovett, M., & Norman, M. (2010). *How learning works: 7 research-based principles for smart teaching*. Jossey-Bass.
- [2] Aronin, S., & Haynes-Smith, H. (2013). Increasing science vocabulary using PowerPoint flash cards. *Science Scope, November 2013*, 33-36. [https://doi.org/10.2505/4/ss13\\_037\\_03\\_33](https://doi.org/10.2505/4/ss13_037_03_33)
- [3] Australian Institute for Teaching and School Leadership (AITSL). (2011). *Australian Professional Standards for Teachers*. AITSL.
- [4] Bain, K. (2012). *What the best college students do*. Belknap Press.
- [5] Bannink, A. (2010). West meets East: on the necessity of local pedagogies. *Journal of Intercultural Communication*, 10(3), 1-11. <https://doi.org/10.36923/jicc.v10i3.508>
- [6] Beesley, A., & Aphthorp, H. (2010). *Classroom instruction that works* (2<sup>nd</sup> Edition). McREL International.
- [7] Belzer, S., Miller, M., & Hoemake, S. (2003). Concepts in biology: a supplemental study skills course designed to improve introductory students' skills for learning biology. *The American Biology Teacher*, 65(1), 30-40. <https://doi.org/10.2307/4451430>
- [8] Benjamin, A., & Bjork, R. (2000). On the relationship between recognition speed and accuracy for words rehearsed via rote versus elaborative rehearsal. *Journal of Experimental Psychology*, 26(3), 638-648. <https://doi.org/10.1037/0278-7393.26.3.638>
- [9] Bjork, R., & Bjork, E. (1992). A new theory of disuse and an old theory of stimulus fluctuation. In Healy, A., Kossly, S. and Shiffrin, R. (eds), *From learning processes to cognitive processes: essays in honour of William K. Estes. Volume 2* (35-67). Erlbaum.
- [10] Bone, E., & Reid, R. (2013). First course at university: Assessing the impact of student age, nationality and learning style. *The International Journal of the First Year in Higher Education*, 4(1), 95-107. <https://doi.org/10.5204/intjfyhe.v4i1.156>
- [11] Boser, U. (2017). *Learn better*. Rodal.
- [12] Breckler, J., Teoh, C., & Role, K. (2010). Academic performance and learning style self-predictions by second-language students in an introductory biology course. *Journal of the Scholarship of Teaching and Learning*, 11(4), 26-43. <https://eric.ed.gov/?id=EJ956751>
- [13] Brown, P., Roediger, H., & McDaniel, M. (2014). *Make it stick: the science of successful learning*. Belknap Press.
- [14] Bungay Stanier, M. (2016). *The coaching habit; say less, ask more & change the way you lead forever*. Box of Crayons Press.
- [15] Caine, R., Caine, G., McClintic, C., & Klimek, K. (2016). *12 Brain/mind learning principles in action: teach for the development of higher-order thinking and executive function*. Corwin Press.
- [16] Cakici, Y., Aricak, O., & Ilgaz, G. (2011). Can attitudes towards biology course and learning strategies simultaneously predict achievement in biology? *Egitim Arastirmalari-Eurasian Journal of Educational Research*, 11, 31-48.
- [17] Carey, B. (2015). *How we learn*. Pan MacMillan.
- [18] Cherry, K. (2019). *How to become a more effective learner*. Very Well Mind. <https://www.verywellmind.com/how-to-become-a-more-effective-learner-2795162>
- [19] Christen, W., & Murphy, T. (1985). Learning how to learn: how important are study skills? *NASSP Bulletin*, 69(483), 82-88. <https://doi.org/10.1177/019263658506948313>
- [20] Crockett, L., Jukes, I., & Churches, A. (2011). *Literacy is not enough; 21<sup>st</sup>-Century fluencies for the digital age*. 21<sup>st</sup> Century Fluency Project, Sage.
- [21] Duckworth, A. (2017). *Grit, why passion and resilience are the secrets to success*. Vermillion.
- [22] Dweck, C. (2006). *Mindset*. Ballantyne Books.
- [23] Erlauer, L. (2003). *The brain-compatible classroom: using what we know about learning to improve teaching*. ASCD.
- [24] Fazzino, E. (2017). *How to study effectively according to science: psychological research uncovers the best strategies to approach learning*. Science Communication. <https://blogs.unimelb.edu.au/sciencecommunication/2017/10/21/how-to-study-effectively-according-to-science-emma-fazzino/>
- [25] Goodwin, B. (2014). Which strategy works best? *Educational Leadership*, October 2014, 77-78. <https://www.ascd.org/el/articles/which-strategy-works-best>
- [26] Goodwin, B. (2018). *Out of curiosity; restoring the power of hungry minds for better schools, workplaces and lives*. McREL International

- [27] Goodwin, B., & Hein, H. (2016). The X-factor in college success. *Educational Leadership, March 2016*, 77-78. <https://www.ascd.org/el/articles/the-x-factor-in-college-success>
- [28] Goodwin, B., Gibson, T., & Rouleau, K. (2020). *Learning that sticks: a brain-based model for K-12 instructional design and delivery*. Association for Supervision & Curriculum Development.
- [29] Hattie, J. (2009). *Visible learning*. Routledge.
- [30] Hattie, J. (2019). Implementing, scaling up, and valuing expertise to develop worthwhile outcomes in schools. *ACEL Monograph number 58*, Australian Council for Education Leadership. [http://www.acel.org.au/accel/ACEL\\_docs/Publications/Monograph/Monograph\\_58\\_2019.pdf](http://www.acel.org.au/accel/ACEL_docs/Publications/Monograph/Monograph_58_2019.pdf)
- [31] Heath, C., & Heath, D. (2008). *Made to stick; why some ideas take hold and others come unstuck*. Random House Books.
- [32] Heath, C., & Heath, D. (2010). *Switch: how to change things when change is hard*. Random House Books.
- [33] Heath, C., & Heath, D. (2013). *Decisive; how to make better choices in life and work*. Random House Books.
- [34] Jensen, E. (2008). *Brain-based learning: the new paradigm of teaching*. 2<sup>nd</sup> Edition. Corwin Press.
- [35] Kornell, N., & Bjork, R. (2008). Learning concepts and strategies: is spacing the enemy of induction? *Psychological Science, 19*(6), 585-592. <https://doi.org/10.1111/j.1467-9280.2008.02127.x>
- [36] Leyden, A. (2019). *20 study hacks to improve your memory*. GoConqr. [www.goconqr.com/en/examtime/blog/study-hacks/](http://www.goconqr.com/en/examtime/blog/study-hacks/)
- [37] Li, J. (2012). *Cultural foundations of learning*. Cambridge University Press.
- [38] Marginson, S. (ed.) (2013). *Tertiary Education Policy in Australia*. Centre for the Study of Higher Education, University of Melbourne.
- [39] Medina, J. (2014). *Brain rules: 12 principles for surviving and thriving at work, home and school*. Pear Press.
- [40] Miyake, A., Friedman, N., Emerson, M., Witzki, A., Howerter, A., & Wager, D. (2000). The unity and diversity of executive functions and their contributions to complex 'frontal lobe' tasks: a latent variable analysis. *Cognitive psychology, 41*, 49-100. <https://doi.org/10.1006/cogp.1999.0734>
- [41] Norton, A. (2016). *Mapping Australian Higher Education 2016*. Grattan Institute.
- [42] Oakley, B., & Sejnowski, T. (2018). *Learning how to learn*. Penguin Random House.
- [43] OECD (2015), *Education Policy Outlook 2015: Making Reforms Happen*. OECD Publishing. <https://doi.org/10.1787/9789264225442-en>
- [44] Pink, D. (2009). *Drive, the surprising truth about what motivates us*. Cannongate Books.
- [45] Pink, D. (2014). *To sell is human*. Cannongate Books.
- [46] Pomerance, L., Greenberg, J., & Walsh, K. (2016). *Learning about learning: what every new teacher needs to know*. National Council on Teacher Quality. <https://files.eric.ed.gov/fulltext/ED570861.pdf>
- [47] Quinnell, R., May, E., & Peat, M. (2011). Conceptions of biology and approach to learning of first year biology students: introducing a technique for tracking changes in learner profiles over time. *International Journal of Science Education, 34*(7), 1053-1074. <https://doi.org/10.1080/09500693.2011.582653>
- [48] Race, P. (2003). *How to study: practical tips for students*. Blackwell.
- [49] Race, P. (2014). *Making learning happen: a guide for post-compulsory education* (3<sup>rd</sup> Edition). Sage.
- [50] Rickards, F., Hattie, J., & Reid, C. (2021). *The turning point for the teaching profession; growing expertise and evaluative thinking*. Routledge.
- [51] Roediger III, H., & Karpicke, J. (2006). The power of testing memory: basic research and implications for educational practice. *Perspectives on Psychological Science, 1*(3), 181-210. <https://doi.org/10.1111/j.1745-6916.2006.00012.x>
- [52] Smith, S., Glenberg, A., & Bjork, R. (1978). Environmental context and human memory. *Memory and Cognition, 6*(4), 342-353. <https://doi.org/10.3758/BF03197465>
- [53] Smith, J., & Hu, R. (2013). Rethinking teacher education: Synchronizing Eastern and Western views of teaching and learning to promote 21<sup>st</sup> century skills and global perspectives. *Education Research and Perspectives, 40*, 86-108. <https://doi.org/10.3316/aeipt.203882>
- [54] Stroh, D. (2015). *Systems thinking for social change*. Chelsea Green Publishing.
- [55] Taylor, K., & Rohrer, D. (2010). The effects of interleaved practice. *Applied Cognitive Psychology, 24*, 837-848. <https://doi.org/10.1002/acp.1598>

- [56] Trifone, J. (2006). To what extent can concept mapping motivate students to take a more meaningful approach to learning biology? *The Science Education Review*, 5(4), 122.1-122.23. <https://eric.ed.gov/?id=EJ1057149>
- [57] Uno, G. (1988). Teaching college and college-bound biology students. *The American Biology Teacher*, 50(4), 213-216. <https://doi.org/10.2307/4448711>
- [58] Wilkinson, R., & Pickett, K. (2011). *The spirit level: why greater equality makes societies stronger*. Bloomsbury.
- [59] Wu, X., & Tarc, P. (2016). Translations and paradoxes of 'Western' pedagogy: Perspectives of English language teachers in a Chinese college. *L2 Journal*, 8(4), 55-75. <https://doi.org/10.5070/L28430214>

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