Problem-based Learning in a Health Sciences Curriculum

Edited by
Christine Alavi

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Problem-based learning is an approach which places the student at the centre of the learning process and is aimed at integrating learning with practice. In this book, the contributors draw on their experience of designing and implementing a course for nurse education in Australia to present effective strategies for those considering adopting the approach or adapting it to their own curricular needs. The book identifies the advantages of such a method of learning in nursing and indicates how these might be extended to allied health disciplines, education and distance education.

Each chapter addresses a particular aspect of problem-based learning, such as developing learning packages in Chapters 1 and 2, looking at possible future questions for problem-based learning and considering the necessary conditions for the development and maintenance of such a course. Other chapters discuss the integration of various types of knowledge and evaluation and in Chapter 10 particular emphasis is put on guidance for adapting the course to use within a more traditional curriculum. All the chapters are presented from a very practical perspective with detailed examples.

Problem-based Learning in a Health Sciences Curriculum is based on the contributors' first-hand experience of setting up a problem-based course and the evaluation and comments from students quoted in the book illustrate their enthusiastic response to this type of learning. It will be of interest to all those who want to explore and extend their teaching methods, including nurse educators, social workers, occupational therapists and psychologists.

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To all the graduates of 1993

Vivien Adams, Sue Alexander, Caroline Allison, Simone Andrews, Susan Appleby, Anika Austin, Sonia Barjasic, Josie Barnes, Elvira Barrios, Elizabeth Bergstrum, Jenny Berrell, Mandy Boswell, Janette Boyce, Wynita Brennan, Fiona Brett, Jennifer Bryant, Jenny Burton, Sandra Castle, Julie Chan-Versluis, Ria Cirson, Renea Collins, Phoebe Collins, Justine Coulson, David Crofts, Gabrielle Curtain, Rosina Daley, Lisa Dawson, Tanya Degney, Nikki Devencorn, Gerri Doogan, Jenny Doolan, Kerri Dooley, Anne Duncan, Tyrone Dungey, Lyn Dunham, Christine Durant, Karen Eastman, Tracey Eleison, Keith Elsden, Yvonne Eriksen, Liz Fountain, Margie Fox-Fryer, Karen Gallagher, Marie Gallibu, Pierette Garner, Renata Geary, Kelly Gifford, Liz Grant, Agnes Gutugutuwai, Rikki Hall, Lisa Hay, Damien Hayes, Pam Haynes, Karen Herbert, Bonnie Houston, Karen Jeynes, Sharon Johnson, Kerri Jones, Melissa Jones, Vicki Jurgevics, Nicola Kennedy, Monika Kilpatrick, Tony King, Astrid Klemmt, Carmela La Pila, Joanne Ladewig, Colin Larwood, Samantha Lee, Robyn Lindsay, Janine Lindsay, Megan Long, Natalie Luxton, Desaree Martinez, Patricia McCabe, Brigid McCarthy, Betty McDonald, Michelle McDonnell, Annemaria McGinn, Fran McKindley, Antoinette McLeod, Sally McPherson, Gillian Melksham, Julie Miller, Sonya Miru, Kim Mitchell, Jeremy Monk, Sarah Moreny, Clare Murray, Clare Nally, Jodi Nimmo, Megan O'Sullivan, Carolina Orellana, Matthew Parnaby, Ann Parnell, Mandy Parravicini, Linda Pforr, Fiona Pullar, Maree Richards, Anthony Rietberg, Sarah Ross, Nicole Roxburgh, Esther Schrijver, Phillip Schwarz, Nadine Smith, Allan Smith, Helen Squires, Leanne Stark, Deborah Stevens, Linda Stevenson, Leisha Stoneley, Michele Stubbs, Jillian Sutton, Sara Thompson, Jocelyn Toohill, Cathryn Vermeer, Annette Vermulm, Richard Walker, Angela Warland, Kerry Watson, Melinda Waugh, Heather Wells, Ingrid Werner, Terri White, Bern White, Marie Williams, Kirsty Williams, Kerryn Williams, Rebecca Young, Anneleis Zeissink.

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Introduction

What kind of curriculum will best help students to become competent professional practitioners? Every new course should start with an answer to this question, preferably an explicit answer. This book is developed around the answer taken in one new nursing degree course. You will discover why and how a course of study beginning with lectures was rejected and instead we had students start by examining the following scenario:

> *Sonia Hepinstall is a student in your group. She has come from a small town 200 km away to start the problem-based nursing course. She has always wanted to be a nurse and is particularly drawn to emergency department nursing. Her aunt, a registered nurse who has worked in a busy metropolitan teaching hospital, has told her that university nursing courses are no good as they don't have enough 'hands-on' experience and that all you have to do is write assignments. Sonia wonders if she has mode the right choice.*

This example will be discussed in more detail later. However, in the wider context, an increasing number of health-care departments and schools in universities around the world are coming to see problem-based learning courses as the best answer to our opening question.

> *It's really just suited me to the ground. I think being able to go out and do your own research and get it by yourself for the group; it's a better way to learn, you're actually learning not just getting it thrown at you.*
>
> *Peter, Year 1 student*

But what is a 'problem-based learning course'? This question is especially important because problem-based learning is often confused with case-study approaches to learning, discovery learning and project-based learning. Sometimes even the most orthodox lecture-based courses are described by their practitioners as 'problem-based' on the grounds that they include an opportunity for students to solve textbook 'problems' during tutorials. In this view almost any course might be described in a

similar way. A much clearer understanding of problem-based learning is needed if problem-based courses are to be designed and run effectively. Such an understanding has been developing over the past few decades as experience of this form of education has grown.

Problem-based learning can be described in many ways, but it is possible to see at least three common threads in all of them. First, there is a clear purpose in regard to an area of study, namely, to integrate practice and theory so as to produce sound understanding and action. Second, there is an educational process carefully considered and designed to achieve this purpose. Third, the process is itself content-specific and reflects the process which led to the generation of knowledge in the area of study in the first place. This third thread can be explained more fully along the following lines. A problem-based learning course is not a course in general problem-solving, but focuses specifically on content (or subject-matter) central to the area of study by requiring students to acquire important knowledge in the process of tackling problematic situations. In effect, by combining a problem-tackling process with the specific knowledge essential to dealing with the problem in question, problem-based learning reflects the real process of knowledge generation, regardless of whether the knowledge is 'pure' (generated by questions of pure curiosity) or 'applied' (generated by questions of practical importance). Problem-based learning is open to whatever considerations are relevant to dealing with a problematic situation; it makes no prior commitments to particular subjects or disciplines but is open to taking into account whatever will help deal with the problem. In this it reflects a significantly different conception of knowledge and understanding from conceptions which presuppose that knowledge is certain, on the basis of unshakeable foundations, and incorrigible and that it must be divided up in the ways typically represented in university departments. It posits a more tentative character to knowledge, possibly an evolutionary character, in contrast to a conception of knowledge as fixed eternally. It treats theory and practice as distinguishable rather than as categorically different, and therefore finds no difficulty in treating real problem-situations as central in the educational context.

The similarity between an original situation of knowledge acquisition in response to problems and a problem-based learning situation often leads to a misunderstanding of problem-based learning. It is sometimes thought that problem-based learning is wasteful of time and energy since it seems to be merely a process of re-inventing the wheel. This misunderstanding often arises because the difference between the original situation and the educational situation is overlooked. In a good problem-based learning course problems are judiciously selected, their presentation is thoroughly designed, and the way they are tackled by students is carefully facilitated—and, most importantly, the sequence of problems throughout the course as a whole must be equally thoroughly designed. A vital principle of problem-based

course design is a requirement to reflect the actual problem situation as realistically and as fully as possible in the educational context, while structuring the presentation of the problem in such a way that effective learning by students can be achieved within the time available in the course. This may sound like an impossible balancing act, but examples of how it is achieved are contained in the chapters in this book. The effect, far from a wasteful re-inventing of the wheel, is effective learning by students not only of the necessary knowledge in the sense of content, but also of the process of acquiring important knowledge as necessary in new situations.

There is, in this, a kind of process of discovery by students. However, it needs to be clearly distinguished from discovery learning. A criticism of the latter was that it did tend in many cases to drop the learner in at the deep end with little guidance; too often this resulted in students floundering. Problem-based learning avoids this difficulty by the selection of problems appropriate to the educational purpose; by a structured presentation of the problems related to the level of understanding of the students concerned and by facilitation, which is to say tutoring that helps students to think creatively, intelligently, critically and sensitively about the problem-situation in question. This guides them where necessary and in a non-didactic way to knowledge they may be in danger of overlooking in their investigations, and it ensures an effective balance between acquiring knowledge and using it and understanding it appropriately.

> *A lot of us were expecting them to be like a school teacher…it was a whole change of concept, they're not there to teach us but to help us learn.*
>
> *Andrew, Year 1 student*

The importance of the use of knowledge may suggest a similarity between problem-based learning and case-study learning, particularly as problems can be thought of as cases. Case-study approaches capture to some extent the reality of actual situations and they generate more active student learning than do lectures, but their didactic element detracts from the self-directed learning of problem-based courses where students make much fuller use of their existing knowledge in order to gain new knowledge and understanding. Examples described in the following chapters show both how students do this and how the course systematically tests students' understanding and use of the knowledge they have acquired. The question of the use of knowledge, and the possible similarity of projects and problems, is sometimes taken to indicate that project-based learning is the same as problem-based learning. Where the project is a problem, then of course there may be quite strong similarities, although other aspects of problem-based learning—such as well-structured facilitation—may be absent. In other cases, however, where the project is

a theme or a general idea rather than a problem, the distance from problem-based learning increases.

Problem-based learning, then, may quite easily be mistaken for other approaches to learning which resemble it in several ways. None the less, it is distinctive. In appearance, particularly as regards the processes observable in problem-based tutorials, the distinctiveness can be quite striking to those more familiar with raked lecture theatres containing serried ranks of fixed seats with students taking notes from the lecturer. A problem-based course does not begin with a series of lectures; it begins with a problem-situation which the students have to begin to deal with in a problem-based tutorial. A belief in the necessity of lectures reflects an assumption that students must absorb certain quantities of information through lectures or lecture-like media (such as didactic teaching texts in distance education) before they will be in a position to think about a subject. In contrast, in a problem-based learning course students begin with a problem because they are assumed not to be entirely devoid of knowledge. They know enough to form an initial understanding of the problem, they can reflect on it, critically evaluate what they think they know about it and what they do not; they may have some idea of how and where they might find out what needs to be known in order to understand the problem more fully, and so on. All this will be rudimentary compared to what they will know and be able to do by the end of the course.

Typically, then, having been presented with a problem-situation, students will work co-operatively in small groups in coming to grips with the problem, in formulating it adequately, in identifying what they need to learn in order to deal with it and so on; there will be fewer contact sessions between staff and students, although these are likely to be of longer duration than the normal lecture; the curriculum will show no division into separate subjects; during contact sessions with staff there will be considerable interaction and intellectual activity among students; and outside contact sessions students will be learning in other ways from various resources (written texts, multi-media, expert persons, films and others).

In its modern form problem-based learning has been a distinctive method since the 1950s when Case Western Reserve University began developing a problem-based course in its medical faculty. Since then other notable examples of problem-based courses have appeared at such institutions as McMaster University in Canada, the University of Newcastle in Australia, the Rijksuniversiteit Limburg at Maastricht in the Netherlands, and in areas of study from the health professions to engineering, architecture, optometry, law, metallurgy and social work. An early example in nursing occurred at the University of Western Sydney at Macarthur, Australia; Griffith University, Australia, now has a fully integrated problem-based learning course, and many other schools of nursing, particularly in South East Asian countries, are adopting this form of education.

While these examples are quite recent, problem-based learning has arguably been in existence for a much longer period in more or less closely related forms. Projects as named components in curricula first appeared in 1908 in connection with agricultural courses in Massachusetts, and these may be regarded as an early form of problem-based learning. In medieval medical schools students learned by following the qualified practitioner on rounds and observing what was said and done. Perhaps the earliest example of a kind of problem-based learning is the description Plato gives in the *Meno* of Socrates presenting a slave boy with a geometrical problem and, by questioning, getting him to see the inadequacy of his original solution to the problem and to think through to a satisfactory solution. However, in its modern form, in the second half of the twentieth century, problem-based learning has been practised in a quite distinctive way.

Problem-based learning places the student at the centre of the learning process and emphasises co-operative learning. The role of the teacher changes so that she becomes a resource for the students, facilitating their learning rather than being merely a purveyor of information. This method of learning has many implications which range from curriculum design to staff development, from educating the profession of nursing to persuading the students that we are adamant in acknowledging that even as novices they come to the university with a great deal of useful and relevant knowledge.

We will discuss all of these issues in more detail in the chapters which follow, but as an introduction to problem-based learning let us look again at the learning stimulus material given at the beginning of the introduction. It was developed to orientate students to a problem-based course in nursing at Griffith University, and will exemplify the learning process used in the first week of such a course.

Students generally come to university with preconceived ideas about nursing, learning and assessment that they have gained from a variety of sources, such as school, the media, friends, relatives and from other personal experiences. These might include the idea that nurses work only with those who are ill; that learning is always directed by the teacher; and that assessment is individual and competitive. These notions are quickly challenged, initially through the following first block of learning stimulus material:

Sonia Hepinstall is a student in your group. She has come from a small town 200 km away to start the problem-based nursing course. She has always wanted to be a nurse and is particularly drawn to emergency department nursing. Her aunt, a registered nurse who has worked in a busy metropolitan teaching hospital, has told her that university nursing courses are no good as they don't have enough 'hands-on' experience and that all you have to do is write assignments. Sonia wonders if she has made the right choice.

This material is supported by suggestions about how to use time; details about off-campus clinical experience associated with the package; a list of suggested and available resources; and references indicative of the concepts and issues related to this package.

The learning material above is deliberately constructed with triggers to initiate discussion on the nature of nursing; on problem-based learning; on assessment; on clinical experience within the course; on living away from home; and on learning within a university setting. The purpose of these triggers is to orientate students to the course and to confront their preconceived ideas.

The role of the teacher here is that of a facilitator of student learning. What this means is that students are guided to develop analytical enquiry skills in processing information. They are encouraged, in effect, to learn how to learn; to be active participants in their own learning rather than passive recipients of the teacher's expertise. To this end each facilitator works collaboratively with a group of students—perhaps 15–20 in number—meeting them on a regular basis to process the learning material.

> *We've been taught to question. We've sort of learned through our group process to question things, and I think when we get out there very few of us will not have the confidence to keep asking questions.*
>
> *Anna, Year 3 student*

By the end of the first two-hour tutorial of the week students will have identified issues about which they need to learn more, how they might organise themselves to do this, and what might be some of the resources available to them. In order for students to achieve this they will be guided by the facilitator to read the learning material and to identify, by means of discussion and using their own experiences, what problems Sonia might have. The facilitator might encourage students to share their own thoughts and feelings about coming to university, and might help students to draw parallels between Sonia's experience and their own. Through the techniques of questioning, reflecting students' comments, validating their experiences and encouraging their contributions, the facilitator demonstrates clearly how the students' input is valued, promoting an atmosphere in which students feel comfortable to speak and can begin to share responsibility for the functioning of the group. Here, as throughout the course, students are encouraged to see problems not simply in negative terms but rather as situations in need of improvement (SINIs), where clients are viewed as needing some action from students placed in the role of registered nurses. Thus, the situation Sonia needs to improve concerns her doubt: has she made the right choice?

This material is specifically designed to be ambiguous so that it allows students to explore a range of issues that might be contributing to Sonia's situation. Identified issues may include her concern that university courses might not have 'hands-on' experience; difficulties she might have encountered living away from home; a particular view of nursing (busy emergency-based nursing); uncertainty about assessment in a problem-based course (all you have to do is write assignments); and general uncertainty about the nature of learning. There may also be rather idiosyncratic issues which might be raised and which may be directly related to what the students are themselves experiencing, but at this stage no issues are dismissed as fanciful or not useful. In working through this process students are introduced to the generation of hypotheses, the beginnings of the clinical reasoning process which they will progressively develop throughout the course. Before the tutorial ends the facilitator prompts the students to organise themselves to discover how they might test these hypotheses in the following three-hour self-directed learning time and, given that they are a group of twenty students, to develop some effective strategies for doing this in order to maximise their learning.

In considering the hypotheses the facilitator helps the individuals in the group who might choose to explore issues alone, or in pairs or small groups, to identify where they might find the information they need, and how they might go about presenting their findings to the group at the one-hour situation-review tutorial later in the day.

There is usually a great deal of turbulence at this point, some students being angry that the 'teacher' does not give the answers, some students being a little confused about what is expected of them and others feeling excited at being able to investigate the learning issues they have identified.

When the students reconvene in their tutorial group later in the day to present their findings they bring back information gleaned from various sources which allows them to begin to test the hypotheses they generated earlier. As has been the case on other problem-based learning courses, we were surprised at the range of activities students undertook in this time. Some students use written texts as their main sources whilst others are more adventurous and might, for example, have spoken to the Health Department about nursing; might have interviewed someone in the university about assessment; might have interviewed Student Services about what support is available for students who are living away from home, or may have discussed nursing issues with registered nurses working in various settings. The information is shared in a variety of ways. Students may bring back posters, overhead transparencies which give information or videos, or they may choose to role-play their information. In the light of this the group together decides which hypotheses they can reject, which they can accept and those that require further information before any definitive decision to

accept or reject can be made. In such a case hypotheses are held for further exploration.

> *One of the benefits of problem-based learning as opposed to lectures is that you can go off on tangents that make links, and even wild guesses as to why someone has a problem. In a lecture you only have the lecturer's point of view.*
>
> *Jane, Year 3 student*

In these early days the facilitator's main role is to encourage students' self-directedness and assist students to develop confidence in their enquiry skills. Such a role is crucial as it helps students form the basis for their forays into the analysis of increasingly complex situations in need of improvement as the course progresses.

Unanswered questions raised at this time form the stimulus for further enquiry. To some extent these questions can have been anticipated and appropriate fixed-resource sessions for the total student population planned, given the deliberate structuring of the learning material. A fixed-resource session is a period of time when the whole student group gathers to explore learning issues. They are helped in this by experts who make themselves available to answer student questions. In the first week the resource persons might include a librarian who could answer questions on the use of the library; a behavioural scientist who might answer questions and initiate exercises about communication and working in groups; a biological scientist who might talk about the integration of science learning in the nursing course; or a panel of nursing faculty who can answer questions on assessment, problem-based learning and clinical experience within the course.

The nursing laboratory is a regular feature of student experience in any nursing course. It provides a safe place for students to rehearse behaviours and psychomotor skills which they will need to perform in off-campus nursing contexts. A nursing laboratory planned as a fixed-resource session in the first week might give the students an opportunity to practise and evaluate their communication skills, to help them take part in an off-campus clinical activity where, in order to discover more about nursing, they can talk to nurses from various clinical areas about their roles and functions. The person who co-ordinates students' clinical learning could previously have arranged for nurses in child health, paediatrics, maternity, community health, various hospital wards and departments, mental health, occupational health and school health to have made time available to spend with a group of students.

The final tutorial of the week serves two purposes. It allows students to summarise and consolidate their learning during the week, enabling them to review the concepts

and issues they identified. As well, a period of time is set aside for students and their facilitator to discuss and analyse the working of the group throughout the week. After this process students might be encouraged (some time could be allocated) to reflect on group experiences, writing their thoughts, feelings and experiences in a private journal.

Why use such a method of teaching-learning—a method which, during the early days of a course, is very labour intensive in the designing of appropriate learning packages and the gathering of resources; which means that tutorials of no more than twenty students are the primary way of processing information; which makes traditional lectures almost non-existent; and which involves a radical rethinking of the way a nursing course is developed, taught and experienced?

Our thinking went something like this. Because nursing is a practice-based profession it is important that the learning reflects a nursing focus so students encounter situations on-campus which mirror, and are directly derived from, those which they will meet in the clinical area. Since nurses also work in multidisciplinary teams which must function amicably and co-operatively, it will benefit students if they work in groups from the beginning of the nursing course. Such group work needs therefore to be valued; co-operative learning which uses a mix of group assessments with individual assessments convinces students that working together is an important component of their learning.

Our motivation for writing this book is, in part, to share some of the strategies we used in order to establish a problem-based course which intimately integrates learning from the sciences, arts, the law, ethics and nursing by structuring these knowledges in learning packages developed from real-life situations where nursing interventions are made. Such knowledges are reiterated in different client situations and with increasing complexity throughout the course. Many examples of such learning packages are given throughout the book. An integrated and reiterative problem-based course, while a more successful way for students to learn, is no more expensive in terms of either human or material resources than a more traditional approach.

Each of the following chapters will address a particular aspect of problem-based learning as it has been identified in the design of a Bachelor of Nursing course. (To give some indication of the generic nature of the course, different packages will be used to exemplify the information.) In this way it will become apparent how such a course is able to address client situations across the life span, those with high and low dependence, in primary, secondary and tertiary health-care settings, in general, psychiatric, palliative care, maternity, child and extended care contexts as well as in multicultural settings.

In the first chapter, we would like to give you the opportunity to participate in a problem-based learning package from beginning to end. This is followed by a chapter

which will deal in detail with the construction of learning packages, beginning with a discussion of conceptual and curriculum issues. It will move on to elaborate the design of learning triggers, resource material and referencing, incorporating a discussion of the processes of identifying and gathering resources. It will highlight the varied ways in which packages can be constructed, the material derived and the packages evaluated.

A chapter addressing facilitation in this problem-based context follows, with the focus here on the challenge it presents for educators in a practice-based discipline like nursing. Issues of the differences from traditional teaching methods; locus of control; student-teacher dyad; group learning; characteristics of good facilitation; and the tailoring of facilitation to problem-based learning will be addressed, along with some discussion of evaluation of facilitation by self, students and peer methods.

Chapters 4, 5 and 6 will address the issues of integration of knowledges. Chapter 4 deals specifically with how the science-learning needs of the student can be addressed. Discussion will include how experts from various disciplines contribute to the development of, and teaching and assessment within, a problem-based learning nursing course.

The integration of student learning in the nursing laboratory is dealt with in the following chapter. Examples of innovative worksheets which permit students to progress at their own pace within the relatively safe nursing laboratory environment are provided as they mirror situations which students will meet in the clinical context. Integrating knowledge in the clinical area is discussed in Chapter 6, where research into students' experience of clinical practice is used to show which elements in the clinical setting students anticipate and find most difficult or challenging, and how a problem-based course using clinical facilitators helps students deal with these elements.

Chapter 7 deals with the importance of orientation and transition to the facilitator role for teachers who are discovering and developing problem-based learning. The chapter discusses staff selection, orientation, continuing education and support, and gives examples of strategies used to promote team building.

Assessment occupies a central position in any course, particularly from the student perspective, but within problem-based learning it forms an integral part of the learning process. This perspective is elaborated more fully in Chapter 8, where innovative assessment strategies include student, self, peer and facilitator assessment. Individual and group assessment items, and examples of both formative and summative assessment formats and their contribution to effective student learning, are described and discussed.

Chapter 9 discusses evaluation of problem-based learning. It considers the role of evaluation in the problem-based learning curriculum: how it can be used to aid curriculum and staff development, and how it can empower students.

Chapter 10 examines how aspects of problem-based learning can be introduced into more traditional programmes. The authors make suggestions about how such transitions may be approached.

In the final chapter the authors take a speculative look at possible futures and questions for problem-based learning, considering the necessary and sufficient conditions for the development and maintenance of such a course.

Chapter 1
Approaching problem-based learning

Marie Cooke and Christine Alavi

> *Holistic approach. Problem-based learning provides problem-solving experiences...learning is enhanced in an environment that is conducive to the free exchange of questions and ideas and one in which the uniqueness of each learner is valued. This is why peer/self evaluation is important. Through problem-based learning the learner is able to enhance their knowledge/skill individually in order to function effectively as a nurse when facing different situations and problems as well as have the ability to work with other team members. Responsibility of the faculty is to facilitate an optimal learning environment.*
>
> *Sarah, student*

We invite you to approach problem-based learning through an experience similar to the one students encounter. Rather than explain the process by which students engage with the learning material, we would like to give you the opportunity to work through a block of learning material in a structured learning package entitled *Timothy Randall*.

> We will guide you through Block 1 and give you the opportunity to work through Block 2 of this package.

For those who do not wish to work through Block 2, further explanation of the whole learning process will follow in future chapters. If you choose to continue with this chapter you will probably identify issues which raise queries, and we would encourage you to jot down ideas or questions for further investigation. Let us proceed then by putting this material into context.

Students, in groups of approximately twenty, have come to the point of engaging with this learning package by working in Semester 1, through similarly structured learning packages which focus on the themes of health, wellness and culture. This package, *Timothy Randall,* is the second of three packages placed in Semester 2, Year 1. All three packages have the theme of loss, and all contain core concepts