Problem Solving and Thinking Skills

Problem Solving skills need to be taught specifically alongside real life opportunities in order for our Learners to be given essential life skills in what to do when things don't go quite the way they planned. This is not an option but a necessity.

THE EQUALS FIVE TIERED APPROACH to My Thinking and Problem Solving

TIER 1 Memory building

Introduction of the task; repetition (as many times as required) of the task; understanding what is required to complete the task. The learner might not be introduced to the problem until you are reasonably sure that they can complete the task without support or, if physical support is needed because of physical disability, can recognise that 'something is wrong'.

TIER 2 Sabotage!! Recognition of a problem

Recognising that something is different or that a required element of the task is not to hand; recognition that asking for help from a member of staff is a minimum requirement for solving the problem.

TIER 3 Independent solutions

Recognition of what the problem is and that the problem can be resolved without asking a member of staff for help; evaluating this one solution; questioning whether the same problem can be avoided in the future.

TIER 4 Generalisation

Recognition that a solution to a similar but unrelated problem can be adapted; recognition that there may be several possible solutions to the problem, including asking peers for help; evaluating whether the solution chosen was the best one.

TIER 5 Self-belief and confidence

Being secure in their choice of solution even when challenged by a member of staff or someone the learner considers to be in authority; recognising that there might be no solution that is immediately available and being secure in this choice when challenged. These might be considered to be higher order problem solving skills but they are essential in the long term to truly enable learners to be independent.

The 'no biscuits in the biscuit tin' example

TIER 1

Memory building involves introduction of the task, namely to be involved in getting biscuits from the cupboard to put in the biscuit tin at the beginning of the day in preparation for snack time. The learner has to be taught a potential solution to the problem before the problem occurs.

TIER 2

Sabotage and recognition of a problem sees the biscuit tin handed out ready for the learners to open at snack time, but no biscuits are in the tin. A variation of this for more able learners or a mixed ability group might be for two biscuits to be in the tin, when there are 6 learners.

TIER 3

Independent solutions sees the problem recognised, but the member of staff unable to give help because they don't know the answer. You are looking for learners to go to the cupboard to get the biscuits without being told to do so. As this problem might now occur regularly you are also looking for some discussion around how to plan ahead to avoid the problem in the future; that is for one or more of your learners to put biscuits in the tin at the beginning of the day without being told to do so, and perhaps for other learners to check that this task has been completed, again, without being told to do so.

TIER 4

Generalisation might now see an extension of the problem. For example, there are no biscuits in the tin and no biscuits in the cupboard. At this stage of generalisation you would expect pupils to make connections where something is completely missing or in very limited supply, that is, for at least one learner to look for biscuits in another cupboard.

There are probably two levels of generalisation that we could look for; that is:

1. generalising a particular problem, for example, in terms of biscuits and cupboards – if they're not in this one, they might be in another one and
2. generalising to looking for anything that is not in its usual place. The latter generalisation skill is of course to be aimed for, but it may be that this is acquired over time through the practicing of LOTS of particular generalisations. In the examples below, we have therefore confined ourselves to exampling particular generalisations, but this should not stop you looking for the wider generalising and praising the heavens if and when this occurs!

TIER 5

Self-belief and confidence sees the learner challenged when a solution is found so, for example2, *Are you sure these are the class' biscuits?"* when a packet is found in another cupboard and "*how do you know?"* Or recognising, that having searched every cupboard, there are no biscuits and having the confidence to be sure when challenged. It is important to note that this particular step is about self-esteem, self-belief and self-confidence, not about being right. That is, for learners with SLD it might be essential to develop confidence in their own decision making even when they are wrong! This might therefore mean accepting the '*I am right'* statement and perhaps later, and as subtly as you can, indicating that it might not have been the right answer. In the 'no biscuits' scenario for example, staff might know that the learner has not conducted a thorough enough search of the other cupboards, but accept that the learner believes there are no biscuits to be found. Later, someone might stumble upon the biscuits and gently, point this out to the learner, with the expectation that self-confidence has not been dented, but that the learner might carry out a better search next time.

There are bound to be times when potential danger or potential damage to equipment might occur if learners were allowed to make wrong decisions, in the kitchen for example, or perhaps when charging phones and tablets. Clearly this is a judgment call because we are NOT suggesting that you allow something to happen that might be unsafe or will cost considerable amounts of money to repair or replace.

Getting to this higher stage will be extremely difficult for most learners with SLD, though that doesn't mean that we shouldn't aim high. Nonetheless, it is not expected that the learner will be challenged every time they make a good decision. Self-confidence and self-belief are fragile things and need to be built up slowly and securely; we break them at our peril! For this reason we would not put Tier 5 into every scenario. It is not required that learners are constantly challenged and staff should think very carefully before doing so.

- The desirability of failure. It is vital that staff accept that having a try at a solution, even when the 'try' is wrong and ends in failure, is much better than (i) staff doing it (ii) staff giving obvious clues ('have you looked properly?' or 'have you looked in this cupboard?') (iii) not trying to solve the problem at all. Pupils should always be praised for their efforts.

The following outcomes have been written on the basis of six repeatable and variable problems that have an infinite number of variations depending on the motivating factors of individual learners. These should not be taught discretely, but as opportunity and motivation (to think and solve the problem) arise.

Learning Intentions	Teaching ideas and activities	Notes
To gain access to my favourite……. toy, snack, drink, i-pad, piece of flappy string, etc. To acknowledge that I want/need equipment To get the resources and equipment I want/need To communicate a want/need	You need to know what your pupil is motivated by and use this to support solving the problem This may be very different for different individuals. Begin with what a pupil wants rather than something they need. Recognising a need is a higher functioning skill **TIER 1 Memory Building**. Introduction of the task, to be involved in getting the favoured item at a regular time (snack, lunch, leisure, and playtime).This might be prompted by a visual timetable or some other regular indication. The learner may need physical or verbal prompting to get the item, but must be involved in the process many, many times. The item must be independently accessible. If it cannot be accessible (because for example, the i-pads need to be locked away) it is not an appropriate item to use. **TIER 2 Sabotage and recognition of a problem**. Play/lunch/snack is announced without any prompt to get the item concerned. The minimum required here is for learners to recognise that 'my favourite….' is missing, that there is a problem and they need to do something about it. This might be (as a minimum) to indicate that they do not have their favourite….. ' and to ask for help from a member of staff. In this case the learner might be assisted to search for their favourite……. We can see that the whole class having this time at the same time can be useful in providing modelling opportunities to the less able learners. Staff must recognise that learners may solve this problem by doing something else or by doing nothing! Whatever happens, staff should avoid prompting! **TIER 3 Independent solutions**. The problem is recognised, but the member of staff unable to give help because they don't know the answer. You are looking for learners to go to the cupboard, drawer, toy tray to get 'my favourite….' without being told to do so. **TIER 4 Generalisation** This might now see an extension of the problem. For example, 'my favourite……' is not in its usual place. A potential solution should not need to be taught because you are looking for generalisation skills, that is, for the learner to look in another cupboard.	The accessibility exception might be for those who are not physically able to take themselves to the place, open drawers, open cupboards, in which case the school should look to putting the item in a place that is accessible or adapting the physical environment before relying on teaching the learner to ask for help. Not finding my favourite toy, snack, drink, i-pad, piece of flappy string etc might well have unintended consequences for the class staff which has to be prepared for. Class staff will know their learners best and should have strategies in place. It is however vital that the missing item is not magically found in order to avoid a potential crisis point for the learner.

Learning Intentions	Teaching ideas and activities	Notes
To find something that is lost.	**TIER 1** To be involved in looking for items when they are lost. Ensure that there are a limited number of places looked in before it's found, and that it is always found in this first stage. It is advisable that items are only lost occasionally, not every day. This intention takes time. This memory building implies that the learner has already gone through the previous learning of gaining access to items and is used to the concept of looking for something. **TIER 2** Sabotage and recognition of a problem sees the regular places where revealing no items or there may be some, but not enough or the wrong size. The minimum requirement here is for learners to recognise that the item has not turned up, they cannot find the item and to ask for help, in which case the learner might be assisted to search for the item. If the whole class have wellington boots to search for at the same time, this can provide modelling opportunities to the less able learners. Staff must recognise that learners may solve this problem by doing nothing, for example not going out in the rain. Staff might have to work on the motivational angle, but should avoid instructing and prompting. **TIER 3** Independent solutions sees the problem recognised, staff unable to give help because they don't know the answer. You are looking for learners to go to the cupboard or drawer to find the item without being told to do so. The learner may need to be prompted to remember where they last had the item, eg, *'I last had my headphones in the hall'*. Alternatively, the learner could find the two wellington boots in different places. **TIER 4.** Generalisation sees an extension of the problem, eg: the item cannot be found in the classroom. A potential solution is for learner to consider remembering when they last had it and check there. The learner may also consider borrowing someone else's, which leads to further problem solving opportunities such as *'Do I have permission?' 'Do they fit me?"* The learner may have to consider what to do if its never found, though we are not suggesting that you permanently lose things deliberately! That is, we would imagine that although these things will inevitably happen naturally, this should not stop staff discussing with the learner what the options might be if it is feared that something is irretrievably lost. **TIER 5** Self-belief and confidence sees the learner challenged when a solution is found, so for example *'Are you sure this is your lunch box?'* when it is found somewhere out of the ordinary and *'How do you know'?* Or recognising that having searched every cupboard for the item, it cannot be found and having the confidence to be sure when challenged. It is important to note that this particular step is about self-esteem and self-confidence, not about being right.	The learner has now moved from 'wanting' to find to 'needing' to find. That is, there is now a connection that has to be established between the item and being able to do something because one has the item, such as eating my lunch, or indeed, not being able to do something because one doesn't have the item, such as, going out to play in the rain with no wellington boots.

Learning Intentions	Teaching ideas and activities	Notes
Recognising that the thing that I want or need is not working, is broken, does not fit etc.	**TIER 1** Memory building involves introduction of the task, to be involved in plugging in, checking leads, switching on equipment. On a basic level, learners might be regularly presented with a pencil that needs sharpening or a pen that's run out of ink. Alternatively, coats that no longer fit the learner can be 'accidentally' re-introduced, with the learner prompted to note the difference and look for the item that does fit. Staff may also prompt the comment that *'we must really throw this away!'* The learner has to be taught a potential solution to the problem before the problem occurs. **TIER 2** Sabotage and recognition sees the switch turned off, even though the learner might have just switched it on, or it is switched off while the learner is making toast. The minimum required is for learners to recognise that something is wrong, that there is a problem, and to do something about it. This might be (as a minimum) to indicate that the toast is not toasting and to ask for help from a member of staff, in which case the learner might be assisted to solve the problem. **TIER 3** Independent solutions sees the problem recognised, but the member of staff unable to give help because they don't know the answer. In this case, you might want to see the learner checking the switch, plug and leads or going to the cupboard for a new pen or sharpening a pencil without being prompted. **TIER 4** Generalisation might now see an extension of the problem. For example, you might be looking for some discussion around how to plan ahead to avoid the problem in the first place; that is for one or more of your learners to check the i-pads and lap-tops are fully charged, without being told to do so, and perhaps for other learners to check that this task has been completed, again, without being told to do so. This might also include practice at what to do if something is actually broken. **TIER 5** Self-belief and confidence sees the learner challenged when a solution is found, so for example *Are you sure this is how you charge the lap-top* and *How do you know?* Or recognising that having charged the lap-top that something else (perhaps outside of the control of the learner) is wrong, and that the problem is not immediately soluble, and having the confidence to be sure when challenged. It is important to note that this particular step is about self-esteem and self-confidence, not about being right.	

Learning Intentions	Teaching ideas and activities	Notes
Recognising that in order to play a game of .....we need……	**TIER 1** Memory building involves introduction of the task, namely to be involved in getting all of the resources for the game, in preparation for playing the game. The learner has to be taught a potential solution to the problem before the problem occurs. **TIER 2** Sabotage and recognition of a problem sees one or more of the resources go missing, that is, they are not where they should be. It may be the case that one or two learners will recognise the problem quickly and the other learners need practice; for example, there are no chairs for Musical Chairs. This is to be expected, but the modelling that will take place by the more able learners could well filter down if the problem is presented often enough. The minimum requirement here is for learners to recognise that something is missing, that is, that there is a problem, and to do something about it. This might be (as a minimum) to indicate that there are no chairs and to ask for help from a member of staff, in which case the learner might be assisted to search for the resources in obvious places. **TIER 3** Independent solutions sees the problem recognised, but the member of staff unable to give help because they don't know the answer. You are looking for learners to go to another (unused) room to get the chairs without being told to do so, or offer another solution such as standing on a mat or sitting on a jumper on the floor. That is, the game becomes Musical Jumpers! As this problem is now going to occur regularly, you are also looking for some discussion around how to plan ahead to avoid the problem in the first place; that is, for one or more of your learners to check that the chairs are where they should be, without being told to do so, or to regularly play Musical Jumpers. **TIER 4** Generalisation might now see an extension of the problem. For example, there are no chairs in the room, none in the other rooms we might be able to look in, and we don't have enough jumpers, A potential solution should not need to be taught because you are looking for generalisation skills, that is, for at least one learner to look further afield, or to use something other than jumpers to sit on.	Game playing has been deliberately introduced as a potential *My Thinking and Problem Solving* exercise because of its natural motivational advantages. When playing games, it may well be that a number of learners will be working collectively to assemble the resources. This therefore involves co-operative thinking and problem solving with learners being encouraged to work together. See below for more discussion on this.

Learning Intentions	Teaching ideas and activities	Notes
Recognising that before working on any activity, I need…….	**TIER 1** Memory building involves introduction of the task, namely to be involved in getting all of the individual resources that they will need in order to successfully work at the activity. The learner has to be taught a potential solution to the problem before the problem occurs. **TIER 2** Sabotage and recognition of a problem sees one of the resources go missing. The minimum required here is for learners to recognise that something is missing, that is, that there is a problem, and to do something about it. This might be (as a minimum) to indicate that there are no …… and to ask for help from a member of staff, in which case the learner might be assisted to search for the item in question. **TIER 3** Independent solutions sees the problem recognised, but the member of staff unable to give help because they don't know the answer. You are looking for learners to search for the missing resource elsewhere, without being told to do so. As this problem is now going to occur regularly, you are also looking for some discussion around how to plan ahead to avoid the problem in the first place, perhaps by agreeing to share resources with another learner. **TIER 4** Generalisation might now see an extension of the problem. For example, there are no resources to be found in the places they might normally be or there are not enough resources when they are located. A potential solution should not need to be taught because you are looking for generalisation skills, that is, for more than two learners to share resources, or to borrow some resources from another class, or possibly to recognise that the activity cannot be undertaken at this time and to purchase resources before the next lesson.	This particular learning intention could work as a group exercise, though the default position should always be to expect each individual learner to think and problem solve for themselves as much as they are able. The list of activities pretty much covers everything that might be considered to be a regular activity that the class might be doing (say) once a week for a half term. You might therefore introduce a visual 'recipe' right at the start, that is, a visual list of resources needed to act as an aide memoir to each of the learners. The generalisation skill of buying missing resources is especially relevant for cooking.

Learning Intentions	Teaching ideas and activities	Notes
Solving problems as a member of a group	**TIER 1** Memory building involves introduction of the task, for example, to be involved in re-organising the classroom when tables and chairs are in the wrong place. This 'problem' may need to occur a couple of times a week for a few weeks before staff are sure that co-operative practices are in place. In this scenario group problem solving will be preferable, but not essential since one learner could drag the tables around the room, so staff may need to complain about the noise involved in dragging rather than lifting. Depending on the ability levels in the group, staff may well need to model solutions in the early stages of working on this as a group problem, perhaps gradually increasing the number of learners who are involved in the exercise until it is all learners and no staff, though staff may be 'advising'. **TIER 2** Sabotage and recognition of a problem sees the room disorganised but staff say nothing and give no prompts, that is, staff will have to 'not notice' the room changes, but carry on as though the room is organised. A variation of this might be for half of the room to be disorganised, especially appropriate when one or two learners get the problem quickly and the other learners need practice; that is, it is their part of the room that is disorganised. Further variations can occur if small cupboards and the teacher's desk appear in the wrong places, or if some of the furniture is outside in the corridor. The minimum requirement here is for learners to recognise that something is in the wrong place, that is, that there is a problem, and to do something about it. This might be (as a minimum) to indicate that they need help from their peers. **TIER 3** Independent solutions sees the problem variations recognised without the members of staff giving prompts. You are looking for learners to organise themselves without being told to do so. **TIER 4** Generalisation might now see an extension of the problem. For example, other rooms are not organised correctly (in the normal manner) such as the hall for assembly. **TIER 5** Self-belief and confidence sees the learners collectively challenged when a solution is found, so for example '*Are you sure this is the way the class has to be set up?'* when learners re-organise the room and '*How do you know?'*	As a general rule, it is probably best to present learners with problems which they can solve themselves; otherwise how are they individually going to learn? It may be that we want learners, especially older learners, to be so confident that they can challenge staff back. *'This is the way it should be, if you want something different, you'll need to do it yourself!'* This is a very difficult thing to do politely, and will need considerable practice.

The below examples demonstrate how these problem solving skills can be embedded into other areas of the curriculum.		
Learning Intentions	**Teaching ideas and activities**	**Notes**
<u>Problem solving within Independence</u> To collect own lunch utensils	**TIER 1** Memory building involves introduction of the task, namely to collect cutlery in preparation for lunch. The learner is taught a solution to the problem, before the problem occurs. **TIER 2** Sabotage and recognition of a problem sees no cutlery or the wrong amounts of cutlery so there isn't enough. The minimum requirement here is for learners to recognise that something is missing, that there is a problem, and to do something about it. This might be to indicate that there are no knives and to ask for help, in which case the learner might be assisted to ask catering staff. Learners could also be offered two knives to see if they are aware that they need different cutlery for different purposes and then prompted as appropriate to work out what is wrong with what they have been given. **TIER 3** Independent solutions sees the problem recognised, but the member of staff unable to give help because they don't know the answer. You are looking for learners to ask the catering staff without being told to do so. To aid this process, you will need to ensure that there is a communicative means to get the message across such as a visual. **TIER 4** Generalisation might now see an extension of the problem. For example, there are no plates. A solution should not need to be taught, you are looking for generalisation skills, for the learner to indicate the problem to a member of the catering staff.	
<u>Problem solving within Communication</u> Dealing with the fact that my communicative partner is ignoring me	**TIER 1** Memory building involves introduction of the task, namely to learn strategies for dealing patiently but successfully at attracting the attention of a communicative partner. **TIER 2** Sabotage and recognition sees the member of staff, ignoring communications. The minimum required here is for learners to recognise that something is wrong, that there is a problem, and do something about it. This might be to ask for help from another, different, member of staff who may then model the appropriate behaviour. This is about solving a problem of the person being busy, not concentrating, or perhaps even being rude! **TIER 3** Independent solutions sees the problem recognised, but the member of staff unable to give help because they don't know the answer. You are looking for learners to go back to the person they want to talk to and try again without being told. Alternatively, the learner could communicate what they have to say to someone else. **TIER 4** Generalisation stage. Eg: the partner is listening, but does not understand. You are looking for generalisation skills, that is for example, for the learner to approach someone else as an 'interpreter' or to use an alternative means of communication.	We know that this problem is likely to occur over and over again at various times and with various people, it is the nature of a busy classroom, and regular problems need regular solutions.

Learning Intentions	Teaching ideas and activities	Notes
<u>Problem solving within Creativity</u> To paint a picture	**TIER 1** Memory building involves introduction of the task, namely for the learners to get all of the materials needed from the respective cupboards, before they sit down to paint a picture. **TIER 2** Sabotage and recognition of a problem sees one of the materials, the paint, has run out. The bottles are empty. A variation of this might be for two bottles to be full, when there are 6 learners. This is especially the case when one or two learners get the problem quickly and some need practice, there are no bottles by the time they get there. The minimum required here is to recognise that something is missing, that there is a problem, and to do something about it. This might be to indicate that there is none, to ask for help, in which case the learner might be assisted to find one somewhere else, or ask to share. **TIER 3** Independent solutions sees the problem recognised, the member of staff unable to give help because they don't know the answer. You are looking for learners to go to another cupboard to look without being told to do so. Alternatively, they can make a decision to share paint. This solution will clearly need some negotiation between the learners. **TIER 4** Generalisation might now see an extension. Eg learners have decided to share but two of the pots accidentally get knocked over by staff. Now there are three problems (i) what to do about the spilled paint (ii) who should do something about it and (iii) how to get refills.	
<u>Problem solving within Play and Leisure</u> To find my swimwear when it has been misplaced	**TIER 1** Memory building involves the learner to be responsible for keeping hold of their swimwear from school to the pool. This might involve several checks along the way. **TIER 2** Sabotage and recognition sees the learner get to the pool with no swimwear. Staff would normally, continually prompt learners to hang on to their bags, but this time no prompts are given. Staff may need to set up distractions on the way, so that everyone has to wait for two minutes. The minimum required here is for learners to recognise that something is missing, there is a problem, and do something. This might be to indicate that they have no bag, to ask for help, in which case the learner could be assisted to back track. **TIER 3** Independent solutions sees the problem recognised, but staff unable to give help because they don't know the answer. You are looking for learners to think about where they might have left their swimwear and back track to look for it once staff are informed. **TIER 4** Generalisation sees an extension of the problem. There is no towel, you are looking for the learner to look in a different place. **TIER 5** Self-belief and confidence sees the learner challenged when a solution is found, for example '*Are you sure these are your trousers?'* and '*How do you know?*'	