Widening Access to Virtual Educational Scenarios

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D 3.4 Training Guides for Scenario Development

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Authors	Terry Poulton (SGUL), Sheetal Kavia (SGUL), Lindsay Germain (Bayer)

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TABLE OF CONTENTS

1. INTRODUCTION

The design of the Virtual Scenario (VS) you create will determined by many different factors. Firstly, the VS you wish to create may be for one of many different types of learning activities: it may be for individual or group based collaborative use, it may be intended mainly for developing knowledge acquisition, encouraging decision making, or for self-assessment. Secondly the VS you create may use extensive media enhancement, or it may just be simple text. Lastly, there are several different Virtual Scenario players available to author your VS, either open–source or commercially available, and these all have differing capabilities.

However, the overall structure of any VS should always be influenced by the learning activity for which it is intended and therefore, when constructing your VS the following approach is generic and can be used for all types of uses and different player systems.

In this deliverable we consider the ways in which the overall structure of a scenario is influenced by the learning activity for which it is intended. The report outlines the advice and guides that are provided to the learners of the MOOC built as part of deliverable 3.5.

2. SCENARIO CONSTRUCTION

Virtual Scenarios can be developed for a number of different disciplines and topics. It is important to identify what real life situations you face in the workplace or common mistakes are being made by learners. The VS will allow you to train the learners in this situation to avoid making similar mistakes in the future or to be better prepared to deal with the situation in the future. When creating a VS, the first step is to identify your chosen topic, and identify the specific objectives you want addressed in the VS. You can begin to address the overall structure of the VS by considering the following three questions.

2.1. How long does the scenario take to complete?

A group of learners, whether with or without a tutor or facilitator, is unlikely to be working through a scenario for more than an hour. This does not mean the scenario needs one-hour worth of pages when you have set aside an hour for a group session but more prompting or areas for the group to discuss the scenario. If it is for an independent learner, a shorter time might be needed, say 10-15 minutes, as the learner is likely to read and click through the scenario rather than spending time in discussion.

2.2. How many areas of interactivity or choices to add?

Not every section of the story or indeed every scenario requires interactivity. Some sections of the scenario will be the gradual unfolding of the narrative or description of an issue, challenge or story. Interspersed within a scenario will be opportunities to manage the direction of the scenario, with options and choices to take if creating a branched Virtual Scenario, or supplementary questions and other resources if creating a scenario of a different type. Some scenarios may have prompting

questions which allows the learners to discuss the scenario so the interactivity occurs in person rather than within the VS platform.

2.3. Would you use the same number of choices for a scenario intended for independent learners or groups of learners?

Maybe not. If we were creating a branching scenario for a Problem-Based Learning group session, it might perhaps contain, 10-12 distinct narrative sections, and you might expect there to be somewhere between 3 and 4 places where the learner can make a choice. This type of scenario could easily fill an hour of discussion for a Problem-Based Learning group, in which there will be a lot of new information to explore. In scenarios developed for independent learners you might wish to keep the scenario itself linear with interactivity such as multiple choice questions or other simple activities to make the scenarios interactive without branching pathways. However this is not to say branching scenarios cannot be used for independent learners.

3. VIRTUAL SCENARIO EXAMPLES

Below is a typical example 'map' illustrating the branching nature of a scenario, with both right and wrong paths; in this instance the yellow route is an 'ideal' pathway through the scenario. Each box represents a page within the branching VS. This type of scenario could also be used with larger groups in lecture theatres with voting systems, and some prompting of students for justification of answers.

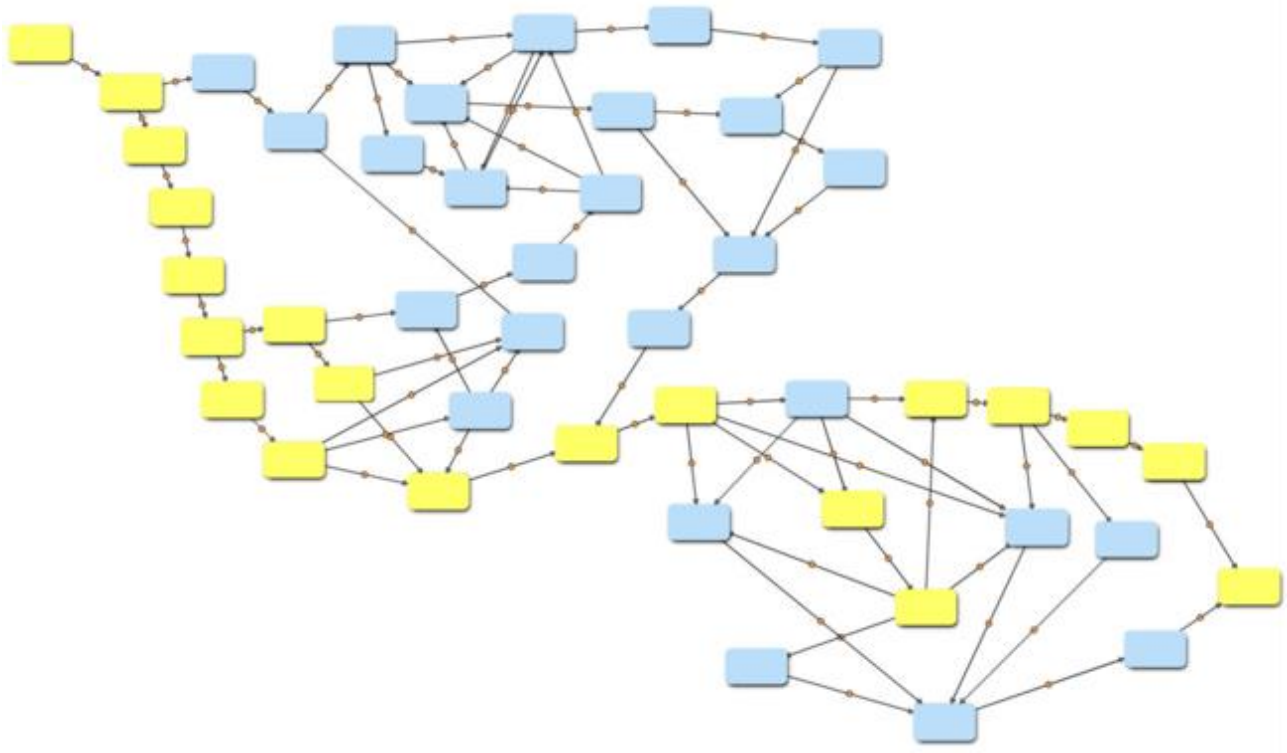

Figure 1. Scenario map of a branching Virtual Scenario

The independent learner on the other hand is more likely to lose interest or focus if the scenario is long, or the narrative builds slowly; they have no-one to share an interesting discussion with! They are more likely to want to get to the heart of an issue quickly, make choices quickly, and move on quickly. Self-directed learning scenarios may include more multiple-choice questions as a means to engage learners. As an example, the below shows a screenshot from a phone app, MedEdCases, which uses a multiple-choice question approach. This has a series of options and beneath these it provides instant feedback to the choices made. This is not a branching scenario, since after the question, the scenario moves forward on the same path, whatever the answer.

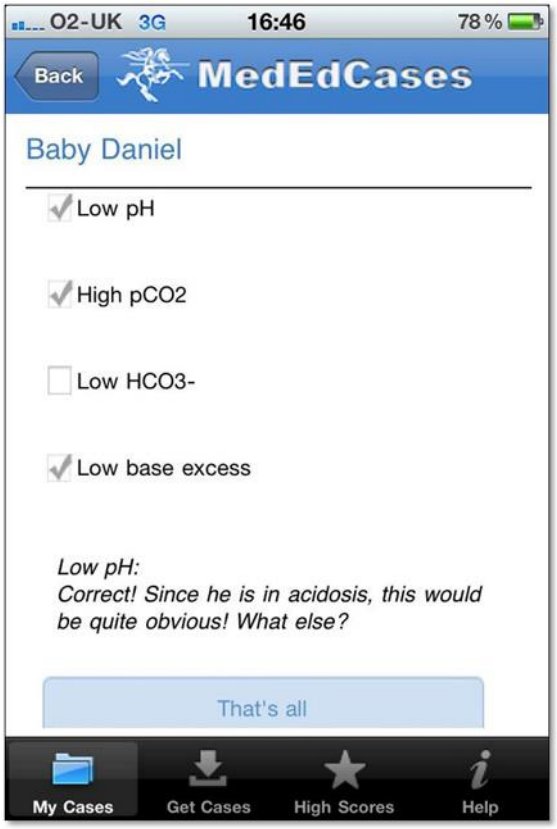

Figure 2. A screen shot of the Baby Daniel Virtual Scenario from the MedEdCases mobile app.

A different approach is an assessment VS. This particular assessment VS is a branching scenario which ranks the learners depending on the answers they get right or wrong in the scenario. This can be progressive so that the 'higher' the learners go up the branching tree (Figure 3) the more difficult the questions become. Alternatively a simpler model would be where the next question in the sequence is the same for all learners irrespective of whether they get the previous question right or wrong. This is illustrated in the case map below.

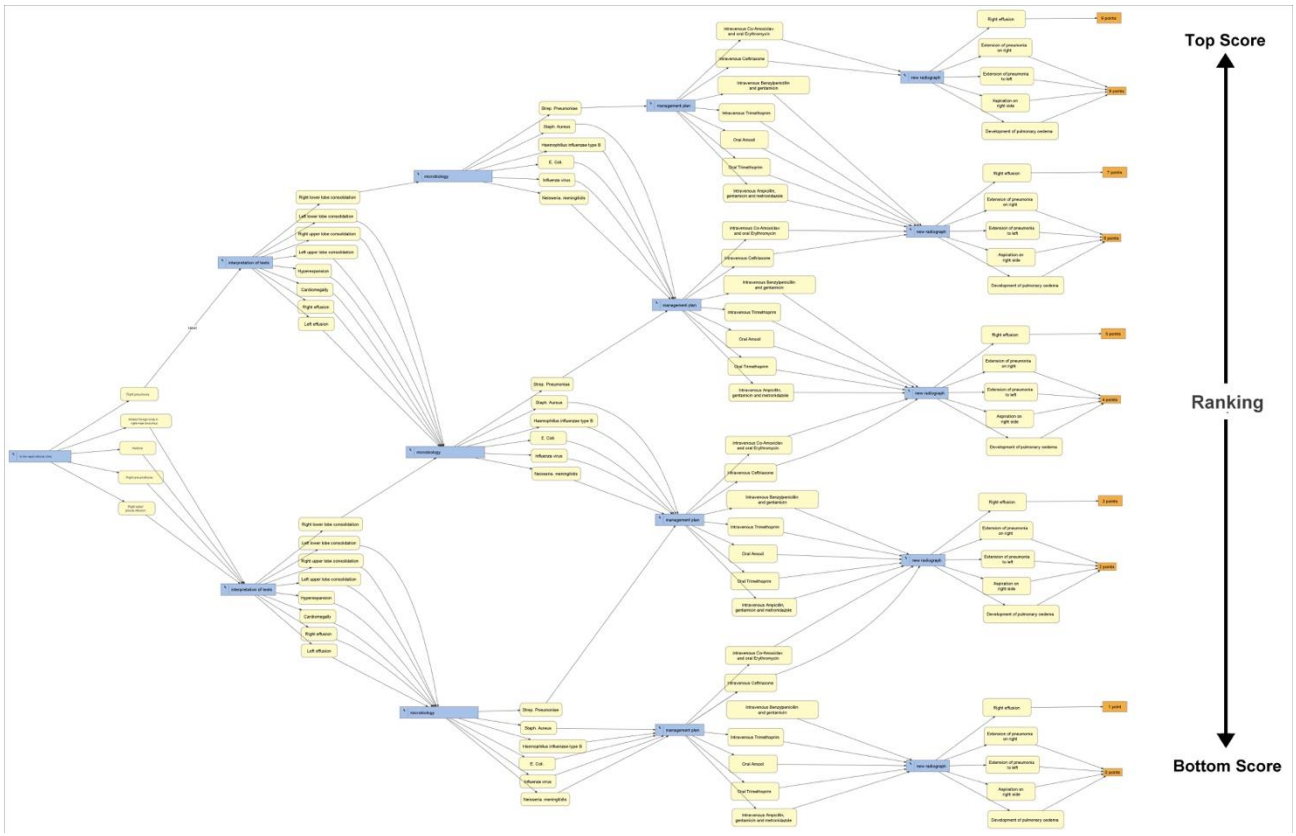

Figure 3. A ranking assessment Virtual Scenario map showing the pages within the scenario and different end points depending on the learners correct or incorrect answers to the questions.

4. THE VIRTUAL SCENARIO CREATION PROCESS

4.1. A 6-step Creation Model

Follow the 6-step creation model to begin creating your scenario. The steps are here to provide you with simple stages to follow when creating your first scenario, however as you become more experienced you may do some of these steps together.

4.1.1. Decide on a suitable topic and learning objectives for the scenario

Ideally you would like to model a multi-step scenario that involves several decisions or question steps. In medical education examples might include a man with chest pain, a vomiting baby, etc. In other fields, a scenario could be an architect being approached by a householder wanting a loft extension, a lawyer with a client who has been assaulted, an accountant with a deficit in his company accounts.

Your scenario construction will be guided by the broad learning objectives you have in mind. Having identified what your scenario is going to be on, you should come up with the key learning objectives. These will be narrower than your original broad aims, detailed and realistic. Revisit

these as you are developing your scenario, to ensure you are still concentrating on these learning objectives.

4.1.2. Draw key 'nodes'

The fundamental basis of case creation is to set up boxes containing text, whether this be on post-it notes or on the PC, which are often called 'nodes' but here we will call them pages. There will be a small number of key pages, essential stages that act as a gateway to the next part of the scenario. Unless your scenario is a linear scenario, these key nodes are probably step of interactivity - choices! Ultimately you will begin with the start node and end node and create the key events, choices or steps in-between.

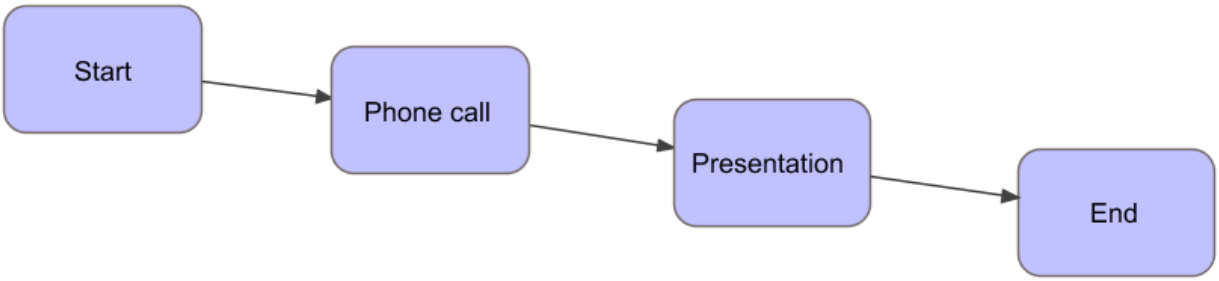

Figure 4. Four key nodes or pages for a simple scenario, each box represents a page and the arrows show the link direction between the pages.

4.1.3. Create an ideal pathway

This does not have to be the only way through the scenario, but will determine the size of the scenario and the optimal path through the scenario. There will be straightforward simple steps that connect key nodes. They can be as many or as little as you like with short snippets of information or nodes with large chunks of information.

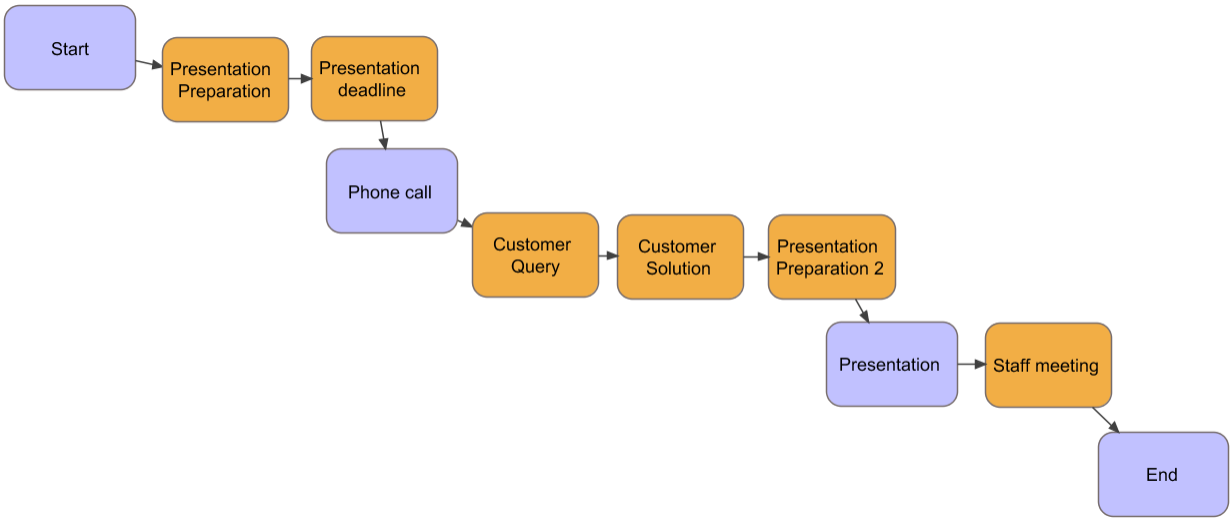

Figure 5. A simple scenario map showing the ideal route through a scenario with key nodes in purple and additional information notes in amber.

4.1.4. Insert additional nodes at points of interactivity (choices)

Your scenario may be a straightforward linear story, in which case this step is not needed, you can move to the next section (4.1.5).

Your scenario may include full branching pathways that represent the various paths within the scenario, and the choices connecting them, and you can start creating these now. These pathways may become alternative poorer choice pathway, which nevertheless induce corrective actions, so that the pathway re-joins the ideal pathway further on. Alternatively these alternate pathways may become virtual dead ends; if for example the consequence of your action is catastrophic to the continuance of the scenario, the learner may need to return to where that option was taken. In this circumstance, the pathway may return to the option point which initiated this choice or, as with games, they must restart the whole scenario.

For the author of a VS creating steps of interactivity, this is perhaps the most interesting task, because this is where an already interesting story can really come alive. It is a step that embodies creativity, imagination and even perhaps a little 'trickery'.

4.1.5. Add assessment steps or questions (MCQs, matching items, SBAs)

You may include question steps (Multiple choice questions, matching questions etc.) as interactive elements. The addition of questions will allow the learner to be more engaged and tested whilst going through the scenario. The type of questions you wish to add will depend on which virtual scenario authoring system you will be using or what technology expertise you have to include and integrate questions into your scenario. For example, in OpenLabyrinth and CASUS you can have free text, multiple choice, list-based questions and others. However if you are using PowerPoint you can create multiple choice questions using links within the presentation, or integrate a tool such as Mentimeter which will give you the flexibility of having free text polling etc.

4.1.6. Enrich with media

Having followed the previous steps, you should now have the skeleton of the case complete. Depending on time and resources, the case can now be complemented with additional features e.g. video, sound, images. It can be linked to other sources of information, such as on-line course materials and relevant websites to provide extra learning material to the learner or reference to official guidelines. Imagery can be aesthetically pleasing however use it wisely as learners completing the scenarios on mobile devices don't want to have scroll down to get to the core material and would prefer to have relevant resources included. There is always a danger to make things look pretty but always ask if the resource is providing anything to the learner?

4.2. Tips for Authoring Nodes in the Virtual Scenario

For the author of a VS there are four main objectives when creating their scenario:

1. Create a scenario that is engaging, so that 'new learning' is memorable
2. Create challenges in the scenario that mimic the challenges of real life or the workplace

3. Create a scenario that mimics not just the real-life challenge but also the tensions, distractions and uneven issues that build up pressures that can make real-life decisions more difficult.

4. Create 'interactivity (choices or questions) where possible; where the learner has to consider what to do or think about possible solutions to a situation. The situation should provoke the learner to think through a number of solutions or options which become clearer as they move forward in the scenario or if thinking about branching scenarios the options should be attractive enough to ensure that learners are often drawn to the wrong choice; errors are more memorable.

The following are some tips that will help when developing your scenario, and we have tried to give them memorable titles:

4.2.1. 'I'm the doctor'

This first phrase is recognisable to those who know the long-running UK TV series running since 1963 (Doctor Who). "I'm the doctor"

In an interactive scenario, the individual is taking charge of the scenario, and takes responsibility for the choices actions and consequences. So the scenario should start with, you are 'the apprentice engineer', 'the junior doctor in accident and emergency' or 'the telephonist taking calls'. This approach increases personalisation and identity with the scenario. The role of the learner within the scenario may change throughout as the learner moves on in time or different departments within the scenario.

4.2.2. 'Just do it'

When creating branching options within a scenario they have to be ACTIONS, ('Just Do It').

The actions taken cannot be hypotheses or thoughts, because only an action can move the scenario forward. The action is obviously based upon the outcome of those hypotheses or thoughts. For example, in a GP scenario, where the correct diagnosis of an illness may be 'viral infection', the various options should not be a choice of different diseases as possible causes, it's the ACTIONS you might take in response to the disease you believe the patient has. If the options were a list of possible diseases, the following pages in the scenario would only be either to agree or disagree with your choice and there is no outcome of the action. Below is an example of an action just do it option in a scenario:

You are trying to finish a presentation. You work in Customer Service and there is no-one else around when the phone rings. It may be an important customer, but the time is almost up for delivering the presentation. It is a rule that whoever is around, answers the phone, even though it is not your job.

What do you do?

Option 1: Answer the phone call and abide by the rules

Option 2: Ignore the phone call and get your presentation done

4.2.3. 'Running Interference'

In American football if you are the player carrying the ball, it is entirely legal to have another player(s) from your team run behind, cutting across the opposing team players and impeding them (in most ball games this would be obstruction and a foul). This player providing the distraction is 'running interference'. How does this relate to scenario construction? How does that relate to scenarios?

In many situations in real-life decision making, there will be a number of possible options to choose from. Some will not make good choices, but they are choices often taken in-real life, because real-life situations can be complex and hurried, and encourage relatively poor decision- making. However, in a written scenario, those complexities and pressures are absent, so the technically correct choice is easy to make - and is therefore always taken by the learner. Less good options/choices are easily ignored.

So, Imagine the correct decision represents the player with the ball, and the learner in the scenario is an opposition player. As the author, you can run interference by introducing a secondary character to cut across the scenario, making it more difficult to identify the correct choice.

A classic example where you can run interference, is a visit to our family doctor with a sore throat. He may examine you, 'reassure you, and send you home'. Usually the doctor is right, it's a small symptom, he sees a bigger picture, and we usually get better anyway! However, in a virtual scenario, a learner will be suspicious of this route, thinking it will lead to a bad outcome, so 'reassure and send home' isn't really an option.

Here is how you can author 'running interference' in a similar Accident and Emergency situation:

You are a second-year graduate doctor working in Accident and Emergency. Supervising you is Dr March, the Accident and Emergency registrar. She is in the paediatric area, seeing a sick child. The Triage nurse calls you over. She is seeing an 80-year-old Caucasian man, who has arrived at the Casualty Department of St George's University Hospital at 6.00 am.

The patient's Wife and adult son have brought him to the hospital by car. The man is unable to walk from the car; he is helped on to a stretcher by a nurse, and taken into the assessment room. The triage nurse has seen the man. She has found that he is pale and clammy, is groaning with pain and is unable to give a history. His wife and son are clearly upset; his wife indicates that her husband has been well yesterday, but awoke with severe back pain about 40 minutes ago.

What would you like to do now?

Option 1: See the patient immediately

Option 2: There are several patients waiting, see them first, make him comfortable in the waiting area

Option 3: The patient will recuperate better at home, send him home

The learner is likely to choose option 1 without too much thought because they are clever enough to understand the patient who is introduced in the scenario is clearly important to the progress of

the scenario. So instead you can run interference with a distractor, and change the options with the following text:

Suddenly a blue light ambulance arrives. There is a 60-year-old main in the back screaming at the paramedics about the severe pain in his chest.

Who should you see first?

Option 1: The pale man

Option 2: The screaming man

In practice the screaming man is well enough to scream! But learners will often choose that option, the clammy man deteriorates rapidly, and thereby they learn that the clammy man is the one who needs to be seen first!

4.2.4. 'Plausible Excuse'

Providing reasons in the text which guide learners towards an option which is technically incorrect, but which can be made to seem plausible. It is a similar issue to running interference but with a different solution.

Given a choice that often happens in real life, but is nevertheless against best practice, the learner when considering an issue, will often take the most technically correct choice. For example, in the following food poisoning scenario, the question is, does the GP test for a 'notifiable' (serious) food poisoning agent or not? Experience shows that GPs will test perhaps half the occasions in that similar scenario, but learners will ALWAYS test! So, the learner must be led into thinking 'not testing' is a realistic option.

You are the General Practitioner taking Dave's history. You discover that he developed diarrhoea and abdominal pain two days after eating in an Indian restaurant, but he is now starting to feel a little better. His stools are still loose, but do not contain any obvious blood or mucous. He has had crampy abdominal pains, which improved a little after opening his bowels. He has not had any other unusual food and his work colleagues and partner have not had diarrhoea as far as he knows. He denies recent foreign travel. He works as a banker in the city.

Clinical examination is unremarkable except mid tenderness on abdominal palpation. He has normal pulse and blood pressure, slight temperature 30˚C; moist mucous membrane lips and eyes.

You advise Dave to stop taking the Imodium he has been treating himself with over the counter, as "it's important for all the poisons to get out of your system". You advise Dave to increase his fluid intake to avoid dehydration, and to stick initially to bland carbohydrate foods (dry toast, biscuits, rice etc.). When he is tolerating these, live yoghurt can be useful as it increases the gut commensal flora which is lost due to the diarrhoea.

You consider if you should test for food poisoning.

Option 1: Arrange test for food poisoning

Option 2: Do not test

In this scenario learners are almost always likely to choose option 1 as the option is given to do something and gain more information. To make option 2 more attractive to learners you can insert the following before the options are presented:

You consider whether stool testing is really necessary in the context of his occupation. Food poisoning is not uncommon and the condition is resolving anyway, why upset him and waste resources? There have been one or two incidents of food poisoning, but nothing alarming, It is after all just a possible episode of food poisoning.

4.2.5. 'Passing the buck'

*A slang expression, which means to pass your responsibility onto to someone else. Else originated from a card games. Card players used to place a marker, called a "**buck**," in front of the person who was the dealer. That marker was later **passed** to the next player along with the responsibility of dealing; a surrender of responsibility.*

In scenarios when you are unable to find a way for the scenario outcome to indicate a mistake was made, you are forced to 'pass the buck' (responsibility), to a new character, who explains that a wrong choice has been made. This is a response to make it more obvious why an action is wrong, when the learner chooses a less ideal option within the scenario, but, in some situations, it is not possible to work out from the evolution of the scenario that the action taken was wrong. In this case it is necessary to fall back on the introduction of another character, usually a senior or more experienced colleague, to tell you the choice was wrong. This is not the best approach, effectively it is just telling the learner they are wrong, so removes the problem-solving element, but it may be necessary to drive the action away from a pathway with no exit and come back to the ideal pathway.

4.2.6. 'Hitting below the belt'

The expression comes from boxing, in which it is illegal to hit an opponent below the belt. It has come to mean an unexpected and unfair action, or insult of some sort, to which the target has little defence.

In a scenario it is the introduction of a factor which seems unfair, not following the rules, which turns what looked like a good decision into a poor one. It seems unfair because the option taken may have been correct. The factor may be an unexpected fatigue fracture in a piece of metal in an engineering scenario, a message that no-one knew about in a business scenario, an unexpected medical complication in an illness scenario; nothing that could be predicted, but real life isn't always fair! A technique to be used sparingly, or the leaner may feel they are being deprived from finding the optimal answer.

You may wish to take a look at the medical ethics scenario called Andy Dufrayne (http://wavesnetwork.eu/index.php?pg=documents--related-resources) which contains complications which may seem unfair. Occasionally the objective is to explore all possibilities, but not to necessarily achieve an unequivocal right answer. There are indeed 'no-win' scenarios.

4.2.7. 7. 'The knockout'

A punch in boxing that knocks your opponent unconscious, typically ending the match.

It is that last point which is most relevant, the almost spectacular ending of the scenario. The poorer the choice, often the greater the learning opportunity: in medicine, an action of killing the patient or in engineering a decision which causes accident and loss of life. This extreme response does increase emotional engagement, and feedback from learners, which suggests it makes the error more memorable. You may find this non-technical view interesting https://www.nytimes.com/2012/03/24/your-money/why-people-remember-negative-events-more-than-positive-ones.html

5. FINALLY…

Test your scenario! If the people that you use to test the scenario, find the correct answer too easily, then you need to work on making the correct answer less obvious. Often this is not just by adjusting the choice, but by adjusting the text before the choice, to make the correct answer less obvious. Remember that an obvious scenario is probably a dull one, a suitably challenging one is probably engaging.

You might be interested in the following resource which is one of the first large reviews that considers the psychological of poor choices and errors “Bad is stronger than good.” Baumeister, R F.,Bratslavsky, E,Finkenauer, C, Vohs, K D.Review of General Psychology, Vol 5(4), Dec 2001, 323-370 https://psychology.iresearchnet.com/social-psychology/social-cognition/bad-is-stronger-than-good/