Developments in nutritional programming illustrated by WinDiets

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Summary
Dietary analysis programs have developed considerably over the last two decades and now include many features that people have grown to expect to find while browsing the internet. The range of functions that can be achieved is growing rapidly and includes the production of stand-alone educational programs that can be used on the internet. These developments are explained in the context of my programming experience using WinDiets, as an example of how programs can currently be designed.

Introduction
A few years ago, it was amazing enough to find that you could buy a mobile phone that you could use in the street; now you can also watch TV on it or take a video of an incident and sell it to a TV news station. Similarly, my first attempts at writing a dietary analysis program were only designed to speed up calculations of data involving food tables. Simple databases have been used to store food composition data for some time, but developments in the manipulation of databases by programs have enabled them to incorporate a wider range of functions. People now surf the internet frequently and have become used to the type of colourful and interactive screens that are sent to their browsers. Pages like these can be generated by the dietary analysis program itself and hence the page produced can depend on what the user has entered. Using a control called a WebBrowser (Microsoft 2007), it is possible to show the pages in the same place on the screen so the user does not get lost, and menus can be constantly available in case you change your mind and want to perform a different function.

During the last decade, I have been experimenting with producing educational programs that work in internet browsers because this environment facilitates interaction and these programs can be accessed by students from home as well as at the university (Wise 1999a). Programs that have been evaluated by questionnaire include a food labelling simulation (Wise 2000), revision crossword puzzles (Wise 2001), research protocol simulation (Wise 2002a), a food composition quiz (Wise 2002b), a metabolic pathways program (Wise 2002c), a puzzle to assist students’ understanding of research methods (Wise 2003) and an activity diary program (Wise & Cowie 2005). These developments led me to incorporate what I learned into my dietary analysis program using the WebBrowser control and the result has been included in the updated version of WinDiets (see http://www.windiets.co.uk).

Advances in database technology
Using modern databases, it is possible to create files that can be stored anywhere and include data from particular projects with analyses of extra foods and settings that are appropriate. The database structure used for these files in WinDiets has the flexibility to allow entry of data for meals at any time of day and for as many days as required, as well as providing the standard meal pattern of a 7-day diary. Users can access database files containing recipes that incorporate information on how to prepare the dish, as well as allowing for calculation of nutrient losses and for producing food labels. Users’
database files can store analyses for foods that are not in the food tables, including those fried in a range of different fats. It is also possible for the main user (with a password) to alter the food tables and add nutrient analyses for all users. Databases also permit files to include classifications of products, for example dietetic products can be selected for patients with specific diseases.

Users in research expect output of data in a single table that they can export for statistical analysis but, using databases, it is also possible for WinDiets to provide data in a format that can be queried directly to answer complex research questions (Wise 1999b). Many research projects now use food frequency questionnaires (FFQs), so their creation and analysis are functions that have also been incorporated (Wise & Birrell 2002).

**Incorporation of web features**

The use of the WebBrowser control has facilitated the introduction of some of the educational features that were previously tested in stand-alone internet programs (Wise 2006). For example, WinDiets makes considerable use of variations in colour intensity to illustrate the amount of nutrients in foods compared with Dietary Reference Values (DRVs). This can be seen:

- When foods are searched for after setting a nutrient, so that they appear for selection with a background colour representing their composition relative to other foods in the list.
- When the user clicks on a food in the list, a more comprehensive composition in terms of nutrients is shown on the screen, again using background colour as well as data in figures and this helps when the user wants to improve a diet and needs to find appropriate foods (see Fig. 1).
- When using the dieting assistant screen, foods appear in two separate lists and higher colour intensities denote higher energy contents thus helping the user choose the lower calorie alternative for the meal.
- When foods are added to the day’s meals, the analysis is instantly recalculated and displayed at the side of the screen, with each nutrient being displayed in a small box with a background colour reflecting what proportion of the DRV has been achieved by the foods in the diet.
- When users want to pinpoint which foods are contributing large amounts of certain nutrients to a meal, the relative contributions can be easily seen by the intensity of colour in a grid.

In addition to using colour intensity, WinDiets has been designed to enable a wide range of different interactive screens to appear on the screen, containing controls such as buttons and lists to choose from. Also, given the prominence of the internet today, WinDiets can actually facilitate the design of stand-alone programs that can be located anywhere on the internet and do not require direct access to WinDiets. These can be used by teachers to illustrate the following aspects of nutrition:

![Figure 1](image.png)
• A simple screen for children and the public contains foods that can be clicked on or off to include or exclude them from the diet – the dietary composition is then shown immediately as a bar chart and as a happy or sad face (see Fig. 2).
• An interactive quiz facilitates learning about the nutritional composition of foods.
• Recipes can be exported to a screen that generates a nutrition food label when the user chooses from the legally available formats.
• An FFQ can be produced for direct data entry and nutritional analysis on the internet.

Conclusion

WinDiets has been designed to include a wide range of educational and research features that make extensive use of database and web-based programming. The use of variable colour intensity and interactive tools are attempts to bring the subject to life for teachers and students alike.

References