PROFESSIONAL SUPPORT
AND WELLBEING SERVICE

Maximising the Effectiveness of your Revision Workbook

Professional Support and Well-being Service
Health Education England, Thames Valley

Contents

Introduction

In order to reach this stage of your career, you have already passed many exams, and it is possible that you have never failed one. It can be a very unpleasant surprise, therefore, when you fail or find it particularly hard to study for postgraduate level exams. However, these exams are quite possibly the hardest exams you have ever sat and you are also contending with work demands, training demands and home demands. For many trainees these exams are the first time they have had to study whilst working full time or with children at home. This has an inevitable impact on your ability to find quality revision time whilst balancing the other demands on your time and your own mental health. The time you have available to revise is so limited it is highly valuable and you want to use it in a way that is maximally effective.

Aims for the Workbook

The aim for this workbook is to use what we know about memory to inform your revision planning. Memory is a phenomenal resource but it is fallible and can let you down when you need it the most. Your hippocampus continues to have a high level of plasticity throughout your adult life, so even though it can feel like your brain cannot work as quickly as it did when you were younger, this is not the case. It is more likely that your brain is working harder than ever but it is also worrying about the patient you saw this morning, the case based discussion you haven't completed yet and what to make the kids for dinner.

Throughout this booklet you will be asked to answer the question: 'How might you adapt your revision plan?' For each section, read the ideas and consider any adaptations that you might make, keep an open mind to the options available. By the end of the workbook, you should have constructed a list of potential ways you could change what you do to make your revision more focused and effective. The final question at the end of the workbook is 'How will you adapt your revision plan?' You should revisit all the possible changes that you have identified and select those that you think will be most impactful for your revision in your context.

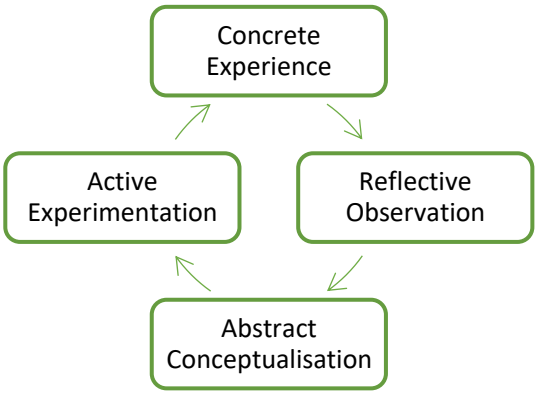
Dyslexia or other Learning Difficulties

If you have failed an exam, or if you are having particular difficulties at work, it is worth considering if you might have dyslexia or a similar learning difficulty that has not been previously identified in your education. It is not uncommon for people with high intelligence to have identified their own strategies and found adaptations that have helped them manage up to a really high level. However, eventually they reach a point where these strategies are not quite enough and some alternative strategies or some extra time in an exam may help to level the differences. If you think that this may apply to you then make contact with the PSWS who can offer screening to see if you might want to take it further for a full assessment.

Adult Learning

Experiential Learning

Educational literature often discusses the idea of learning preferences when it comes to effective learning. One of the most common are those developed by Honey and Mumford based upon Kolb's experiential learning cycle. The experiential learning cycle describes a pattern of learning from experience that involves reflection, consideration of theory, models and ideas followed by trying out some new ideas or options. This cycle may start from an experience but it may also be prompted to begin by reading of new theories or ideas that you want to try out in practice.



This experiential process is effective for adults who have significant amounts of information already stored in their memory. The combination of the real-life basis with reflective thinking and application of theoretical knowledge helps the brain form links with other memories. The increased linkages facilitate future retrieval of that memory because there are more 'cues' that can trigger the recall of the information. This is where the concept of PUNS and DENS can be effective:

Patient's	Doctor's
Unmet	Educational
Needs	Needs

Patient contacts as a resource for gaps in knowledge are effective because they help create these links; you recall the condition or presentation in combination with the patient experience. However, generally they can only act in support of study, most trainees will not see patients with every possible presentation of all the relevant conditions that will be covered by the assessment. Therefore, PUNs and DENs can fill in gaps and should be harnessed as part of a revision strategy that works in collaboration with scheduled study. Allowing some flexible time in your revision plan to accommodate these naturally arising learning points can be a sensible approach to take advantage of the memories already stored.

How **might** you adapt your revision plan?

Learning Preferences

Honey and Mumford suggested that from this cycle, four learning preferences could be identified. These exist along two axes:

The theory describes how everyone has one or two dominant preferences for their learning. Activists like to learn by doing, role plays and having a go. Whereas reflectors prefer a thoughtful approach with opportunities to read and learn through one to one discussion. Pragmatists like ideas to be applied to real life examples working out general principles from a variety of practical examples. Whereas theorists like to explore abstract ideas and models as general principles before considering application to real life contexts.

To undertake the full experiential learning cycle requires the skills of each of these preferences, so it is most likely important that individuals develop skills in all of these learning preferences. The evidence suggests that while people report better learning when they learn in a manner that matches their preference, when tested they have not actually learned any more. Therefore, while the people do seem to identify preferences, this probably represents a comfort zone rather than an enhanced learning process.

Another common learning preference classification is VARK. This describes four different modalities of learning and suggests that we have a preference for one or two of them over the others.

V – Visual: Learning material that is presented in a pictorial or graphic manner

A – Auditory: Learning by hearing information presented

R – Read/write: A preference for material presented as text

K – Kinaesthetic: No specific preference for visual, auditory or read/write modes but a preference for any of these modes linked to real life experiences

Again, the evidence seems to suggest that the best learning occurs when a combination of modalities are used, even if you feel that you have strong preference.

Instead of attempting to meet a particular learning preference, a more effective strategy would be to incorporate different strategies for your learning. This will take advantage of the opportunity for comprehensive learning that maximises the number of neuronal connections forming as you create memories and the cues that will prompt the retrieval of that memory.

How **might** you adapt your revision plan?

Long-Term Memory

A combination of experimental work and studies with amnesiac patients have provided a firm basis for the historical theory of a memory system that is constructed from multiple components. At the very basic level, this is the division into Long Term Memory and Short Term Memory or Working Memory. Structurally, Long Term Memory can be further divided into a number of different types of memory – each associated with different areas or networks in the brain. However, from a learning and revision perspective, it is more useful to consider the strength of memories formed, and most importantly how the strength of a memory in the Long Term Memory can be increased.

Storage Strength and Retrieval Strength

Memories can be considered to have two forms of 'strength': Storage strength and retrieval strength. The strength of a memory increases through Long Term Potentiation – each time information is encountered or a memory is retrieved the neuronal connection increases in strength.

Storage strength increases each time a concept is revisited, every time you experience the information, in whatever manner, the storage strength will get a boost. There is an increasing strength of the neuronal connections 'within the memory'. The strength of storage can be felt as a 'familiarity' with the information.

Retrieval strength is the ease with which you can recall the memory: the strength of the neuronal connections linking that memory to others that could help cue the retrieval. Retrieval strength fades after each use. This is likely an evolutionarily favourable factor to avoid our minds being overwhelmed by too much easily accessible information.

In an exam situation, revision practices will need to support the development of both storage and retrieval strengths. A number of strategies have been found experimentally to improve recall, they often seem to make things more difficult initially but provide better outcomes and are therefore sometimes referred to as desirable difficulties.

How **might** you adapt your revision plan?

Desirable Difficulties

Making things more difficult may seem counter-productive, and certainly you should avoid overburdening yourself in your revision. However, there are some key points of increased difficulty that are desirable – when some things are a little harder in your revision, future recall is enhanced.

Testing

Covering the material repeatedly will help build storage strength and doing this in different ways enhances the connections formed around the memory. However, it only builds storage strength and success in an exam will depend on retrieval of the information. To build retrieval strength you have

to repeatedly recall the information. This may be in the form of practice questions and question banks – these are a good way to test your knowledge and often reflect the unpredictable and mixed nature of content that you will experience in the exam. However, there are limits to the actual amount of content that will be retrieved, especially if you are answering multiple choice type questions that only require retrieval of relatively small pieces of knowledge in comparison to the total knowledge required. Therefore, you may want to incorporate other ways to build up retrieval strength that require retrieval of broader knowledge as well. For example, select a suitably sized topic and write everything you know about it onto a blank sheet of paper. Then using a different colour pen, go back through it with a textbook, guideline or other reference and add more detail that you couldn't retrieve. Repeat this activity a few days later and hopefully, as your retrieval strength builds you will be able to put more onto the blank sheet of paper first time round. If you have a partner to work with, give them the textbook pages or similar and you tell them everything you know, they can then prompt you with questions to fill in gaps. Or even record yourself saying everything you can retrieve on a topic, when you listen back have the written resource in front of you and identify those things that you couldn't retrieve the first time.

How **might** you adapt your revision plan?

Vary the context

Traditional advice for revision is to set up a clear workspace to study in to help get you in the right frame of mind for working. There may be benefits to this approach, especially if there are other distractions at home like small children. However, from a memory perspective, it is actually more beneficial to vary the context you are learning in. By varying the context of learning, you are again increasing the number of cues associated with the memories. You may find yourself recalling that, the information was written on the top right hand side of your notes page, and also that you were revising at the dining room table, in the doctors mess or in a coffee shop at the time. You will obviously want to avoid highly distracting areas because struggling to ignore distractions will limit your attentional focus, but there may be other variations that you can add in to help increase cues for the memory.

How **might** you adapt your revision plan?

Interleaving vs blocking

One of the perhaps surprising aspects of learning identified through experimental work has been that dividing concepts into clearly defined different topic areas may feel efficient but may not be the best way to learn long term. Take, for example, three conditions that overlap and can be easily confused: conditions A, B and C. Traditionally you might split them up so that you study them discretely from one another to help you differentiate them, studying them in a pattern like this: A, A, A, B, B, B, C, C, C. However, when there are obvious potential overlaps or confusion, studying them in this blocked manner means you already know that you are studying condition A – you don't have to learn the first step in the decision making process, is it A, B or C? So, although initial learning feels like it takes longer, an interleaved approach: A, B, C, A, B, C, A, B, C, mixing them up together is actually more effective longer term.

How **might** you adapt your revision plan?

Distributed vs massing practice

A final desirable difficulty, requires a certain amount of pre-planning in your approach to revision. After an initial study period the storage and retrieval strengths both get a boost. Storage strength will then remain higher but retrieval strength will fade over the following few days. There is an opportunity to gain an extra boost in subsequent retrieval strength if you re-cover the material 3 - 5 days later. Taking this approach would mean you build in opportunities to recap learning (preferably through testing – see the first desirable difficulty) 3 - 5 days after you first covered the material, this is called distributed practice. People tend to be goal oriented in their revision, aiming to cover a section and tick it off and move on, this is highly rewarding. However, there is value in reinforcing that learning a few days later to enhance future retrieval of the information in your exam.

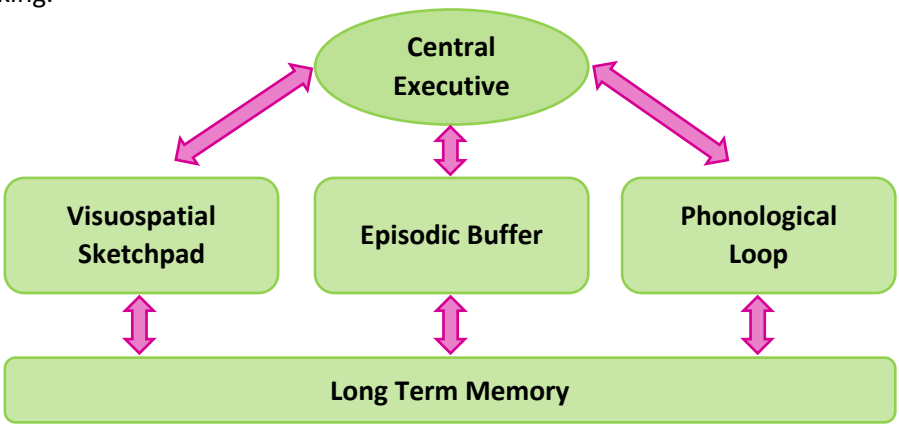
How **might** you adapt your revision plan?

Working Memory

Multi-Component model

The Working Memory is the part of your memory that manipulates incoming information from your senses along with information pulled from your Long Term Memory. It is often referred to as Short Term Memory, but it is more specific than that, the Working Memory is not just the short term recall of information, like rehearsing a lengthy number to yourself while you find a pen to write it down, it is the area of the brain that uses information to solve problems and make decisions.

The multi-component theory of Working Memory describes how different areas of our brain seem to function independently but collaboratively to manipulate incoming information. In broad principles, the visuospatial sketchpad records visual and spatial information and feeds that to the central executive while the phonological loop records auditory information and feeds that to the central executive. Both use some information from either visual or language centres of memory storage to facilitate this process. The episodic buffer acts to bring in any other relevant information from the Long Term Memory. The central executive uses this information for high level cognitive functions – the type of thinking usually required in high level exams like problem solving, prioritisation and decision making.



This model shows the importance of using multiple modalities for learning. Incorporating auditory and visual information into the processing can effectively enhance your learning. You can improve your chances of cueing information from the Long Term Memory when you need it in the exam by building learning around auditory and visual forms of learning. This may involve discussion, lectures, podcasts or even listening to your own recording of notes to facilitate auditory learning. For visual learning, you can enhance your note taking using pictograms, images, colours and structure. It is worth noting that reading test is actually processed using auditory areas of the brain because the text is 'heard'.

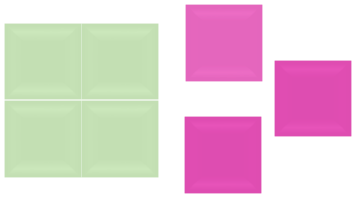
How **might** you adapt your revision plan?

Cognitive Load Theory

The Working Memory has a very limited capacity, over the decades the precise limit has been varyingly identified somewhere between 4 and 7 units of information plus or minus two. Precision in this type of experimental work is hard to generalise but regardless of the exact capacity, there is clearly a limit on the amount of information that the Working Memory can hold and it is not very high.

What does seem consistent though, is that this limit is on the number of units of information that can be manipulated by the Working Memory, but not on the size of the unit. Experts in a subject are able to make links and see patterns that link information together into bigger units.

A novice will view these four units of information separately and this will 'fill up' the Working Memory capacity



An expert recognises the links between the information and the Working Memory treats them as a single unit. This leaves 'room' for three further pieces of information.

Written exams, especially multiple choice questions, will often require you to hold onto a number of different pieces of information at once: the data you get in the question stem must be held in the Working Memory whilst you read through potential answers and make comparisons to work out which is the best answer. If you can make links and patterns during your revision, you will be better placed to hold onto relevant information, without missing bits, and manipulate it to solve the problem posed by the question.

One of the best ways to support the formation of links between information is by using mind maps which visually mirror the way memories are linked through neuronal connections. Text is minimised, where possible limited to single words, to reduce any unnecessary complexity. The construction of mind maps can be time consuming, there are a number of free software programmes that can speed up the process. Whilst mind maps are not always the best way to represent the information being studied, they are one of the ways to enhance learning that consistently seems to improve performance at recall.

How **might** you adapt your revision plan?

Managing Exam Stress

Mental and Physical Health

Exams are inevitably stressful and if you have previously failed the exam in question this can further add to the stresses of balancing work, training and study. You are the expert in yourself and you may benefit from a little reflection on what you are like when you are stressed, what the early indicators are and what has worked in the past to reduce your stress levels. There are two general aspects to managing the anxiety and stress associated with exams: the stress that will build during the revision period and the specific peak of anxiety on the day.

Stress in the build up to your exam

When you are not focused on anything, your brain will shift into using the Default Mode Network. The DMN is associated with mind wandering and ruminating thinking that can occur with anxiety. When you need to focus the DMN should be inhibited so that other parts of your brain associated with attention and focus can take control. However, this inhibition of the DMN is impaired when you are stressed, this means that if you are stressed you may find it harder to focus and to keep your mind on the problem. If you can calm your stress levels in the run up to the exam you will be in a better position to maintain focus in your revision and in the exam.

It can be tempting to drop hobbies and exercise when you are studying for an exam, to some extent you have to balance the reality of the time you have available and you will be better placed once you get to the exam if you feel you have prepared. However, if the preparation process has placed you under stress, you may find that the extra study has not paid off because your brain is responding to the increased cortisol in your system. Building in time to relax to improve mental and physical health is an important aspect of effective revision planning as well.

How **might** you adapt your revision plan?

Stress on the day of the exam

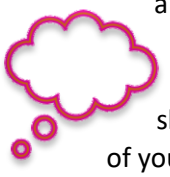
Stress on the day of your exam can be advantageous up to a point, moderate levels of stress have been shown to enhance Working Memory function but at high levels of stress the ability to process lots of different pieces of information is impaired. This has been shown to lead to reduced performance or, through the use of fMRI scanning, an increase in effort to sustain the same level of performance. Either of these consequences are undesirable in an exam situation where focus may required for a long time. If past exam experiences suggest that stress on the day of an exam will be unhelpful, or if a previous failure of this exam may heighten a stress response on the day, you may find it useful to put in place some mindfulness exercises that you can do in an exam context.

Mindfulness exercises can be a quick and simple way to calm a stress response, they do not have to be complex or lengthy and there are any number that you could incorporate into your day to day life and that could be done at your desk or between stations in an exam.

- Breathing exercises – close your eyes or gently look down and focus on your breathing. Feel the air going in through your nose, past the back of your throat. Notice the feel of the lift of your rib cage, the downward draw of your diaphragm that creates the vacuum for air to rush into. Feel the relaxation of your chest as it drops inward and downward and creates a pressure to push the air back out again. Sense the temperature of the air drawn in and pushed out and slow down the process over the course of a minute. If your mind wanders, and it probably will, gently pull it back to focusing on your breathing.

- Focus exercises – this can be done with any object that you might have available but in an exam situation you may find this limited so a focus exercise can be done with just your hand. Take your left hand and really focus your attention on it for a while, take note of the sensations in your hand, any feelings you get as the blood flows around your fingers and the palm of your hand. Use a finger on your other hand to 'draw' around your hand, do this slowly, noticing the changing sensation and pressure as your finger moves around the edge of your hand.

- Thinking exercises – to undertake this type of exercise you will need to select a mantra, learn a short poem that has meaning to you or develop a list of important words. Once you have them committed to memory, spend up to a minute repeating it slowly over and over in your mind. Do this whilst allowing your breathing to slow, let your shoulders drop, unclench your jaw, drop your tongue from the top of your mouth and relax your face.



There are many, many other mindfulness exercises that you can do to help you reduce your stress in the exam you just need to find what works for you. They are not exercises that you can start on the day of the exam, remaining focused and mindful takes practice. Your mind is like a naughty puppy that will not stay sitting on a mat, it will wander off and you have to gently put it back where it should be. Over time, your mind will wander less as it becomes trained, like the puppy, to stay focused on the exercise you are completing.

How **might** you adapt your revision plan?

Your prior experiences

So far this booklet has focused on what experimental evidence suggests about how memory works and what implications this might have for effective revision. This provides some practical suggestions and may even cause us to revisit some assumptions we make about the way that we learn. However, to reach this stage of your training, you have already studied and successfully passed many exams. In your past you have a number of successful revision periods to draw on. Sometimes former strategies are no longer feasible due to changes in context: full time work, children and other aspects of adult life can require adjustments to the revision process. However, it is also important to maintain those things that have worked before.

Consider exams you sat at different stages of your career so far: at school, at university, previous membership exams. Think around the following questions to think if there is any reason to revisit a former strategy:

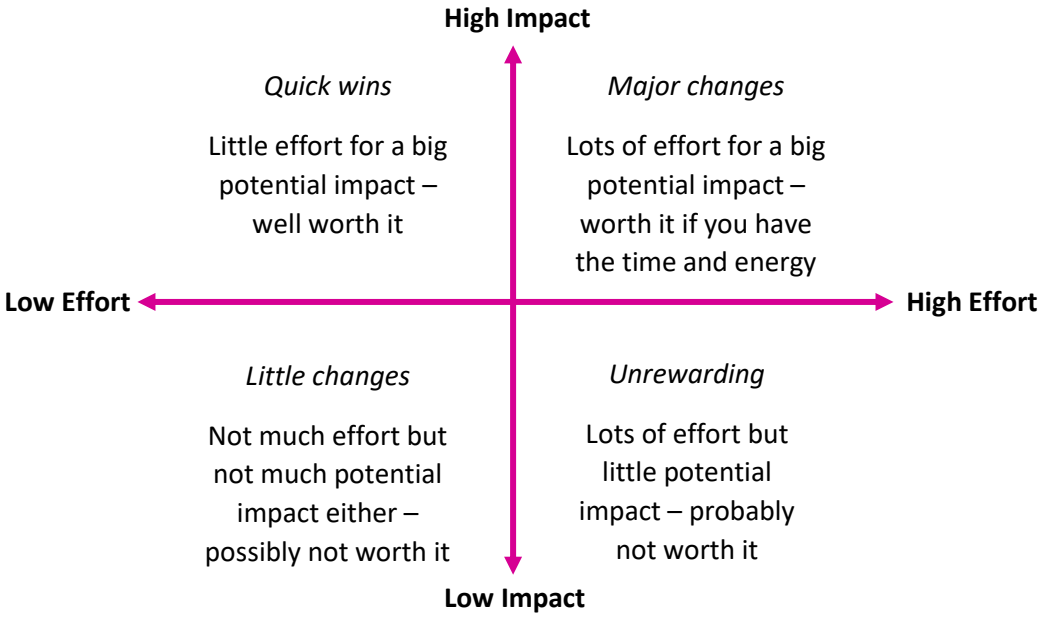
- Assuming you took some sort of notes, how did you do this? Did you use colours, how did you structure them?
- Did you display your notes at all?
- How did you use practice questions?
- What time in the day did you work best?
- What did you do in the last week before the exam?
- What did you do to relax or keep yourself calm during your revision?
- What did you do to relax or keep yourself calm in the final hours before the exam?

How **might** you adapt your revision plan?

What changes are you going to make?

Throughout this booklet you have hopefully identified a number of practical ways that you could adapt your revision process. However, it is unrealistic and overly complicated to change too many things at once. Look back through each section and select up to three or four things that you will attempt to incorporate into your revision plan.

Consider an impact/effort grid to help prioritise your options for change:



How **will** you adapt your revision plan?

1.

2.

3.

4.