

Genetics in Practice

A Template for Interactive Case Studies

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Genetics & Your Practice, began in 1994 as course for primary health care practitioners to get Continuing Medical Education (CME) credits and to help health care providers learn about the importance of genetic counseling and the fundamental difference between genetic counseling and traditional health care. The course was originally funded by grants from the Health Resources and Services Administration Department of Health and Human Services (DHHS), and the March of Dimes.

In a collaborative project between the March of Dimes and Idaho State University Departments of Nursing (ISU) and Continuing Education/Special Programs, the course was converted to an online asynchronous course. Since the course was primarily didactic, ISU approached a team of graduate students at Utah State University's Department of Instructional Technology (USU) to develop an administrative template for interactive case studies and to produce one completed case study. The goals of the template system were: (1) Give students a chance to "practice", thereby giving them a set of procedural knowledge as opposed to facts devoid of context, (2) Enable the production of any number of case studies with no additional programming costs, (3) Make it easy to update the case studies since research in the field of genetics is in a constant state of flux.

A Paradigm Shift

Health care providers usually diagnose a problem and then prescribe a treatment using the SOAPE model (gather Subjective and Objective information about the patient, Assess the patient, and then develop a treatment Plan, with a follow up Evaluation). Because of some very complex factors, this is not always the goal of genetic counseling. Though many genetic disorders and risk factors can be identified there is not always a treatment. It may be possible to let someone know that they are at a higher risk for developing a disease as a result of genetic testing, but have no intervention to offer the patient that will change their risk, or it may be that the only treatment available is extremely invasive.

One example of this kind of case is the testing for the genes that indicate an increased risk for getting breast cancer. A woman may find out that she has a higher than average risk for breast cancer as a result of a genetic test, but then be told that the only treatment is a radical bi-lateral mastectomy. If she chooses to take this treatment option, she is still at some risk for developing breast cancer in residual breast tissue that is often left even after a mastectomy.

The effects of finding out about a genetic risk without having any viable treatment options can also be very detrimental to the patient. The psychological impact of being told about a risk, but having no viable treatment is profound. In addition, any time a patient finds out about they have a genetic anomaly, they run the risk of jeopardizing their health and/or life insurance coverage. They may also face discrimination in other realms, such as employment options or in their status within their family.

Because of these factors, the goal of genetic counseling is not to diagnose, instead the goal is to first, gather critical information and relay that information back to the patient in a way that is meaningful to the patient. The patient can then make an informed

decision regarding how to proceed. This kind of patient led approach may be very difficult for doctors who are trained to diagnose and treat patients.

A Case Study Approach

In order to teach health care practitioners how to apply the SOAPE model to genetic counseling situations, we developed a simulation whereby learners are guided through a counseling situation. Learners still conform to the SOAPE model, however implementation of the assessment and planning portions of the model are somewhat different.

The primary goal of the Genetics in Practice simulation is to show health care providers that when they are in a genetic counseling situation, their purpose is not to diagnose, but rather to provide the patient with all the relevant information he or she needs in order to make an informed decision about how to proceed.

Jeroen van Merriënboer (1997) argues that whole task practice is imperative for learners to acquire an appropriate schema by inductive processing. Case studies allow learners whole task practice as instruction because the case studies can provide scaffolding in the form of an expert who provides the learner with the necessary information they need to successfully complete the scenario.

The Jasper Woodbury series is an excellent example of case based instruction (Pellegrino et. al 1991). One of the goals for Jasper is to develop mathematical knowledge as well as skills. In assessing the effectiveness of Jasper, Pellegrino and his colleagues found that student using Jasper outperformed control groups both in the areas of basic math concepts (like representation of fractions) in addition to abilities (like fraction/decimal conversion).

Although many instructors, particularly in “content” rich disciplines may have a fear that the scenario-based approach will overshadow and somehow decrease the amount of declarative knowledge acquired by the learner, scenarios can in fact increase both procedural and declarative knowledge gains (Cliff and Curtin 2000).

Case studies provide learners the opportunity to solve meaningful, realistic problems to gain both procedural and declarative knowledge. A case study consists of a cover story, a role the learner will play, operations with consequences the learner can perform during the scenario, resources for the learner to use, and feedback about the learner’s choices as they play their assigned role (Shank, Berman, Macpherson, 1999).

We designed the breast cancer case study to represent a realistic genetic counseling problem. This case study leads learners through a counseling visit, provides an expert function to allow learners to ask questions to help them infer correct choices, and allow them to make mistakes and receive feedback at the end of the case study.

The case studies start with an introduction screen.



(Figure 1-Learner's view of case study's introduction)

The introduction in this case study is given by a nurse who introduces the learner to the problem. The learner has the choice of getting the introduction with video, or audio. The introduction is comprised of a problem statement, important dramatic enhancements, and a clear role for the learner to play. Once the learner has been introduced to the case study, they can make a number of choices to perform the subjective and objective portion of the SOAPE model. These include questioning the patient, asking the expert questions, ordering tests and procedures, and reviewing their notes.

When the learner feels that they have gathered enough information, they proceed to the assessment phase where they type out what they consider to be the critical factors of the case. Next, the learner moves into a planning phase where they determine what information to provide to the patient, and how to deliver that information. Then they present the information to the patient and receive a reaction from the patient, the nature of which depends on how closely their actions correspond to what an expert would do.

In the final phase of the case study, the learner gets detailed feedback regarding the choices that they made in comparison to what the expert would have done.

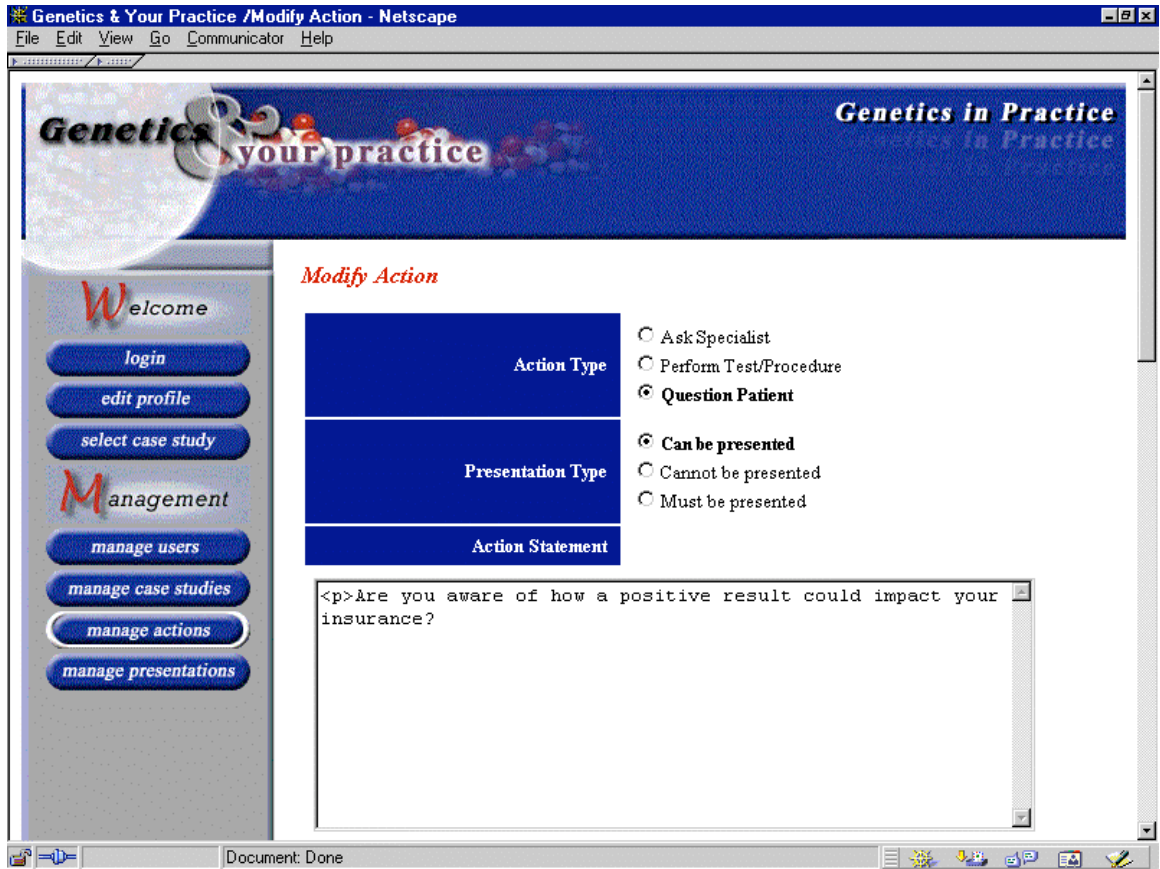
In keeping with the goals of the template system, several choices had to be made. These include creating a simple interface for inputting and updating case studies, devise a way to include media but not to be dependent upon specific types of media, as well as figure out a way to track learner's choices.



(Figure 2-Administrator screen for managing cases studies)

The template relies on an expert rule set which compares the learner's performance to that of a genetic specialist. Since the web is a stateless environment, tracking a learner through the application presented some initial challenges. Rather than rely on cookies, the application generates a set of unique identification numbers for a user as soon as they enter a session. These numbers are then transferred to all other pages in the application via the URL. Variables for that learner are stored in a database on the server side where they are modified and retrieved when necessary. This allows the system to track the learner's choices and compare them to an expert performer.

The administrative interface is comprised of a number of windows and choices of inputs.



(Figure 3-Administrator screen for modifying the learner's choice of actions)

Despite the template being very user friendly, the methodology of designing case studies is complex and not supported by the tool itself. Some important considerations in developing case studies are:

1. Identifying expert performance
2. Determining legitimate questions, actions and presentations
3. Determining reasonable distracter questions, actions, and presentations.

Discussion

The development of templates such as Genetics in Practice is feasible and presents the potential to be a powerful training tool for online instruction. It is important to keep in mind however, that use of the tool does not insure quality case study development.

References

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