The Personal Learning Planner: A Software Support Tool for Self Directed Learning

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Abstract

This paper presents an overview of the development of the Personal Learning Planner (PLP). The PLP is a software based support tool developed to assist students with their self directed learning. The educational context indicating the need for such a tool is described and the conceptual underpinnings of the three sections of the PLP are presented. Issues associated with delivery and database requirements are

discussed before an outline of the functionality of each of the developed sections is presented. Formative evaluation of the prototype and students' self directed learning behaviour will inform further iterations of the program.

Keywords

Self directed learning, Problem based learning, Planning behaviour, Self management of learning, Software development

Background

Self directed learning (SDL) is a student-centred approach to learning where learners take control of their own learning processes and experiences. The learners "decide how, where and when to learn the content they have identified as important" (Hammond & Collins, 1991; p. 153). In the context of a problem based learning (PBL) curriculum, SDL requires students to identify issues that require investigation, locate suitable resources to investigate the learning issues, prioritise and plan their investigation, investigate these resources and then relate the information they have gathered back to the learning issues and the original problem (see Barrows & Tamblyn, 1980).

In 1999, the School of Medicine at the University of Melbourne introduced a new medical curriculum incorporating PBL, SDL and educational technology (see Keppell, Elliott & Harris, 1998). Each week, students are presented with a clinical problem (or "problem of the week") in a small group tutorial. Through group discussion and with the help of a tutor/facilitator, students generate hypotheses about the potential causes of the clinical problem. The group then considers the mechanisms that might underlie these hypotheses. This process allows students to identify aspects of the problem they think require further investigation over the week. These areas become the students' "learning issues" for the week. Students are then required to undertake "self-directed learning" where they investigate the problem using the learning issues they have generated.

The introduction of a new curriculum presented curriculum coordinators with a number of concerns. In the "old" curriculum, students' learning activities were largely constrained by the timetable which prescribed classes and provided little, if any, opportunity for students to consider their own educational goals or to set their own learning priorities. In this more traditional curriculum, teachers would often instruct students and tell them what topics they were required to "learn". In the "new" curriculum, timetable guidance is reduced and students are encouraged to construct their own learning pathways by generating their own learning issues. This transition reflects a move from a teacher-centred to a student-centred curriculum.

Given the freedom associated with a student-centred approach to learning, students may initially feel quite daunted by the SDL component of the course. As Hammond and Collins (1991) point out, "Learners accustomed to teacher directed learning may have no experience of self-management

of learning so it may initially be intimidating." (p.154). Furthermore, there are a number of skills associated with SDL that place new practical and cognitive demands on students. These new skills include the ability to plan and manage ones own learning, the ability to review and reflect on ones own investigations and practical research skills associated with SDL.

The other major issue that arose with the introduction of the new curriculum was that students might not be aware of the degree to which they are covering the syllabus. In the past, because there was a clear demarcation between the biomedical and clinical sciences on the one hand and, between disciplines within the biomedical sciences on the other, it was relatively easy for students to determine whether they were covering the required material. However, this becomes more difficult within the new problem based curriculum, due to its vertical (between biomedical and clinical sciences) and horizontal (across biomedical disciplines) integration.

In an evaluation after the first year of the new curriculum, many students indicated that in a number of key areas of study they were unsure of the goals, needed more feedback on their progress and were unsure what constituted essential information. Furthermore, while they were generally very positive about PBL, they often mentioned that they were unsure what was required of them. Students' desire to obtain feedback regarding their progression towards the course objectives was matched by the Faculty's desire to ensure that students were satisfying the vocational requirements of the course.

In an attempt to give students more support in the SDL process, course coordinators have provided students with a weekly list of resources (textbooks and chapters, web pages, journal articles, computer facilitated learning modules etc) that may be used to investigate learning issues which have been generated from the first PBL tutorial. As students advance in their course the amount of detail associated with these resources will be progressively reduced. The provision of a resources' list is, to a certain extent, antithetical to the philosophy of SDL as students are directed to resources rather than having to identify, locate and determine the relevancy of resources themselves, based on their own learning goals. This is a concern in that students may show little regard for the learning issues associated with a particular problem if they are simply provided with a prescriptive list of resources which "need" to be covered. For this reason the SDL process in the new medical curriculum has sometimes been referred to as "directed-self learning".

While the SDL process represents a complex array of tasks in which students need some support, providing a resources' list may be an overly prescriptive means of giving this support. By providing a resources' list much of the planning and management of learning is taken out of the students' hands. In addition, the provision of a resources' list, to a certain extent, removes the need for students to review their individual processes of investigation.

The Personal Learning Planner

The Personal Leaning Planner (PLP) was developed in response to the concerns outlined above and had two objectives. First, to assist students with the planning, organisation and management of their investigation of the problem of the week. Second, to help students reflect on their investigation of the problem and to allow students to see they were covering the syllabus in a balanced way. Ideally, in meeting these objectives the PLP would also remove the need to provide students with a list of resources to investigate the problem. The PLP was developed as a software support tool, reflecting the Faculty's commitment to educational technology (Keppell, Elliott & Harris, 1998).

With these objectives in mind, the PLP was conceived as having three primary phases (searching, planning and reviewing). The planning phase would be further divided into two sections (conceptual planning and action planning). It was envisaged that the PLP would include a short tutorial on planning and self management of learning, however, the overarching goal of the program would be to provide students with practical experience and on-line support in SDL while helping them work on their actual course content. The rationale of the three primary phases of the PLP and the general requirements of the system are described below.

Searching

The searching phase of the PLP is designed to allow students to identify, for themselves, resources with which to investigate the problem of the week. Students should be able to search for medical resources online using their learning issues. They should be able to access information that enables them to determine the relevancy of each resource to their own investigation of the problem. Finally, students should be able to select or mark resources for use in their investigation and subsequent phases of the PLP.

Planning

An important component of SDL is the ability to plan ones learning. Lawrence (1991) and Hammond and Collins (1991) suggested that planning is a useful—even necessary—pursuit for students, and also note the problems students traditionally have had with planning and managing their own learning. Furthermore, Lawrence (1991) argued that, generally,

planning is required because some tasks "require attention, effort and organisation, because they are either complex, novel, or both complex and novel…" (p. 85). Students in the new medical curriculum need to perform tasks that are both complex and novel. Tasks are complex because students are presented with ill defined problems and are given a wide array of resources to investigate them. The content being investigated is, in many instances, also novel for students. Finally, the situation itself is novel as students are probably more familiar with teacher-centred learning environments, where the role of planning and management is traditionally fulfilled by teachers and a timetable.

Planning behaviour is often seen as goal dependent and part of either a general or specific problem solving process (Polya, 1957; Lawson, 1991; Lawrence 1991). A concept of planning behaviour that is contingent on problem solving and goal directed behaviour is consistent with the educational context into which the PLP will be introduced. Students' planning takes place in the context of a "problem of the week" and planning is seen as part of students' problem solving processes. The general goal in this context is to arrive at an adequate resolution of the problem, while specific sub-goals are to investigate learning issues that facilitate this general goal.

In addition to being seen as a component of problem solving behaviour and as goal directed, De Lisi (1987) noted that the word "plan" has two different connotations. She says…

> "A plan may be defined as a drawing or diagram such as a map of a town's roads or an architect's blueprint for a building. Alternatively, a method of doing something or a procedure, or a detailed program of action may constitute a definition of a plan." (p. 83).

The development team decided that both types of planning should be manifest in the planning phase of the PLP. That is, students should have the ability to create a map of the relationships between their learning issues and resources (conceptual planning) and also be able to organise a specific course of action with regards to the investigation of the problem (action planning).

Reviewing

The objective of the reviewing phase of the PLP was to allow students to review, evaluate and reflect on their SDL. The development team had two aims in mind for this final phase. First, it should provide students with an opportunity to evaluate the degree to which they are covering the syllabus.

Students should be able to see how they have negotiated each problem of the week (short-term review), as well as the pattern of their investigations over a number of weeks or a semester (long term review). In addition they should be able to get some indication of the degree to which they are covering the learning objectives set out by the Faculty for each problem. It was envisaged that students might modify the way they investigate future problems after engaging in this review process.

The second aim of the reviewing phase was to encourage students to reflect on and evaluate their planning behaviour, especially their conceptual planning. Reflection is an important component of students' learning (Boud, Keogh & Walker, 1985; Herrington, Herrington & Oliver, 1999; Jonassen, Mayes & McAleese, 1993) and they should be encouraged to engage in this type of metacognitive activity to enable them to evaluate their understanding of the relationships between issues surrounding each problem (Flavell, 1976).

Design and Development of the PLP

Work began on the design and development of the PLP based on each phase's goals and conceptual underpinnings. Just as there were a number of educational requirements for the PLP, there were also a number of software requirements. These fell into two main categories: database and delivery requirements. Issues that emerged in these two categories are expanded upon below.

Database requirements

The PLP needed to interface with two databases: a database of resources and a profiles' database. Both databases needed to be scalable. The resources' database would consist of a series of resources identified by the Faculty as relevant to the medical curriculum and available to students within the University through its various libraries, resource centres, computer laboratories or online. Each resource entry in the database would comprise (where appropriate) a title, author details, publication details, resource type (e.g. books, computer facilitated learning modules, web site etc.), keywords, and a short abstract. The database would be searchable through the keyword, author or title fields. The database must be readily updated by the Faculty and easily accessed and searched by students. The profiles' database would store the results of students' searching and

planning activities. The records of these activities would form the basis of the PLP's review phase functionality.

Delivery requirements

The delivery requirements were that students must be able to access and run the PLP from within the Faculty's two computer laboratories and computer equipped PBL tutorial rooms. As each of these locations is equipped with networked Macintosh computers, the PLP must be Macintosh deliverable. It was also desirable that students be able to access and run the PLP from any location within the university, from home and from other remote locations (such as hospitals or clinical schools). Most students and many of the hospitals and clinical schools support the Windows platform. It was desirable, therefore, for the PLP to be cross-platform and internet capable.

Development Rationale

We developed the PLP prototype using a RAD (Rapid Application Development) tool (SuperCard®). SuperCard® features strong integration with the MacOS, excellent text and graphic handling capabilities, and ready extensibility through third party add-ons. The decision to use a RAD tool as opposed to a traditional programming language (e.g. C+, Java) was made to provide maximum flexibility during the development process. In particular, it enabled us to quickly implement and evaluate alternative functionality of both the planning and searching phases of the PLP. Once the PLP's functionality is finalised it is envisaged that a robust, scalable, cross-platform product will be developed. A working prototype, which included the first two phases of the PLP (searching and planning), was developed in a comparatively short time.

The Personal Learning Planner Prototype

A schema of the components of the PLP is presented in Figure 1. The boxed area in Figure 1 illustrates the components of the PLP that have been developed as a working prototype. The prototype utilises a flat-file database of resources, which is accessed locally. The functionality of the three working prototype components is explained below Figure 1.

Figure 1: The structure of the Personal Learning Planner.

Searching

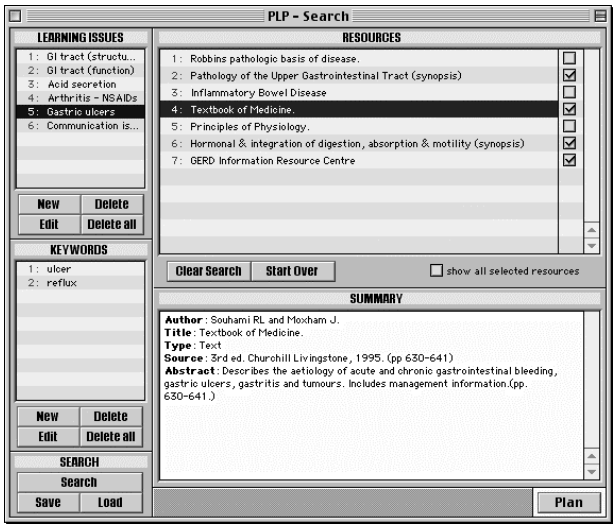
The searching phase of the PLP emulates a standard database searching program, with some additional, specific functionality given the educational requirements of the package. Initially students are asked to enter their learning issues for a particular problem or investigation into the fields provided (see Figure 2a). For each learning issue, students then generate keywords with which to interrogate the database of resources. Thus, students can search for relevant resources using their learning issues and associated keywords. For each search the PLP displays all resources associated with a particular keyword. For each resource, students are able to call up summary information. The summary provides students with the title, author, type of resource (eg. computer facilitated learning modules, textbooks, journal articles and web sites) and an abstract. Students should be able to determine the relevancy of each resource to their own investigation on the basis of this information. Students can select resources that are of interest to them and will be used in their investigation of their learning issues. At any time during their search students can view a list of the resources they have selected. Finally, resources that have been selected are carried over into the planning phase of the PLP.

Conceptual Planning

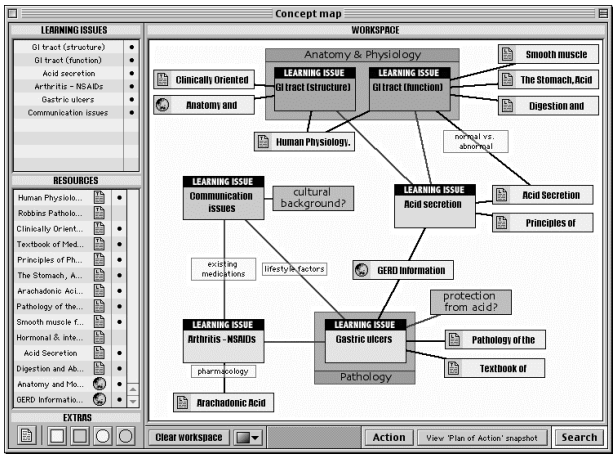
A priority for developers was to design the PLP generally—and the conceptual planning section particularly—in a way that promoted its use by students. The development team felt that students would only use a tool such as the PLP if they saw it as useful to their studies and it was easy and fun to use. In the conceptual planning section the team attempted to promote students' engagement with the program by asking them to actively construct a concept map. A variety of tools were made available to students so that they could be creative in the construction of their maps and to give them the flexibility to plan in an individual way.

In the conceptual planning section, students are asked to construct a concept map of the relationships between the learning issues they have identified and the resources they have selected from the searching phase. Students can place “tiles” of their learning issues and resources into an on-screen workspace (see Figure 2b). The workspace is dynamic and students can drag tiles to any location and draw links between them. The summary information for each resource is available on a pop-up field so that students can use this information to inform the construction of their concept map. Students are also able to annotate their maps or the links between tiles and may also group sections of the map using different colours and shapes. Different visual backdrops are available to students as another means of prioritising or grouping sections of their concept map.

a.



b.



c.

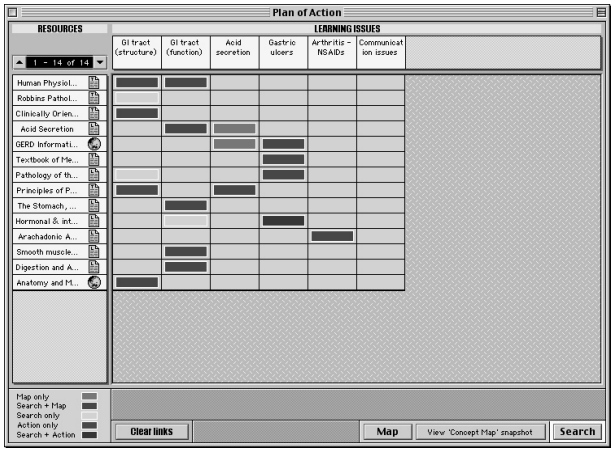


Figure 2: Examples screens from the PLP: (a) searching, (b) conceptual planning and (c) action planning.

Action Planning

After completing their conceptual planning, students are able to organise a specific course of action using the action plan. The action planning section of the PLP consists of a dynamic two-way table which has the students' learning issues on one axis and their resources on another (see Figure 2c). Each cell of the table represents a potential link between a learning issue and a resource. The links or associations students have made in the previous two sections of the PLP (searching and conceptual planning) are shown as coloured cells for students when they enter the action planning section. Different colours are used to represent the different phases and sections of the PLP where students have made associations between learning issues and resources (i.e searching vs. planning, conceptual planning vs. action planning). Students can create or delete links by clicking on the cells of the table. They are also able to prioritise their learning issues and resources by reordering the rows and columns of the table. To assist with this process, students can review a snapshot of their conceptual plan and the summary information associated with each resource. By completing this process students are able to create a concrete guide for their study activities over the week.

Conclusions and Future Directions

The development of PLP is progressing well, however, clearly there are a number of outstanding issues which need to be addressed before the program is implemented. The functionality of the review phase needs to be finalised. Two issues that need to be resolved in the review phase are the nature of the statistics that will be presented to students for their review and how students will be given an idea of the degree to which they are covering the syllabus. Currently it is envisaged that students will be able to review their own learning issues, keywords, selected resources, concept map and action plan for each week of the curriculum. They will be able to review summary statistics of the learning issues that their cohort identified as well as the resources that their cohort selected to investigate each problem. The learning objectives for each problem of the week will also be available for students' review.

Finally, modifications will be made to the working prototype on the basis of the formative evaluation of the searching phase and the conceptual and action planning sections. Formative evaluations have been carried on the PLP, however, space does not permit these evaluations to be reported adequately. In addition, an evaluation of current medical students' SDL behaviour has been completed that will inform the way in which the PLP is integrated into the curriculum. Discussions have already been carried out with the Faculty's education unit to determine the best means of integrating the PLP into the curriculum.

It is envisaged that the PLP may also be applied in other curricula which incorporate inquiry based learning (case, problem or project based learning) and SDL. The database of resources would be the only major change in moving from one educational context to another, as resources would clearly need to be curriculum specific. In these educational contexts the PLP would support students in their SDL while allowing them the freedom and flexibility to maintain their learning independence.

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