

**A DEVELOPMENTAL MODEL FOR THE DESIGN AND IMPLEMENTATION
OF WEB-BASED PSYCHOLOGICAL INTERVENTIONS**

by

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THESIS

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ABSTRACT

The helping professions frequently implement interventions in a variety of settings to address the needs of various client groups. With the advent of the Internet a number of such psychological and medical interventions have appeared on the Internet. This phenomenon requires further scrutiny as the benefits of online interventions have not been established and no clear guidelines for the development of these interventions exist. This study aimed at developing a model which can be used to design and implement Web-based psychological interventions, while also investigating the practical and ethical considerations of such an enterprise. A developmental research strategy was used as it allows for continuous modifications to be made throughout the research process. Due to a paucity of literature regarding the development of online interventions, the knowledge base from the fields of intervention design, instructional design, and Web-based learning was consulted as a background and foundation for the model. Specifically, the developmental research model of intervention design by Thomas and Rothman (1994) was integrated with the instructional design model of Nadler and Nadler (1994) and the hybrid design model of Web-based learning design by Passerini and Granger (2000). Along with some input from other instructional design and Web-based learning models, this process initially yielded a model of Web-based intervention design with five stages and 23 tasks. The practicality and value of the model was evaluated by applying its guidelines to the development of a limited online career assessment intervention. This intervention was completed by postgraduate students who subsequently provided feedback regarding their experience of the intervention. Based on the process of applying the model and the students' experience of the intervention, the initial model was revised and refined and a final model consisting of five stages and 20 tasks emerged.

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Chapter 1 – Introduction and Outline of Study

“The Internet has the ability to reach people all over the world and provide highly specialised psychological interventions otherwise not sought or obtainable.” Ritterband et al., 2003, p. 527.

1.1 Introduction

The helping professions are constantly challenged by new problems and new tasks involving diverse client groups. Interventions are therefore developed to meet some of the needs of these client groups (Siegel, Attkisson & Carson, 1995). Such interventions are implemented in a variety of settings, such as schools, organisations, and so forth (Thomas, 1984). The need for interventions is clear and its application on a variety of platforms, in a variety of settings should follow logically from the diverse client groups that interventions cater for. However, while interventions aimed at groups are desirable in terms of their reaching larger target groups, there is a danger that such interventions might become less effective.

Recently a number of psychological and medical interventions have found their way onto the Internet, particularly the World Wide Web. These interventions are primarily designed as self-management programs catering for the individual, although online¹ therapy is also offered. With the emergence of these interventions a number of issues have been raised:

The perceived benefits of these programs are not clear, although a few studies have indicated a beneficial impact (e.g. Christensen, Griffiths & Jorm, 2004; Wang & Etter, 2004; Copeland & Martin, 2004). Authors such as Amig (2001), Ritterband et al (2003) and Ybarra and Eaton (2005) have emphasised that online interventions need a strong empirical validation in the literature, especially in terms of outcome. In this regard a review of the existing literature and implemented online interventions indicates that very little research has been done to guide the development and evaluation of these interventions.

Online interventions aren't necessarily developed by human service professionals and the anonymity provided by the Internet can shield the qualifications or lack

¹ The terms “online” and “Web-based” are used interchangeably in this study. Reference to the Internet, however, refers to the larger system of which the World Wide Web forms part.

thereof of intervention designers from users. Whereas human service professionals are typically guided by a code of conduct, designers of online interventions frequently are not. Without a standard of practice (including ethical issues) to guide the development and implementation of these interventions benefits to users and the quality of the interventions remain controversial (Childress & Asamen, 1998; Devineni & Blanchard, 2005; Ritterband et al., 2003)

There is no existing knowledgebase for the development and implementation of such interventions and currently these interventions, especially self-management programs, appear to have been designed according to the developers personal experience. While personal experience might be an acceptable guideline in the absence of a knowledgebase, it can also lead to biased or superficial interventions. This issue can be compared with using the method of authority to gain knowledge; it can be helpful, especially as a starting point, but might also have some shortcomings, such as subjectivity or lack of real expertise (Gravetter & Forzano, 2006).

Childress and Asamen (1998) called for caution in the implementation of interventions via new technology as potential harm can arise from unforeseen risks. For example, traditional face-to-face interventions allow for continuous assessment and adjustment of treatment, thereby minimizing risk for the client. In contrast, anonymity in the online environment enhances the avoidance of stigma but simultaneously limits monitoring and possible crisis intervention. Amig (2001) pointed, in this regard, to the value of physical clues in face-to-face treatment. In the online environment clear signs of abuse, illness, or neglect can t be discerned or interpreted.

This study aims at developing a model which can guide the design and implementation of online psychological interventions. It is anticipated that the model will be especially suited for the development of self-management interventions. A self-management intervention is regarded as one where the user progresses through an interactive programme with little or no active input from a therapist or other human service professional. A further aim of this study is to delineate this field in terms of practical and ethical considerations while critically investigating the viability of such interventions. In order to develop such a model, an approach, based on the **developmental research** design strategy, will be followed as this design allows for continuous modifications throughout the different stages of the process and is particularly suited to the design of innovations.

Developmental research guides the development of an innovation which is designed to meet the needs of groups, organisations and communities and is aimed at creating a solution or strategy to address an existing problem in a reliable, practical manner (Thomas & Rothman, 1994). The emphasis is on a methodology which allows for an orderly means whereby design problems may be identified and solved and a resulting innovation be developed and evaluated (Thomas, 1984).

For the purpose of this study a simplified self-management program, namely a career guidance system, will be developed based on a proposed developmental model. It must be emphasised, however, that the focus of the study is on the building of a *model* for the development of Web-based psychological applications and *not on the evaluation of the effectiveness of the specific Web-based psychological intervention utilised* in this study.

As very little literature regarding the development of online interventions exist, the existing knowledge base on intervention design, instructional design and Web-based learning will be utilised. In this regard, Lin and Hsieh (2001) emphasised that the success of a Web-based learning model depends on its appropriateness for a particular learning situation. It can be assumed that any intervention will involve some form of learning and therefore it is proposed that information which can contribute to the development of this model can be found in literature on Web-based learning design, as well as “traditional” psychological intervention design, such as programme development.

To further address the learning component of the intervention program, Nadler's (1989) Critical Events Model (CEM) will be utilised alongside Thomas and Rothman's (1994) intervention research model as the CEM points to critical events that occur throughout the programme design and implementation process and emphasises continuous evaluation (Nadler, 1989) (*See Figure 1.1*).

1.2 Background and Problem Statement

As with most, if not all, sciences, psychological applications have found their way onto the Internet in forms such as information resources, self-help guides, psychological testing and assessment, psychological advice via email or bulletin board, and so forth (Barak, 1999). Probably the most controversial of these psychological applications are therapeutic interventions and psychological research.

Both these applications have no standards of practice to guide their implementation in an online environment (Childress & Asamen, 1998) and ethical dilemmas therefore emerge from such an application (Amig, 2001; Sampson & Lumsden, 2000). For in example, in the case of psychologists, the APA Statement on Services by Telephone, Teleconferencing, and Internet (American Psychological Association, 2005) issued in 1997 stated that these services are evolving quickly and a future revision of the APA's ethical code would consider such treatments. The statement advised that "psychologists follow Standard 1.04c, Boundaries of Competence, which indicates that *„In those emerging areas in which generally recognized standards for preparatory training do not yet exist, psychologists nevertheless take reasonable steps to ensure the competence of their work and to protect patients, clients, students, research participants, and others from harm. (par. 3)."*

Thus, due to the unique nature of the Internet it can be expected that, with appropriate guidelines, these problematic applications can be utilised in a positive way. The Internet has a number of unique features that could benefit self-management programs. It can accommodate a high degree of interactivity, can provide individualisation in terms of structure and feedback, can utilise a variety of multimedia, and has the ability to adapt to the user's characteristic style. It is especially the ability to individualise and adapt that sets the Internet apart from other intervention strategies and in the last few years technological advances have been made in the ability of computer systems to learn from the user and adapt content accordingly (e.g. the studies and work by Hanisch & Straßer, 2003; Papanikolaou, Grigoriadou, Magoulas & Kornilakis, 2002).

Among the variety of therapeutic interventions the emphasis will be on self-management programs as they lend themselves most to the unique capabilities of the Internet, have increased in popularity over the last few years, and there are indications that they can be expected to contribute positively (Gati, Kleiman, Saka & Zakai, 2002; Sampson, Kolodinsky & Greeno, 1997; Walters, Miller & Chiauzzi, 2005; Zabinsky, Wilfley, Calfas, Winzelberg & Taylor, 2004).

An Internet search (via Google), as well as a literature review, indicate that a large number of online self-management programs exist. Most are commercial (e.g. www.assessment.com) but some are partially (e.g. www.emode.com) or completely free (e.g. www.stopsmoking.org). These self-management programs cover a wide variety of topics, ranging from medical applications, such as asthma management

(Atherton, 2000; Krishna, Francisco, Balas, König, Graff & Madsen, 2003; McPherson, Glazebrook & Smyth, 2005) to HIV/AIDS informative sources, as well as self-esteem enhancement, time-management, stress management, career guidance systems, and so forth (See, for example, Ritterband et al, 2003 for an empirical review). These programs differ in their complexity, interactivity, and scientific validity. As an example a review of existing online medical interventions showed positive health outcomes for 10 comparative studies, although the methodological quality of many was considered poor (Bessel, McDonald, Silagy, Anderson, Hiller & Sansom, 2002). As poor methodological procedures in research allow for the intrusion of extraneous variables, the value or accuracy of any results obtained from these studies can be questioned.

Despite the possible shortcomings of existing online interventions, indications are that their presence on the Internet will continue to grow and increase in complexity as computer systems technology develops. It is not within the scope of this study, however, to explore the state of computer systems technology. Suffice it to say that, with some limitations, current computer systems technology can accommodate the development of self-monitoring interventions and have been able to do so for a number of years.

The information sources that will form the foundation for the development of the initial intervention will come from the fields of intervention design, instructional design, as well as Web-based learning. There is currently no identified indication that sources from intervention design have been utilised in the development of existing self-management programs but clearly theory from Web-based learning and instructional design have formed the foundation of many online learning programs (e.g. Chen, 2001a; Papanikolaou et al., 2002; Waschull, 2001).

1.3 The Integrated Developmental Research Model

This study follows a developmental research design approach in order to formulate an integrated model for the design of Web-based interventions. As very little literature regarding online interventions exist, the existing knowledge base on intervention design, instructional design and Web-based learning is utilised as a foundation. Specifically, an attempt will be made to formulate an integrated developmental research model by integrating the seven phases of the Thomas and Rothman (1994) model of intervention research, elements from Nadler's (1989) Critical Events Model,

as well as the five phases of Passerini and Granger's (2000) hybrid design model. These three models complement one another by, on the one hand, utilising similar tasks during their various phases and, on the other hand, describing different tasks, which can add to the integrated model. The methodology that will be followed can be illustrated as follows:

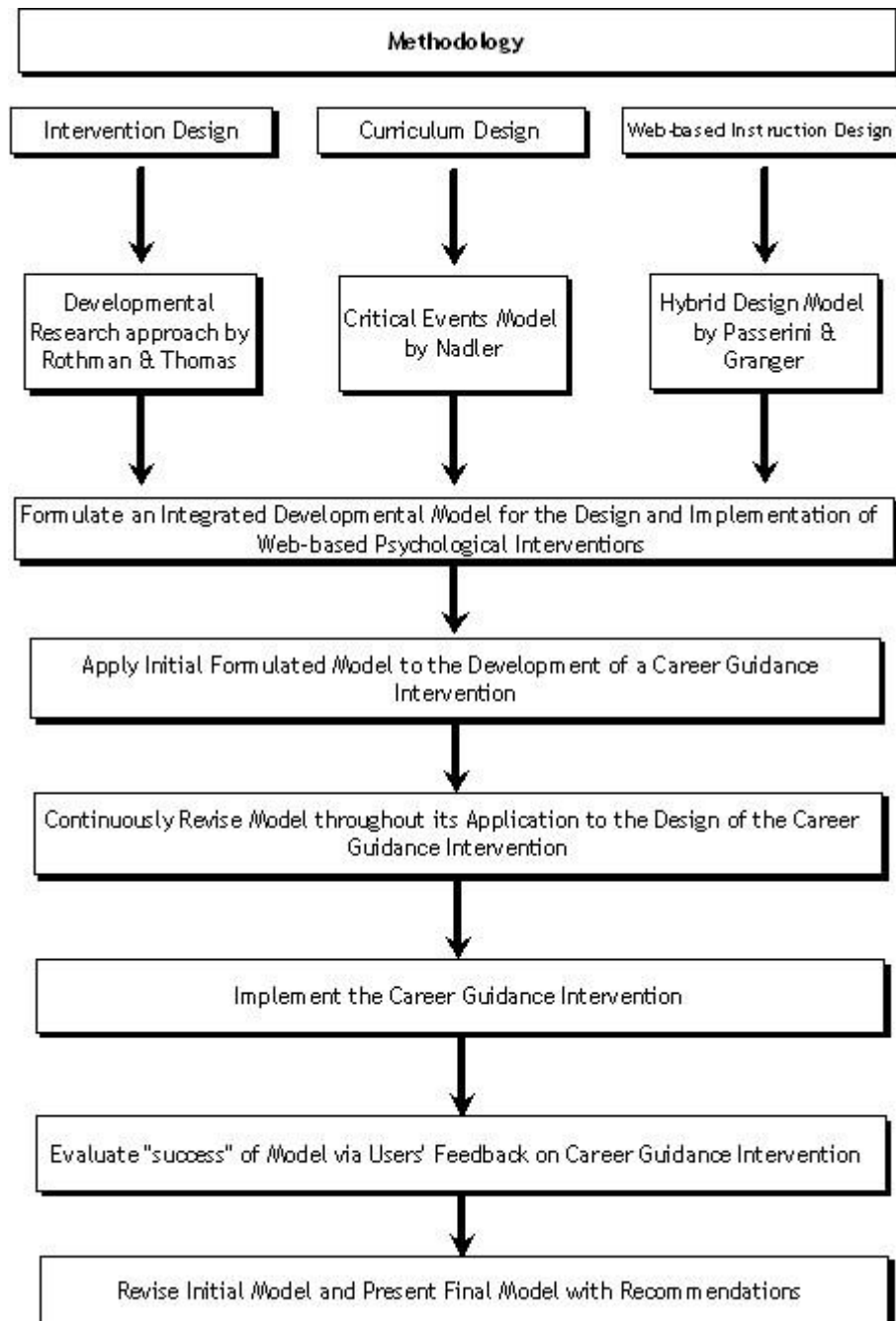


Figure 1.1. Proposed plan of study.

1.4 Objectives and Goals

The main aim of this study is to develop a model which can guide the design and implementation of online psychological interventions. In order to achieve this goal, the following practical steps will need to be taken (*See Figure 1.1*):

The design of the initial developmental model will be based on a review of the literature.

Firstly, Thomas and Rothman's model of intervention design will theoretically be blended with Nadler's model of curriculum design and Passerini and Granger's model of Web-based instruction design.

The integrated developmental model will then be refined and revised by applying its guiding principles to the development of a limited career guidance intervention.

The career guidance intervention will be implemented and based on the results of such implementation, the integrated developmental model will again be revised where necessary and a final model will be presented, along with recommendations.

1.5 Summary

This study aims at constructing a developmental model which can serve as a guide for the design and development of Web-based psychological interventions. It should be kept in mind that this study is grounded methodologically in a developmental research design but also uses this developmental research design as a basis for intervention design. Psychology has already made use of the Internet in terms of different applications but no formalised structure exists for the development of Web-based interventions. Due to this gap in knowledge the model needs to be developed by utilising existing models for intervention design and integrating them with existing models for the design of instructional and Web-based training.

Due to the unique, adaptive nature of Web-based psychological interventions, it is necessary to also move beyond these models and focus on user and environmental characteristics which can be addressed during the development and design phases. In order to develop and refine the proposed model, a Web-based career guidance intervention will be developed and implemented. Users' feedback from their experience of this intervention will provide indications of the feasibility of the model and also suggest any modifications that should be made.

This chapter focused on the rationale for a study of this kind and provided a background sketch of the context within which the study will take place. An explanation was provided for the choice of a developmental research approach and a brief literature review of the various models to be utilised, was provided. The chapter then focused on an overview of the proposed developmental model and its initial steps after which the planned steps to be followed were outlined.

In the following chapters a more detailed account of the models, their integration and application, will be discussed. Figure 1.2 indicates how the following chapters are integrated with the proposed plan of study (*See Figure 1.1*).

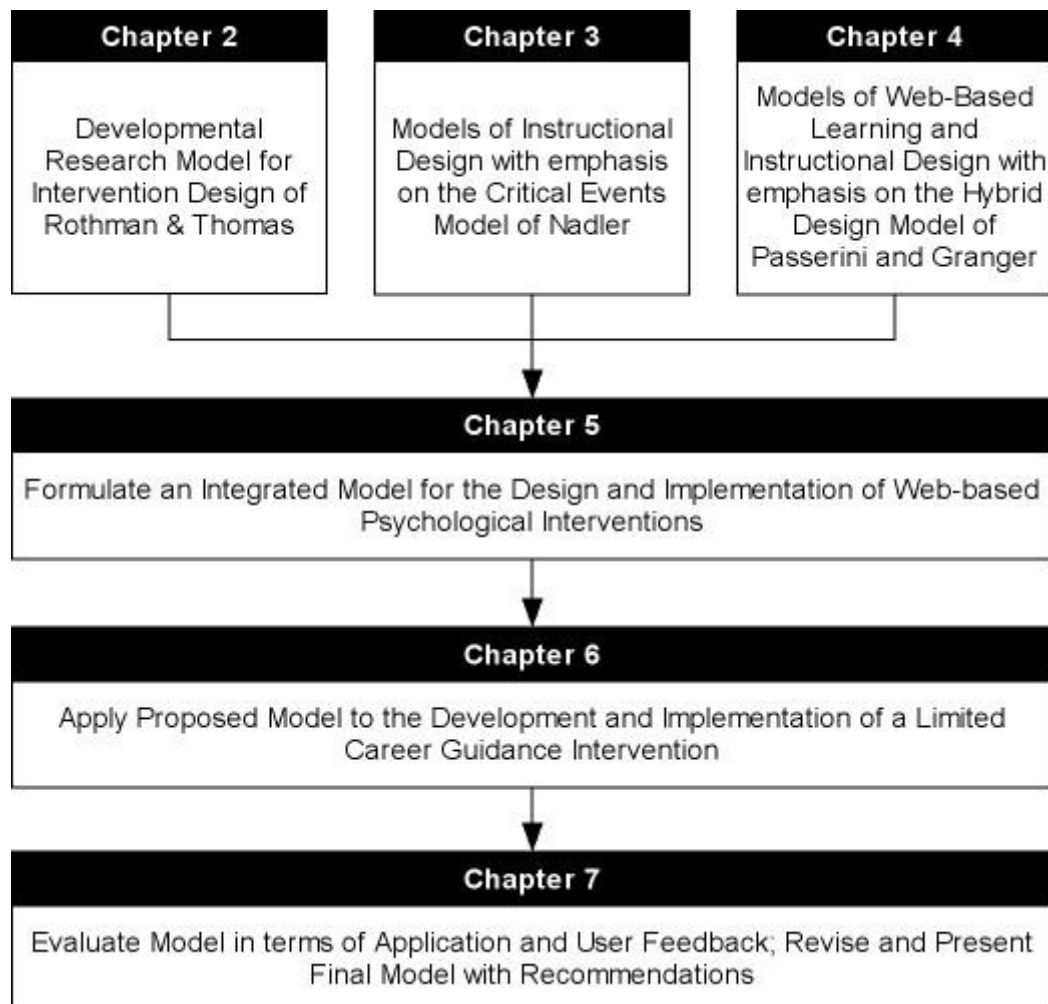


Figure 1.2. Chapter outline as Integrated with Developmental Research Process.

Chapter 2 – A Developmental Research Model for Intervention Design

"Making interventions without a design methodology is like making bridges without mechanical engineering or creating computers without electrical engineering." Thomas, 1984, p. 15

2.1 Introduction

Thomas (1984) pointed out that frequently interventions in the helping professions are developed without any reference to a specific methodology. Such an approach is limiting and leads to interventions restricted in their innovative options, applicability and effectiveness because the interventionist is forced to stay within the boundaries of the more obvious and familiar intervention development approach. This state of affairs is ameliorated by the fact that there is a constant need for new interventions, most of which are only used briefly because of their limited applicability or efficacy.

The need for, and nature of interventions evolve constantly. The resources available to interventionists are also developed and refined on a constant basis (as with the emergence of Web-based intervention programmes). This study therefore aims at formulating a model that can guide the development of interventions which will function in a World Wide Web-based environment. As no such model exists, it is necessary to turn to existing models which could provide guidelines. A first requirement would therefore be to investigate the process of intervention design and identify any prominent, time-tried, research-validated model which could form the foundation of the proposed model to be formulated in this study. Such a model should be studied critically and in detail, so as to determine its usefulness and feasibility for this study.

With a model of intervention design as foundation, it will be necessary to discover additional elements which could make this traditional model portable to a Web-based environment. By taking the nature of existing Web-based interventions into consideration, it is clear that learning is involved, frequently appearing almost as a form of courseware. It is therefore anticipated that portability would require two additional steps from the intervention design foundation.

Firstly, a focus on instructional design would be necessary. Two reasons justify this, namely, with current Web-based interventions little or no contact is established

between users and interventionist and therefore the efficacy of the intervention depends mainly on the quality of its construction and presentation, the development of which should be guided by principles of instructional design. Furthermore, the traditional intervention development approach, which will be discussed in this chapter, indicates design and development steps where instructional content is to be created as part of the intervention. Thus, it will be necessary to investigate the nature of instructional design, mediating factors involved in the instructional design process, and prominent models of instructional design.

Secondly, with the model of intervention development, as well as a chosen model or combination of models of instructional design as foundation, the nature of the Internet, in terms of current knowledge that could contribute to the development of a model for Web-based interventions, should be investigated. It is anticipated that such a knowledge base would be found in current models of Web-based learning, which are themselves built on traditional models of instructional design. Figure 2.1 provides a graphical representation of the development process.

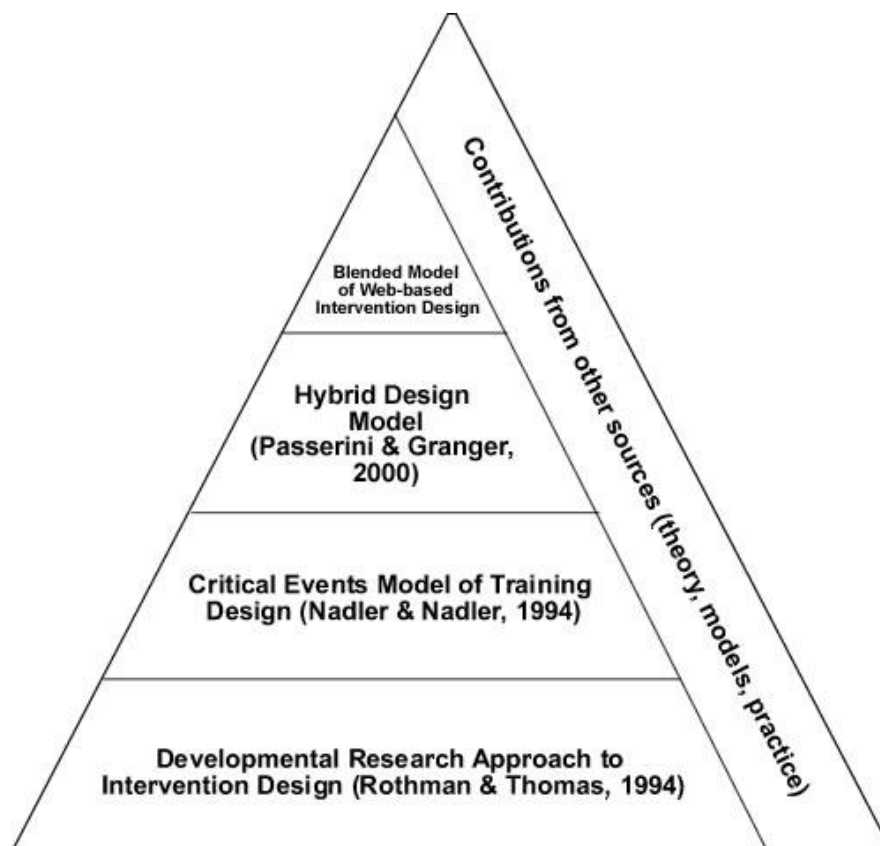


Figure 2.1. Proposed approach for the formulation of a blended model.

The focus in this chapter will be on the first step towards the proposed model of Web-based intervention design, namely an overview of a prominent traditional model of intervention design. In this regard, the approach formulated by Thomas and Rothman (1994) will be discussed. This model is built on the initial work of Thomas (1984) and Rothman (1980). Their approach to intervention development is particularly valuable for a number of reasons:

Both Thomas and Rothman have been publishing in the intervention development field for more than 25 years (See for example, Rothman, 1980; Rothman, Erlich & Teresa, 1976; Thomas, 1978; 1984; 1992)

The work of Thomas and Rothman is frequently quoted in research utilising their approach to intervention development (See for example, Grasso & Epstein, 1992; Spence-diehl, 2002; Tropman, Erlich & Rothman, 1995). It has also been successfully utilised within the South African context (See for example, Hartzenberg, 2003; Pierce & September, 2000)

The work of Thomas and Rothman forms the basis of a developmental research approach as formulated by Thomas and Rothman (1994). This developmental research approach will form the foundation on which this study will develop its model.

Given, therefore, the impact that these two theorists have had on the field of intervention development, this study will follow a *similar* developmental research approach. Thomas did not initially state that his approach is developmental in nature in 1984 but did do so in 1992. A more complete developmental research approach can however only be found in the work of Rothman and Thomas (1994).

The developmental research approach to intervention design by Thomas and Rothman (1994) does not constitute a pure model. The authors provide an outline of stages but the steps within these stages appear to be somewhat arbitrary in sequence, no doubt to facilitate the unique requirements of each intervention problem presented to the interventionist. For the purpose of this study, the model is explained according to the sequence of steps initially determined by Thomas (1984; 1992) and therefore the discussion will be a blend of the approach formulated by Thomas and Rothman (1994) and that formulated by Thomas (1984).

2.2 The Developmental Research Approach to Intervention Design

“Developmental research may be the single most appropriate model of research for social work and human service because it consists of methods directed explicitly toward the analysis, design, development, and evaluation of the very technical means by which social work and human service objectives are achieved.” Thomas, 1992, p.72-73

Thomas (1984) stated that developmental research is regarded as the methods through which human service can analyze, design, create, and evaluate social technology. This approach utilizes knowledge from diverse areas, for example, the behavioural sciences, social sciences, scientific fields, principles of innovation, etc. The developmental research design emphasises the processes through which information from these diverse sources is transformed into designs suitable for an innovation.

The Thomas and Rothman model has been developed in such a manner that successful completion of the various activities will increase the chances of solving problems during each step and eventually producing an effective intervention. Their approach encompasses six main phases (See Table 2.1), namely:

1. Problem analysis and project planning
2. Information gathering and synthesis
3. Design
4. Early development and pilot testing
5. Evaluation and advanced development
6. Dissemination

Each of these phases involves specific activities that are required in order to complete that phase.

2.2.1 Problem analysis and project planning

Problem analysis and project planning encompass those activities that are prerequisites for the design and development phases (Thomas, 1984). This phase is regarded as a basic requirement for any research, however intervention research, due to its nature, requires that some unique factors be taken into consideration. These factors can be divided into a knowledge component and a practical product

(Thomas & Rothman, 1994). Initially knowledge components are utilised and in later steps applied in such a manner that a practical application is derived.

Problem Analysis & Project Planning	Information Gathering & Synthesis	Design	Early Development and Pilot Testing	Evaluation and Advanced Development	Dissemination
Identify and analyze key problems	Identify and select relevant existing types of information	Identify design problems and intervention requirements	Develop plan for trial use in a pilot test	Plan evaluation in light of the degree of interventional development	Assess needs and points of access of potential consumers
Initiate state-of-the-art review	Identify relevant information sources	Specify boundaries of the domain of D & D	Create a limited operational model of the intervention for trial use in the pilot test site	Select evaluation methods	Formulate dissemination plan
Determine feasibility	Establish retrieval procedures	Determine design participants	Determine developmental research medium and/ or procedure	Conduct pilot evaluation	Design and develop appropriate implementation procedures
Prepare project plan	Gather, process, and store data	Use disciplined problem solving and creativity	Determine developmental and monitoring instruments	Carry out systematic evaluation	Prepare user-ready innovation for potential consumers
Set a developmental goal	Collect and analyze original data, as appropriate	Generate, select, and assemble solution alternatives	Identify and address design problems	Revise intervention as necessary	Test use of innovation in "test market"
	Synthesize data and formulate conclusions	Formulate an initial intervention or other innovation model	Revise intervention as necessary		Monitor and evaluate use
		Initiate proceduralization	Continue proceduralization and implementation of model		Revise (or reinvent) innovation as necessary
			Plan field test and select a site		Develop and conduct large scale dissemination as appropriate
			Expand the trial field test as informed by the pilot		Repeat above steps as necessary
			Implement field test and revise intervention as necessary		

Table 2.1. Phases and operations of intervention research (Thomas & Rothman, 1994, 11).

The Problem analysis and project planning phase consists of the following tasks:

2.2.1.1 Identify and analyse key problems

The Problem analysis and project planning phase involves the identification and analysis of key problems in order to facilitate a general orientation to the problem and understanding of the possible or theoretical feasibility of the project (Thomas & Rothman, 1994). Initially a problematic human condition is identified, for example, physical abuse of children or addressing the emotional needs of disabled individuals. Such a problematic human condition can exist within any context, for example, personal, social, educational, or health contexts and it is recognised that existing approaches are not adequate in addressing the problem (Siegel et al, 1995; Thomas, 1984).

Thomas (1984) stated that human problems are created by humans and occur due to underlying social, cultural, or economic influences. Two factors serve to identify human conditions as problematic. Firstly, certain norms or standards determine what levels of behaviour or well-being can be considered as appropriate. Secondly, discrepancies between these norms and the existing behavioural levels or states of well-being indicate that the latter are problematic (*See Figure 2.2*).

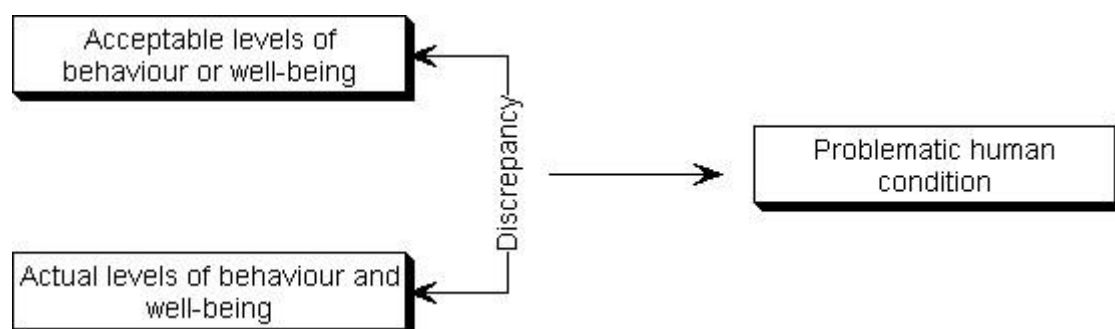


Figure 2.2. Identification of a problematic human condition.

With a problematic human condition identified, it is necessary to determine its severity and the component aspects of the problem. Simple identification of a problematic condition is not sufficient, however. Problem analysis should be done in order to determine one or more of the following:

What is the extent or severity of the problem, for example, the prevalence?

What are the component aspects of the problem and how could they be translated into intervention objectives?

What possible causal factors can be identified and what are the implications for treatment?

What are the effects of the problem, for example, in terms of behavioural, social, and economic concomitants?

When these aspects are applied to an example of a career guidance intervention, a number of aspects come to the fore. The individual can be assessed in terms of the clarity of his or her career plans, for example, does the person have a specific field of practice in mind? The severity of the problem can guide the intervention objectives as it informs the component aspects of the problem. In other words, once the severity of the problem has been gauged, it can be described in terms of its component aspects, which can then each become an intervention objective. In an online career guidance intervention these component aspects can be addressed via various activities, for example, those aimed at abilities, needs, personality, and interests, amongst others. In terms of an online intervention causal factors might be difficult to assess, unless a standardised means of assessing possible factors can be developed. For example, causal factors might relate to career immaturity, weak decision-making ability, or lack of career information.

Although not all of the abovementioned key questions need to be addressed, the more comprehensive the problem analysis, the better the priorities for the design and development of the intervention can be attended to (Thomas, 1994).

2.2.1.2 Initiate state-of-the-art review

Once a problematic human condition has been identified and analysed, the importance and scope of the problem area becomes clear. It does not, however, indicate whether or not any existing interventions are adequate in addressing the problem and whether further development of these interventions is feasible. Before it can therefore be determined whether the development of an intervention can be undertaken, it is necessary to evaluate the state of existing interventions. This evaluation will form the foundation for conducting a state-of-the-art review. The state-of-the-art review serves to identify the strengths and weaknesses of existing interventions and will help the researcher to determine whether an effort to develop an intervention is worthwhile (Thomas, 1984). A state-of-the-art review typically involves the following:

A review of the relevant existing literature

A review of current practice

Consulting with experts in the field

Attendance of professional conferences, conventions, and workshops where advances in the relevant field are presented (Thomas, 1984)

2.2.1.3 Feasibility study

A feasibility study provides some guarantee that the development of the planned intervention is worthwhile and not a waste of resources. Thomas (1984) defined feasibility as the practicality of the proposed development when considering factors, such as technical, organizational, economic, financial, political, and use feasibility.

Technical feasibility requires that existing technical development be in such a state that it can support the development of the planned intervention. Technical feasibility can be determined via the data gathered from the following sources:

Basic and applied research

Scientific and other technology

Legal policy

Social innovation

Practice

Personal and professional experience (Thomas, 1984)

For example, the emergence of computer-based assessment around 1970 and, more recently, Internet-based interventions in the field of career guidance clearly illustrates that technical advancements can have a profound influence on the implementation of planned interventions.

Organizational feasibility indicates the extent to which the individual (and his/her organization) is capable of carrying out the planned development of the intervention. Four aspects need to be considered:

Do the relevant staff members have the necessary skills, training and talent to carry out the development?

Is the planned intervention supported by top personnel?

Is there operational administrative support?

Are the necessary organizational resources, such as telephones, photocopying equipment, and computers, available (Thomas & Rothman, 1994; Thomas, 1984)?

Economic feasibility indicates the extent to which the expected benefits outweigh the expected costs. Design and development costs should be projected while leaving room for unexpected factors and errors. Similarly, expected benefits can be roughly quantified in monetary terms, for example, the benefit of restoring drug addicts to regular employment (Thomas, 1984).

Financial feasibility refers to the extent to which funds are available to cover the expected costs of the design and development of the intervention. Thus, even though economic feasibility has been ascertained, it does not imply that the project will be financially viable and vice versa. It is important to bear in mind that financial feasibility is necessary at the outset while economic feasibility is required over the long term (Thomas, 1984).

For example, Internet-based interventions have typically made career guidance interventions much more affordable as large numbers of users can simultaneously utilise the intervention, thereby justifying and recovering the implementation costs. It also frees up the interventionist for other, related activities, for example, providing support via email to users of the intervention.

The extent to which the planned development is acceptable to those who have the power to influence its acceptance and continuation, is referred to as the **political feasibility** of the project. Without political feasibility the planned intervention may only be partially successful or blocked from completion (Thomas, 1984). For example, in South Africa large numbers of the population don't have access to computers and high telecommunication costs inhibit institutions, such as schools, to obtain access to the Internet where information and interventions, amongst others, could be accessed.

Use feasibility provides an indication of whether the proposed intervention will be adopted in the field for which it was developed. It is important to note that, other than with the other types of feasibility, initial lack of use feasibility is not a clear indicator that the project should be abandoned. An initial lack of acceptance of an intervention is not indication of the long-term acceptance it might receive (Thomas, 1984; Thomas & Rothman, 1994).

2.2.1.4 Preparation of a project plan

Based on the information gleaned from the various steps followed during this phase, a detailed preliminary project plan can be drafted. This project plan will then serve to

guide and act as a reference point for the remainder of the development process (Thomas, 1984; Thomas & Rothman, 1994).

2.2.1.5 Setting a developmental goal

The final step of the first phase involves the setting of goals and objectives. Thomas and Rothman (1994) regarded goals as broad conditions or outcomes desired by the relevant community. Thus, broad goals indicate what specific outcomes are regarded as the end points of the intervention.

Objectives are viewed as more specific changes in programs, policies, or practices which are regarded as contributory to the broader goals. Thus, objectives refer to the smaller steps that need to be completed successfully within the intervention. Both goals and objectives serve to clarify the planned ends of the intervention project and provide structure for the next phase (Fawcett et al, 1994; Thomas, 1984).

2.2.2 Information gathering and synthesis

During the **information gathering and synthesis** phase specific types and sources of information relevant to the task are identified, along with the gathering, processing and integrating of information. The outcome of this phase should comprise of a list of functional aspects that can be integrated into the design of the intervention (Fawcett et al, 1994). The following tasks are identified as part of this phase:

2.2.2.1 Using existing information sources

This step involves a literature review. Empirical research, reported practice and relevant identified interventions are examined. Fawcett et al (1994) advised, in this regard, that computerized data sources be utilised for this purpose. They emphasised, however, that the literature review must extend beyond the literature of the researchers particular fields and justify this by pointing out that societal problems are not confined to a single discipline.

Thomas (1984) further stated that the selection of information sources must be done in such a manner that they aid in addressing design problems. He is clear that the selection of a source must be shown to be relevant to the intervention and adequate in addressing the requirements of the researcher.

In terms of a career guidance intervention, for example, literature regarding career counselling and assessment could be consulted and existing career assessment

instruments, especially those which have successfully been utilised in a computerised environment, could be investigated.

2.2.2.2 Studying natural examples

A potential source of useful information is the examination of existing solutions to similar problems. Fawcett et al (1994) suggested interviews with interventionists and clients who have experienced similar problems. These people might be able to give advice regarding the probability of success of the proposed intervention and provide some insight into possible solutions for design problems. Similarly, unsuccessful interventions should be investigated in order to determine which factors contributed to their failure.

2.2.2.3 Identifying functional elements of successful models

Critical features of relevant previous interventions should be analysed and judged based on questions such as the following (Fawcett et al, 1994):

Is there a model program or practice that has been successful in addressing the problem? What made the program or practice successful?

Which events might have been critical to the success of the program?

What conditions, such as client characteristics, organizational climate, environmental factors, etc, could have been critical to the success of the program?

What specific procedures were utilised in the program, e.g. what information was provided to the clients, what incentives were used, and what training was given?

Were any environmental obstacles removed, e.g. policies or regulations inhibiting change?

For example, when developing a career guidance intervention interviews could be conducted with career counselling experts. People who have received career guidance and those seeking career guidance could be consulted to determine their needs. Furthermore, any existing career guidance strategies or interventions could be examined and their efficacy evaluated. Specifically, the aspects which made the interventions a success or failure would have to be examined. An examination of the users who participated in the intervention, the way in which the intervention was provided, for example, a workshop, and any obstacles that had to be overcome, could be investigated.

2.2.3 Design

The third phase involves the **identification of design problems and intervention requirements**, along with a problem-solving strategy and the generation of alternative solutions (Thomas, 1984). During this design phase an initial intervention is also formulated and proceduralisation is initiated. Thomas (1984) pointed out that design is not well understood in human service, due, especially, to the complexity of this field.

The design phase is closely linked to the next phase of early development and testing. A variety of activities are associated with this phase but typically, three activities are initially important (Fawcett et al, 1994; Mullen, 1994):

2.2.3.1 Framing of the design objective

Mullen (1994) indicated that conceptualisation of the problem should lead to framing of a design objective. He distinguishes between an intervention objective, which is a statement of a desired change in some social problem, and a design objective, which refers to a task that needs to be achieved during the design process.

Broadly speaking, intervention research is aimed at developing a social technology which could improve a social problem. Social technology is described as including all artefacts used by service professionals or change agents in order to achieve intervention objectives. A distinction is made between embodied technology, such as a software program, and disembodied technology, which refers to a concept or process. A social intervention frequently utilises a technology which is in abstract form (Mullen, 1994).

For example, in terms of a career guidance intervention, an existing, proven, career assessment instrument, such as the SNUG guide (Scheepers, 1996) can be utilised as an embodied technology, while being guided by the disembodied technology, Holland's theory (Nel, 1999), which underlies the development of the SNUG guide. The SNUG guide can, in turn, be partially converted into a computer-based or Internet-based technology (*See Chapter 6*).

2.2.3.2 Designing an observational system

Fawcett et al (1994) pointed out that researchers should develop a system of observing events that are related to the phenomenon. This system should enable discovery of the extent of the problem and a means of determining the effects of the

intervention. They regard such a method as closely linked to the design process and critical to the period of pilot-testing. This method will then serve as an instrument providing feedback to be used for refinement of the intervention.

The focus of change is determined via the observational system and it is therefore also necessary to define observational events in ways that can be observed. For this purpose, the observational system should consist of three parts:

- Operational definitions of the behaviours or products associated with the problem
- Examples and non-examples of the behaviours or products to help discriminate between occurrences of these
- Scoring instructions to guide recording of desired behaviours or products

(Fawcett et al, 1994)

It should be noted, however, that not all interventions aim at bringing about change and the efficacy of an intervention should not necessarily be judged in terms of the extent of change that had taken place. For example, a career guidance intervention could confirm a person's career choice, thereby simply strengthening an existing decision. This also illustrates that the lack of change brought about by an intervention does not imply that the intervention is of no value or advantage to the individual.

2.2.3.3 Specifying procedural elements of the intervention

Through observation of the problem and investigation of relevant interventions and innovations, procedural elements for use in the intervention can be identified. Procedural elements include use of information, skills, and training for their acquisition, change strategies, reinforcement or punishment procedures, etc. These elements should be detailed in such a manner that replication by others would be possible (Fawcett et al, 1994).

With the abovementioned two aspects in place, further attention needs to be given to the following:

- The design domain, boundaries, and requirements (Mullen, 1994; Thomas, 1984)
- Identification of design problems
- Generation, selection and assembly of solution alternatives
- Formulation of an initial intervention
- Proceduralisation (Thomas, 1984)

2.2.3.4 The design domain, boundaries, and requirements

Design activities must be focused by setting specific objectives. A design domain should therefore be set. This design domain should consist of elements assumed to be fixed (and therefore not requiring design) and elements that do need to be designed. The intervention is then regarded as a set of interacting elements, such as the interventionist, the client, and the techniques used. Each of these elements will determine where design work should be done (Mullen, 1994). It can, however, be argued that the client should form the most crucial element in the design process as he or she determines the techniques that can be used.

With the design domain specified, design requirements should be determined. Design requirements refer to the conditions which the intervention should address and satisfy in order to be considered effective. Design requirements should be specific to each component of the intervention and be comprehensive (Thomas, 1984).

2.2.3.5 Identification of design problems

The design and development of an intervention or helping solution is regarded as a series of problems in a developmental sequence that requires a systematic solution. A design problem is therefore viewed as a specific aspect of a helping strategy that is undeveloped, unspecified, or otherwise unresolved. The solution of such a design problem will thus facilitate achievement of the design objectives and ultimately the intervention objective (Mullen, 1994). Identification of design problems might also lead to a reformulation of the design objectives in order to incorporate any unanticipated factors.

2.2.3.6 Generation, selection and assembly of solution alternatives

Based on the information gathered earlier, ideas and potential solutions are generated. The generation of solution alternatives is done at this point, as design problems may have emerged and could contribute to alternative solutions being generated. Generation of solutions should be a free-flowing activity where as many solutions as possible are produced without initial evaluation of their applicability. Factors to consider when selecting an alternative should include the following:

- Likelihood of it as a problem solution
- Relative advantages as compared to other possible solutions
- Its requirements in terms of technical expertise

- Acceptable cost
- Compatibility with other components of the intervention
- Anticipated efficacy and efficiency
- Anticipated usability by interventionists (Thomas, 1984)

Assembly involves the arrangement of all elements, from minor details through to large aspects, such as new techniques. Thomas (1984) pointed to three criteria applied to the assembly process:

Completeness, which refers to the extent to which the relevant components of the intervention have been specified.

Compatibility, which indicates whether the elements of the intervention interfere or conflict in any way

Relatedness, which refers to the extent to which the components of the intervention are relevant to each other

2.2.3.7 Formulation of an initial intervention

Assembly of the different elements leads to a blueprint or symbolic representation of the intervention. Such a blueprint could consist of a written statement, such as a proposal, or a set of flowcharts. Only once this blueprint has been realised, can the design be said to be complete (Thomas, 1984). It is, however, important to point out that the design will still be tentative and will require application and testing (Mullen, 1994).

2.2.3.8 Proceduralisation

Proceduralisation refers to the process whereby the required activities of the intervention are described and converted into procedures that can be followed by people involved in the helping strategy. The result of proceduralisation emerges in innovation procedures, which prescribe the intervention activities in practical terms, such as who will do what, when, where, how, for whom, and under what conditions. Innovation procedures usually emerge in written form. They can consist of practice guidelines, ethical codes, etc and can be presented as a list of innovation activities, a user manual, or set of flowcharts (Thomas, 1984).

For example, a career guidance intervention would be proceduralised by dividing the necessary tasks among the various designers of the intervention. All assessment instruments, such as the SNUG guide, would be gathered, a storyboard indicating

the envisaged flow of all activities and assessments would be created, and the mode of delivery would be prepared. Any ethical guidelines would now be enforced.

Different types of innovation activities can be distinguished, namely recurrent activities which are continuous, nearly continuous, or intermittent, and non-recurrent activities that are stepwise or episodic. All innovation activities are important and an effective procedure should include specifications for all of the types of activities. However, the step-wise activities are deemed the most important due to the fact that most helping behaviours are differential, sequential, and ordered (Thomas, 1984).

Typically, the intervention activities are vague and poorly conceived at the start of proceduralisation. As this process continues, most activities become specified and isolated in such a manner that they are fully described and their inter-relatedness determined. The process of proceduralisation should be repeated every time the intervention has been implemented. In this way an effective reformulation of procedures can take place and lead to refinement of the intervention, if necessary (Thomas, 1984).

2.2.4 Early development and pilot-testing

Development refers to the process whereby the intervention is put into practice on a trial basis. This process allows the interventionist to test the helping strategy for its adequacy, the results of which would lead to refinement and redesign where necessary (Rothman, 1980; Rothman & Tumblin, 1994; Thomas, 1984). During the **early development and pilot-testing** phase a plan for trial testing is therefore developed and an operational model, limited to that which is required for trial use, is created. Design problems are again identified and addressed and the intervention is revised as necessary. Proceduralisation is continued and the model further implemented (Thomas & Rothman, 1994). The following broad tasks form part of this phase:

2.2.4.1 Formulation of the development plan

The development process requires that a number of important decisions be made. These decisions impact on all subsequent development practices. Once these decisions have been carried out, a development plan can be prepared. The following aspects come under consideration in this regard (Thomas, 1984):

2.2.4.1.1 Scope of anticipated development

The way the development process is conducted depends mostly on its scope. Although many aspects are beyond the interventionist's direct control, certain factors can be manipulated from the start.

A first factor involves the *domain* of design. The areas implicated in the design domain are also the areas which could potentially be developed. Therefore, the scope of development cannot exceed the domain of design as initially set during the design phase (See 2.2.3.4 *The design domain, boundaries, and requirements*).

A second factor refers to the *depth or extent* of the trial implementation. The intervention or aspects thereof can be tested superficially, extensively or completely replicated. The more extensive the trial implementation, the more confidence the interventionist can have in the adequacy of the intervention. Practical limitations, such as time and resources, or the design domain, frequently limit the extent to which an intervention can be tested.

A third factor involves *generality over cases*. If development is done over a variety of cases, a broadly applicable innovation may emerge. This strategy may, however, lead to a superficial product. It is rather recommended that the process is started with a limited sample, such as typical cases, after which it is expanded with later development (Thomas, 1984). In line with the issues raised here by Thomas (1984), designing interventions for deployment over the Internet can present a problem due to the variety of cases. It is therefore anticipated that trial implementation with a limited sample will be an important aspect (See 5.3.3.3 *Conducting pilot testing*).

2.2.4.1.2 Concurrent evaluation

The interventionist should decide to what extent he or she wishes to conduct evaluation concurrent with the development. A problem with intervention design is the fact that it is frequently redesigned and adjusted throughout development, thereby making systematic evaluation problematic. However, evaluation during development should take place in order to determine the efficacy of the intervention in terms of outcome it had for the individual. Therefore evaluation should be such that it can judge the adequacy of the intervention and, to a certain extent, the outcomes of the intervention strategy (Thomas, 1984). For example, should a career guidance intervention confirm an individual's career choice, then the intervention was successful in terms of the outcome it had for that person.

2.2.4.1.3 Setting for trial use

Lastly, a decision should be made regarding the setting in which the trial implementation will take place. An ideal setting will include easy access to trial users, administrative support and few additional obligations beyond those required by the development of the intervention (Thomas, 1984).

2.2.4.2 Operational preparation

In order to put the development into operation certain activities are required. These activities are very similar to those typically needed in a small human service or research organisation. While many considerations are self-evident, the following need special consideration:

2.2.4.2.1 Staffing and development skills

Rothman (1980) indicated that three basic qualifications are required of staff involved in social science applications, namely conceptual thinking ability (regarding theoretical writing), practice competency (skill in application situations), and dependability-reliability (regarding reporting and task completion). Thomas (1984, p. 173-174) added the following qualifications:

- Familiarity with intervention design
- Knowledge of conventional behavioural science research methods
- Observation skills
- Ability to analyse and apply own experience
- Ability to solve problems systematically
- Dedication to developmental mission

Thomas (1984) did, however, point out that not all practitioners will possess all of the skills mentioned. In this regard each participant should therefore bring some of the required skills to the development process. It is in this regard that personal experience can play a positive role in intervention design (*See 1.1 Introduction*).

2.2.4.2.2 Supervision and project management

That which is learned from the development process derives from first-hand experience while the intervention is tried, tested, and modified. Decisions are typically made on an almost immediate basis and therefore constant supervision and project management are critical to the success of the development process. Proper

direction and coordination of all the development tasks need to be carried out while simultaneously allowing for innovation (Thomas, 1984).

2.2.4.2.3 Sampling

Whereas sample drawing in the behavioural sciences emphasises representativeness, the sample drawn in development should consist of cases addressing the design problems. Such a strategy will then allow for subsequent elimination of these problems during development. In this way sampling aims at providing developmental opportunity. Cases which provide developmental opportunity can be of at least two types:

Those cases that provide an opportunity for developmental testing of innovations designed earlier.

Those cases that provide an opportunity to let new design problems emerge, which can then be rectified in such a manner that the design and intervention objectives be achieved (Thomas, 1984). The addition of extreme cases might also allow for testing of the intervention to the fullest extent.

Sample size should be such that repeated trials can be run while adjustments are made. Initially, the sample may be smaller but a large number of cases may be needed to complete development.

2.2.4.3 Trial use and developmental testing

Trial use offers the interventionist the opportunity to implement the intervention with the intended clientele. In this regard, trial use becomes performance testing and the emphasis is on reliability, optimal conditions, and whether the intervention functions as it should. During trial use an intervention is subjected to developmental testing, which refers to the process of testing, revising and redesigning the intervention as necessary (Reid, 1994).

Trial use results in three types of outcomes, namely redesign, initial design, and replicated use. All three outcomes are regarded as critical to development. If a problem can be handled with an innovation, an opportunity for **replicated use** presents itself. If a new problem is encountered, **initial design** is called for. If the application of the innovation appears to insufficient, **redesign** is required. It is important to note, however, that only systematic implementation of trial use will result

in the adequate emergence of these outcomes. Specifically, trial use is implemented in order to provide information about the following:

What innovations need to be developed further to counter design problems?

What revisions and changes are required during redesign?

What is the operational feasibility of the intervention?

Is the intervention appropriate and adequate for the task it has been developed for?

What appear to be some of the outcomes for the client (Thomas, 1984)?

Answers to these questions will guide the evaluation of the intervention.

2.2.4.4 Evaluation regarding characteristics of use and design specification

While evaluating the intervention during trial use, questions should be asked regarding the way the intervention has been designed and how this design meets the requirements specified initially. Questions are therefore asked regarding frequency and characteristics of use, as well as obstacles to implementation. Quantitative methods can be used to yield descriptive data but in-depth analyses, at this stage, may not be possible (Washington, 1995). In this regard, qualitative analysis may yield more useful information (Reid, 1994).

Reid (1994) distinguished between two types of intermediate outcomes following evaluation during development. The first outcome provides an indication of whether or not the intervention achieved its goal and is similar to the outcome of trial use specified by Thomas (1984). The second outcome measures immediate outcome success or change as anticipated during the design of the intervention. Assessment of these intermediate outcomes provides an indication of the efficacy of the intervention and allows the interventionist to trace the process whereby the intervention initiates change.

2.2.5 Evaluation and advanced development

Thomas (1994) explained that evaluation in intervention research involves an empirical inquiry in order to determine the effects of the intervention, including its efficacy. Although evaluation was done during early development and pilot testing, this phase emphasises systematic outcome evaluation. This process is critical and the time and effort spent on this evaluation is justified because of the advanced development that the intervention has reached. The results of this evaluation will

indicate whether the intervention will be kept and utilised or whether it will be developed further (Thomas & Rothman, 1994). Through repeated application of the intervention, limitations can be detected and addressed. If satisfactory results are obtained during this evaluation, the interventionist will be able to move on to the phase of dissemination.

Advanced development consists mainly of further developmental testing of the intervention and can only take place once the initial design and pilot-testing has been completed and there is sufficient justification to continue with the implementation of the intervention. Thus, the intervention will be replicated until it has been shown to be successful without requiring major changes or redesign (Thomas, 1994).

Evaluation and advanced development have three related requirements:

The evaluation should provide a fair assessment of the outcomes of the intervention

The intervention should provide the service for which it was designed and intended

The intervention should be evaluated during implementation, in such a manner that it can be developed further than was possible during pilot-testing.

In terms of **evaluation**, Thomas (1994, p. 276) pointed to 19 steps that need to be followed:

1. Statement of evaluation objective
2. Determining what is to be evaluated
3. Establishing project organisation
4. Selecting an evaluation site
5. Selecting the sample
6. Selecting the research design
7. Selecting measurement and assessment instruments
8. Establishing human subjects procedures
9. Defining and organising the intervention
10. Selecting and training practitioners/or therapists
11. Selecting and training assessors
12. Assessment of the clients or other subject participants
13. Implementing the intervention

14. Determining intervention integrity
15. Monitoring outcomes
16. Analysing the results
17. Interpreting the results
18. Drawing conclusions
19. Refining and redesigning the intervention, as appropriate

In terms of **advanced design and development**, Thomas (1994, p. 285) pointed to 11 steps that need to be followed (some of these overlap with those occurring during evaluation):

1. Selecting the intervention site
2. Selecting clients or other participants
3. Determining the scope of advanced design and development
4. Determining the mode of practice or intervention
5. Selecting interventionists
6. Selecting the method of developmental testing
7. Establishing procedures to retrieve innovation data
8. Analysing the data
9. Refining and redesigning the intervention as necessary
10. Proceduralisation
11. Engaging in further design and development, as appropriate

Regarding the abovementioned steps, Thomas (1994) emphasised that some occur repeatedly during the design and development of the intervention. For example, proceduralisation may be performed on a number of occasions in order to determine what progress has been made and to facilitate further development.

2.2.6 Dissemination

The intervention research process completes with the **dissemination** phase during which a dissemination plan is formulated and appropriate implementation procedures designed (Thomas & Rothman, 1994). Thomas (1984) referred to this phase as one of implementation, maintenance, and termination. He emphasised the critical importance of this phase and stated that it is mainly concerned with practitioner activity during the introduction of the intervention, and afterwards. Regarding practitioner activity the following areas of implementation are relevant:

2.2.6.1 Introducing the intervention

The introduction of the intervention should be done in such a manner that it is suitable for the client and done with procedures appropriate to the situation (Rothman, 1980). Thomas (1984) explained that possible activities include explanation of the intervention to the clients, providing a reason for, and explanation of the intervention, obtaining client consent and cooperation, and carrying out initial activities required to start the intervention.

2.2.6.2 Achieving appropriate program involvement

Although introduction of the intervention might be fairly easy to implement, it might be difficult to obtain client participation. Compliance with the intervention requirements will be necessary in order to reach the intervention objectives. To determine client involvement, the interventionist should monitor their behaviour and thus, certain monitoring procedures should be put into place (Rothman, Erlich & Teresa, 1976; 1978; Thomas, 1984).

2.2.6.3 Monitoring target behaviour

Apart from monitoring client compliance, measures should also be put into place in order to determine whether target behaviours are approximated. Should the intervention objectives not appear to be attainable, the interventionist should then be able to decide upon suitable courses of action in order to facilitate the process. Similarly, should the intervention objectives appear to be reached, yet client compliance was not satisfactory, it implies that other factors are responsible for the outcome (Corrigan, MacKain & Liberman, 1994; Thomas, 1984).

2.2.6.4 Re-evaluating and re-adjusting the intervention program

Depending on the results of the monitoring procedures discussed above, it might be necessary to re-evaluate and adjust the intervention. The intervention might even need to be changed completely. Typically, changes can be made without having to return to a previous phase of the developmental process. With the desired changes being effected it might still be necessary to make minor adjustments for optimal functioning of the intervention (Thomas, 1984).

2.2.6.5 Sustaining change

Thomas (1984) emphasised that, if change was the outcome of the intervention, then it should be sustained to such an extent that habituation and adjustment to the change can occur. This might take from weeks to months to come into place. It is

considered adequate to continue the intervention for at least two months before moving onto the maintenance step of the dissemination phase.

Regarding maintenance, Thomas (1984) pointed out that sustaining change is an important, yet difficult to achieve, goal. Those factors that brought about the initial change might not be the ones necessary to sustain the change. Special procedures are therefore required to achieve persistence of change. These special procedures are known as generalization methods but are not as well developed and are therefore brought into being and applied as the situation demands.

2.3 Summary

This chapter focused on the developmental research strategy as it is utilized in intervention design and development. The model of Thomas and Rothman (1994) was blended with that initially conceived by Thomas (1984). This blended model was discussed in terms of the phases suggested by the authors, along with those steps commonly agreed to be relevant. The developmental research model of Thomas and Rothman (1994) forms the foundation on which the proposed integrated developmental model, which is the focus of this study, will be built. This model is not, however, sufficient on its own due to the field of application of the integrated model proposed in this study.

The field of application of the proposed integrated model involves the World Wide Web. This medium poses unique challenges to the interventionist due to its emphasis on technology and limited contact with users. Emphasis therefore also needs to be placed on the quality of the presentation of the intervention. To address this issue, the proposed model should also make use of the principles of instructional design. Therefore, Chapter 3 will focus on models of instructional design, specifically the Critical Events Model of Nadler (1989).

Chapter 3 – Models of Instructional Design

“... by the end of this millennium new and different design paradigms will have been developed and will be widely used... . The exact nature of these paradigms is unclear, but the need for new design models is evident from glimpses we get of future learning environments such as microworlds, hypermedia, and ... ,mind tools.” Gustafson, Tillman & Childs, 1992, p. 453.

3.1 Introduction

The developmental research model of Thomas and Rothman (1994) cannot adequately address the development of a Web-based intervention, as it was not developed for this purpose. Web-based interventions necessarily require that the principles of instructional design be followed due to the fact that limited or no contact takes place between interventionist and users. Adequate provision for effective delivery of the intervention should therefore be made. Such adequate delivery can only be accomplished through what the user views on web pages. These web pages become a medium through which learning or change has to take place.

Instructional design theories and models address the process through which effective learning processes can be developed. Therefore, by blending a model of intervention development with that of instructional design it is envisioned that the unique requirements of the Web-based environment can be partially met. As discussed in the preceding chapters, it will also be necessary to investigate theories and models of Web-based learning as these make more provision for the Web-based environment than traditional theories and models of instructional design and learning can.

Chapter 3 will therefore first investigate and compare six theories of instructional design which can be considered to represent the current broad range of practice in instructional design, after which the Critical Events Model of Nadler (1989) will be discussed in detail. It is proposed that this model be blended with that of Thomas and Rothman (1994) in order to provide the first two legs on which the foundation for the model proposed in this study, will be built.

3.2 Models of Instructional Design

“... we shall eventually find ourselves on the path toward a theory of instructional design... if instructional design (ID) is able to expand its intellectual base in the not too distant future.”
Seel, 1997, p. 355

Instructional design emerged from General Systems Theory and utilizes several of its underlying principles:

Instructional design is regarded as a system of elements that dynamically interact with, and influence, one another.

Planning in instructional design requires that an analysis be made to determine how the different components interact with one another.

Instructional design is a process that follows an orderly but flexible sequence characterized by both “looking forward” and “looking back” (Gustafson & Tillman, 1992). In this respect it reminds of the developmental research approach.

Although the abovementioned principles have been applied to theories and models of instructional design, theorists in the field tend to agree that no single general, comprehensive theory of instructional design exists, although there is a need for such a general theory. Typically, the field of instructional design is regarded as a prescriptive one and therefore in need of a prescriptive theory. Seel (1997) pointed out, however, that a prescriptive theory would be impossible in the field of instructional design as it would already indicate how the designer should reach instructional goals in principle. Thus, it would not be a theory. Based on this line of reasoning, Seel (1997) asked for a descriptive theory of instructional design and adds that it is doubtful if something such as a prescriptive theory could, in fact, exist.

An important aspect to bear in mind regarding instructional design is that there is a clear difference between theories and models used in this field. Whereas other sciences would regard a model as the representative of a more comprehensive theory, the field of instructional design utilizes models to emphasize or develop certain aspects of instruction. Due to this approach, instructional design models frequently only consist of defining conditions and are not required to be confirmed via empirical investigation. Thus, these models become part of a more comprehensive theory, based on their practical applicability. Due to this nature of instructional design models, they should be evaluated in terms of their adequacy and usefulness in making a theory more precise and comprehensive (Seel, 1997).

Although models of instructional design should ideally comply with the abovementioned criteria, they frequently do not. Seel (1997) distinguished between several broad groups of instructional design models:

Models aiming at making more precise, interpreting, and completing theoretical approaches of instructional design.

Organization models, acting as prescriptions for instructional planning by ordering the sequence of instructional activities.

Planning and prognosis models, which attempt to construct alternative learning environments.

A multitude of instructional design models has been developed (Andrews & Goodson, 1995). The models briefly described in the subsections that follow tend to focus on one or more specific components of the instructional design process and can be easily classified into one of the three broad groups mentioned above. They have been chosen because they adequately represent the broad range of practice in instructional design.

3.2.1 The Dick and Carey Step-by-Step Design Model

The Dick and Carey Step-by-Step Design Model (See *Figure 3.1*) was based on practical experience gained in the field of computer-assisted instruction during the 1950s and 1960s (Dick, 1997). The model indicates a series of procedures and techniques aimed at producing effective instruction.

Through the series of events the designer determines learning objectives and then creates an instructional strategy in order to reach these objectives. Assessment tools are then used to measure learning goals compared with the instructional goals. The model also incorporates a feedback loop in the form of formative and summative evaluations whereby instruction can be revised (Dick & Carey, 1990). **Formative evaluation** refers to a system whereby assessment is regarded as an ongoing process of information gathering. This process leads to continuous feedback that is assumed to shape the learning experience. **Summative assessment**, on the other hand, involves a final judgement regarding learning outcomes and therefore does not occur as frequently as formative assessment (Archer, Rossouw, Lomofsky & Oliver, 2004).

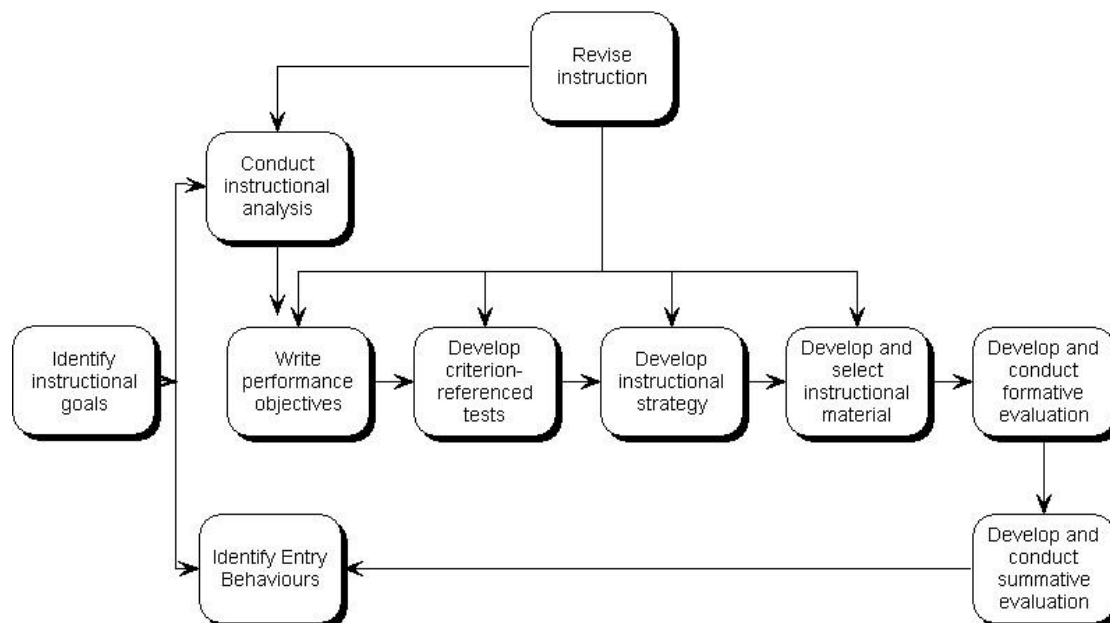


Figure 3.1 The Dick and Carey Model (Dick, 1997, p. 365)

A number of criticisms can be raised against this model:

It does not accommodate individualised instruction very well as learning objectives are determined beforehand by the designer (Passerini & Granger, 2000).

It is too time-consuming to implement in practice and designers tend to take short-cuts in order to reach deadlines (Dick, 1997)

The model appears to approach instruction as taking place within a closed system, thereby not taking into consideration of the environment within which it takes place (Rothwell & Kazanas, 1998)

The model only accommodates evaluation towards the end of the design process, after which the instruction can be revised. Continuous evaluation and revision can therefore not be done throughout in order to adapt the design to accommodate emerging requirements or address unforeseen design problems.

3.2.2 The Jerrold Kemp Design Model

The Jerrold Kemp Design Model (See Figure 3.2) is more flexible than that of Dick and Carey. It identifies several developmental phases without fixing the order of the phases. Continuous, formative evaluation of each design and redesign phase is presupposed during the development. An important characteristic of the Jerrold

Kemp model is its focus on learner characteristics which influence the choice of instructional objectives and strategies during the development of the design (Kemp, Morrison & Ross, 1994). This relates well with Thomas and Rothman's focus on the client as part of a set of interacting elements (See 2.2.3.4 *The design domain, boundaries, and requirements*). Apart from focusing more on individualised instruction in terms of learner characteristics, the Jerrold Kemp model still follows the objectivist approach and is more suitable for two-way audio communication than Web-based courses (Passerini & Granger, 2000).

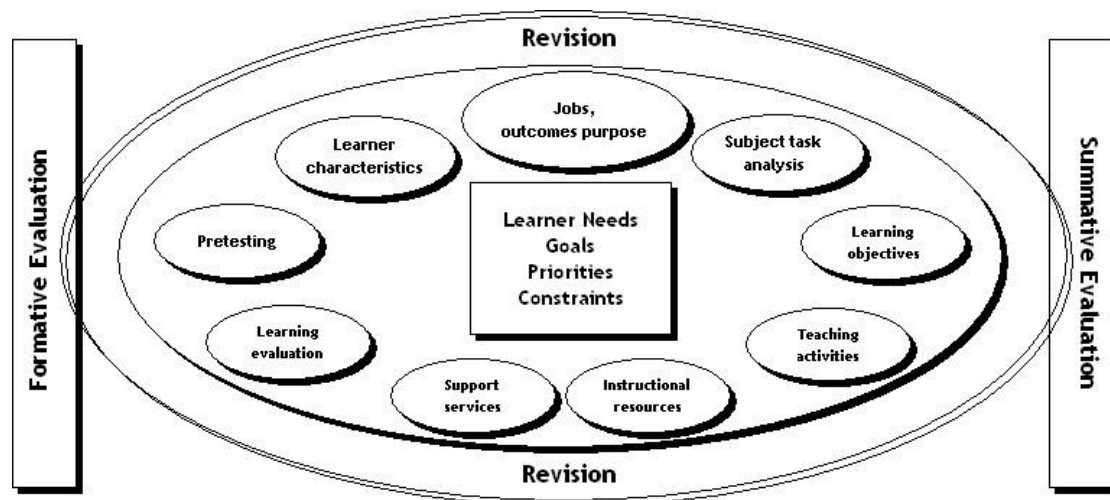


Figure 3.2. The Jerrold Kemp Design Model (Passerini & Granger, 2000, 7).

3.2.3 Merrill's Instructional Transaction Theory

Instructional Transaction Theory assumes that different kinds of instructional goals exist and therefore different instructional strategies are necessary to help the learner achieve the instructional goals. This type of theory consists of three components, namely a descriptive theory of the knowledge or skill to be learned, a descriptive theory of instructional strategies necessary to achieve the goals, and a prescriptive theory that relates the knowledge and strategies. Whereas the descriptive components identifies the concepts which describe the knowledge or strategies, the prescriptive component contains if-then conditions, for example, if a certain knowledge outcome is required, then a certain type of instructional strategy should be used (Merrill, 1997).

Instructional Analysis Theory is partly based on Gagné's conditions of learning, which is a descriptive theory of knowledge with five types of outcomes, namely intellectual

skills, cognitive strategies, verbal information, motor skills, and attitudes, as well as a descriptive theory of strategies. In terms of the latter, nine instructional events are outlined, namely gaining attention, informing the learner of the objective and activating motivation, stimulating recall for previously acquired knowledge, presenting the stimulus material, providing guidance to the learner, eliciting performance, providing feedback, assessing performance, and enhancing retention and transfer. Gagné's prescriptive component indicated the conditions necessary for learning to take place (Merrill, 1997).

Instructional Transaction Theory expands Gagné's approach in order to provide a theory with expanded rules which could drive automated instructional design suitable to, in turn, drive a computer programme. The theory describes knowledge in terms of knowledge objects: entities, activities, and processes. There are, furthermore, interrelationships between the knowledge objects, for example, abstractions. A set of instructional algorithms, called transaction shells (or computer programmes), provide the rules for selecting and sequencing the knowledge objects (*See Figure 3.3*). The transaction shells also send messages to the knowledge objects to have them display a multimedia resource which can represent them or display their name. A strength of Instructional Transaction Theory is the fact that it can select the best transaction for a particular learner at a particular time and context (Merrill, 1997).

The designer utilizing Instructional Transaction Theory will follow six steps:

- Selecting the knowledge objects for instruction
- Sequencing the knowledge objects
- Selecting the appropriate transactions related to specific knowledge objects
- Sequencing the transactions
- Enabling the transactions by allowing interaction with the learner to take place
- Adapting the manner in which a specific transaction is enabled to meet the needs of a certain learner (Merrill, 1997)

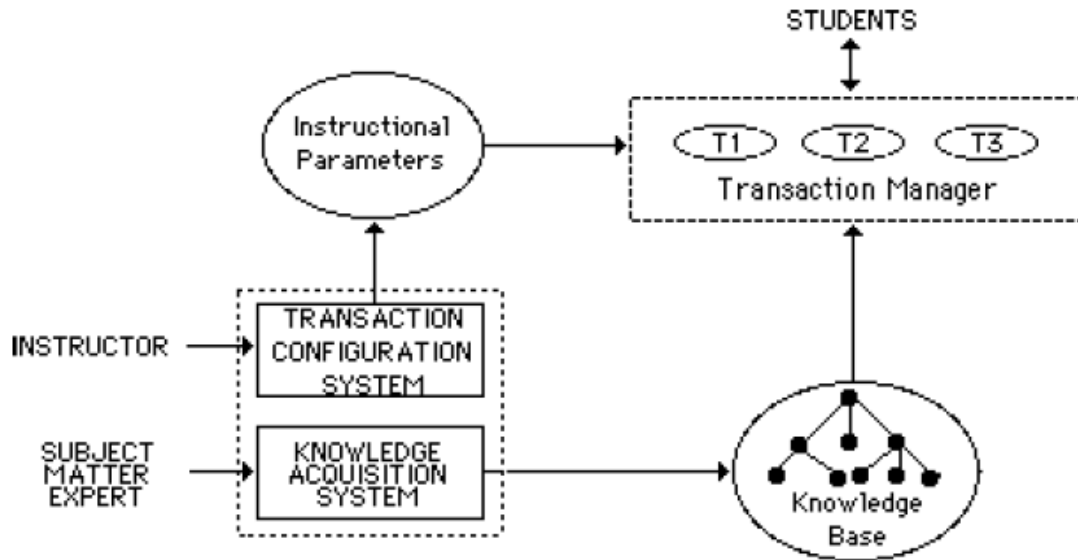


Figure 3.3. An Instructional Transaction Shell (Merrill, Li & Jones, 1991, p. 12)

A number of criticisms can be raised against this model:

Although this model appears to be remarkably flexible and adaptable to individual learner needs, it does not address the requirements that knowledge objects should meet in terms of content and how such content could influence learning. No form of evaluation appears to have been considered as a step before adaptation of a knowledge object is done.

3.2.4 Schott and Seidl's PLANA Model

The PLANA (*Planning instruction under the consideration of subject matter analysis*) model was developed to address the issue of providing the learner with the possibility to learn what he or she should be able to, or wants to, know. Schott and Seidl (1997) approached this goal by assuming that the learner should be able to learn during instruction that which he or she has to demonstrate during assessment. This can be accomplished by ensuring that the subject matter is content valid to both the instructional goal and the assessment items.

The PLANA model is formulated around aspects of the instructional process and the format of instructional tasks (ITs). The instructional process is conceptualised as consisting of a certain number of steps necessary to ensure that the learner will achieve the instructional goals. Instructional tasks link the various steps, making them interrelated. Ideally these steps would involve the following:

Firstly, the instructional goal is precisely defined by a class of instructional tasks

Secondly, the state of the learner (what the learner still needs to be taught) is determined with reference to the instructional goal (which was defined in terms of the IT s)

Thirdly, instruction is carried out by using the instructional tasks

Lastly, the learning outcomes are assessed through assessment tasks (Schott & Seidl, 1997)

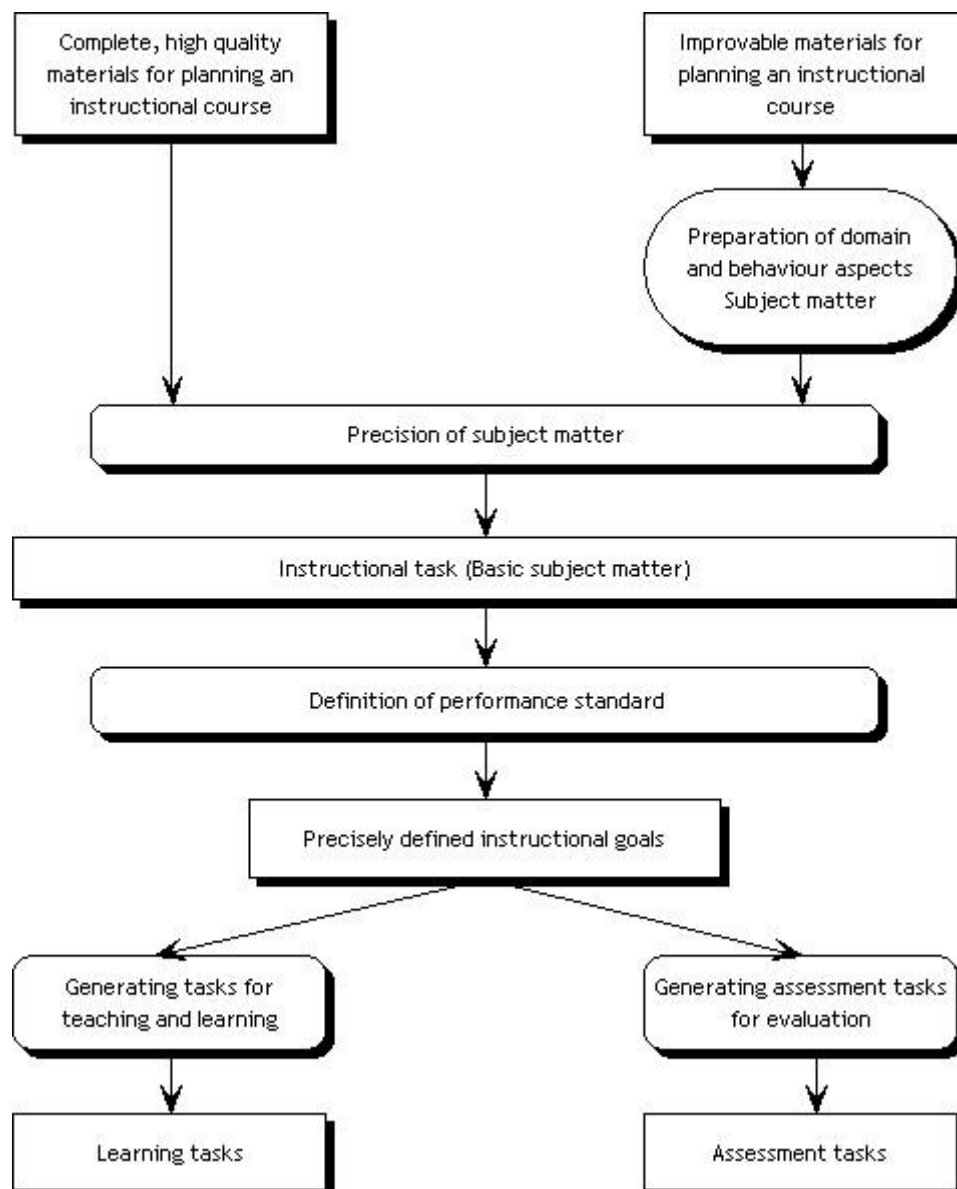


Figure 3.4. The main steps of the PLANA model (Schott & Seidl, 1997, p. 405).

These steps support the approach of the PLANA model which is to facilitate task analysis by ensuring that learning tasks and assessment tasks are in accordance with one another. A more complete summary of the main steps of the PLANA model is shown in Figure 3.4.

The PLANA model is only briefly discussed here. It is a comprehensive procedure aimed specifically at attainment of instructional objectives via instructional tasks and assessment. Schott and Seidl (1997) mentioned a number of empirical studies which have validated the efficacy of the PLANA procedure. They did, however, point to some limitations:

PLANA is not a complete instructional design model as it does not consider teaching methods and media content

PLANA is focused on the school environment and can accommodate only a limited number of instructional goals

The model is mostly focused on cognitive knowledge and less on knowledge for actions

PLANA is a time-consuming approach.

3.2.5 Tennyson's System Dynamics Model to Instructional Systems Development

Tennyson (1997) provided a model which is an integrative system that can dynamically adjust to different authoring requirements within a specific problem situation. Its purpose is therefore to provide an instructional design solution for each type of learning problem. The System Dynamics Model moves away from a static, linear approach to one that is complex and dynamic with a variety of feedback systems.

The System Dynamics Model consists of a number of components (*See Figure 3.5*), the first of which is the situational evaluation. This evaluation involves the assessment of the learning problem and the construction of a prescription (a set of authoring activities). These authoring activities comprise, amongst others, determining learner characteristics, and validating the situational diagnosis (Tennyson, 1997).

The second component is that of a knowledge base. This knowledge base refers to domains of concepts that relate back to the authoring activities. Therefore, for example, the authoring activity of determining learner activities relates to the concept of assessing the user population. Similarly, validating the situational diagnosis forms part of proposing an instructional systems development solution plan. Tennyson (1997) proposes a number of domains and subdomains (described in Figure 3.5), for example, a foundation domain, maintenance domain, and design domain.

A strength of the System Dynamics Model is the fact that it can accommodate all current and, probably, future theories of learning. It is therefore not limited to theories such as behavioural, cognitive or constructivist learning theories because it does not approach the design process from a learning theory approach but rather from a situational analysis angle. This model can be applied in a variety of instructional settings, be it computer or video, etc. A weakness is the fact that it does not appear to have received any empirical validation as yet.

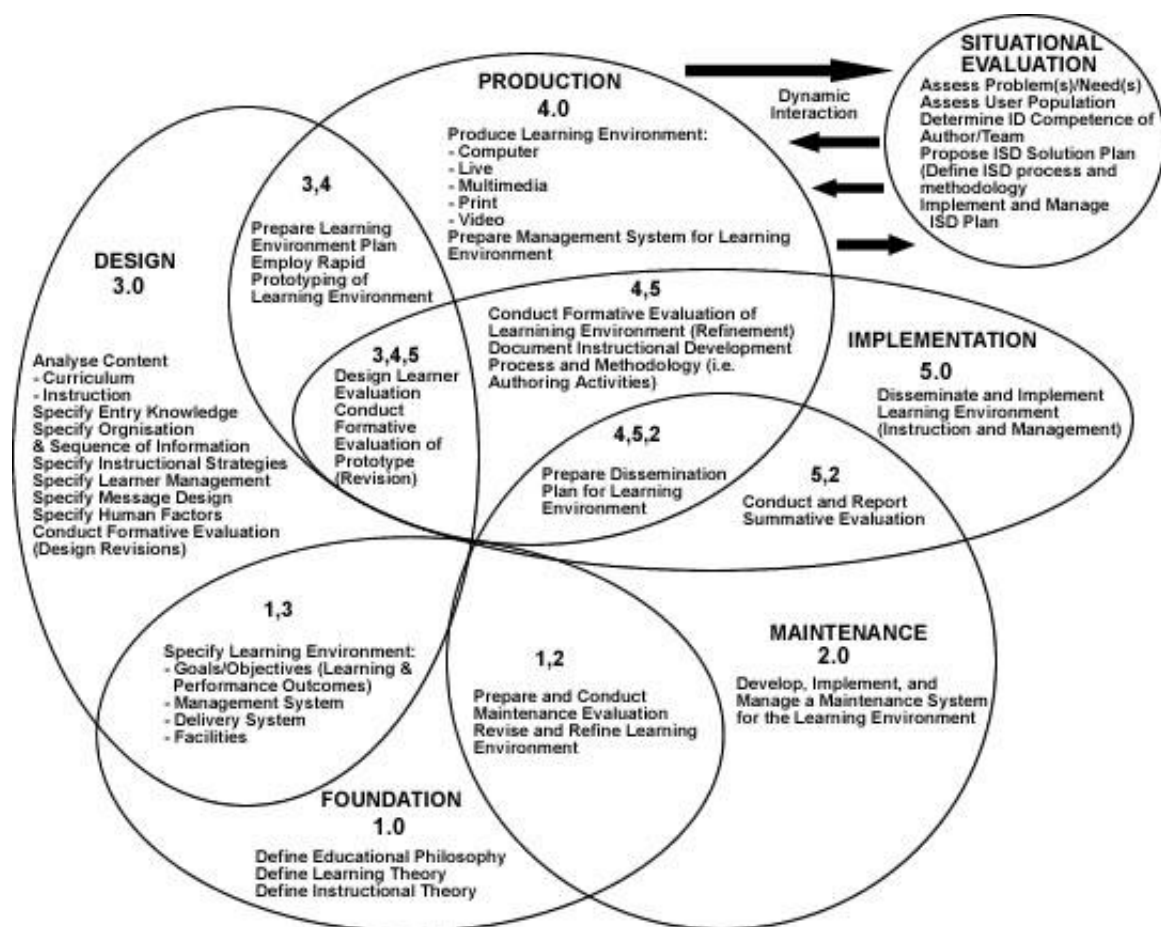


Figure 3.5. System Dynamics Model of Instructional Systems Development (Tennyson, 1997, p. 416).

The System Dynamics Model also relates well to aspects of Thomas and Rothman's (1994) approach. For example, the Design phase concurs well with Thomas and Rothman's Design phase, as well as with the instructional steps outlined by Nadler and Nadler (1994) (*See 3.3 The Critical Events Model*). Similarly, the Production phase links with the Development phase described by Thomas and Rothman, although the emphasis is here on an instructional learning environment, rather than an intervention focused on a problematic human condition. Furthermore, the Implementation phase relates to Thomas and Rothman's Dissemination phase. As will become clear when Passerini and Granger's (2000) hybrid model is discussed (*See 4.2.4 Passerini and Granger's Hybrid Model*), the System Dynamics Model fits in well with the hybrid model but due to the former's complexity and non-linear approach, advanced integration of the System Dynamics Model with the proposed model of this study is envisioned to result in an unnecessarily cumbersome initial model.

3.2.6 Van Merriënboer and Dijkstra's Four-Component Instructional Design Model for Training Complex Cognitive Skills

The Four-Component Instructional Design Model (4C/ID) evolved from both a theoretical and an empirical foundation over a period of almost 20 years. Whereas most models of instructional design start with the statement of instructional goals, Van Merriënboer and Dijkstra (1997) argued that such an approach is not feasible when designing for the training of complex, multidimensional cognitive skills. Such cognitive skills rather require a variety of integrated instructional goals to guide their development throughout.

This model focuses exclusively on the task analysis and how the results of such an analysis can be converted into a training strategy. It is therefore not a comprehensive model but rather one that can be included in a more complete instructional strategy, such as those found in instructional systems design models (*See 3.2.5 Tennyson's System Dynamics Model to Instructional Systems Development*). The model has its foundations in cognitive theories of learning and information processing and utilises several of the key concepts in this field (*See Figure 3.6*).

The 4C/ID model comprises four layers, referring to activities or methods that should be used by the instructional designer in order to produce effective training. As indicated in Figure 3.6, these layers refer to:

Box 1: Principled skill decomposition

Box 2 range: Analysis of constituent skills and related knowledge

Box 3 range: Selection of instructional methods

Box 4: Composition of the training strategy (Van Merriënboer & Dijkstra, 1997)

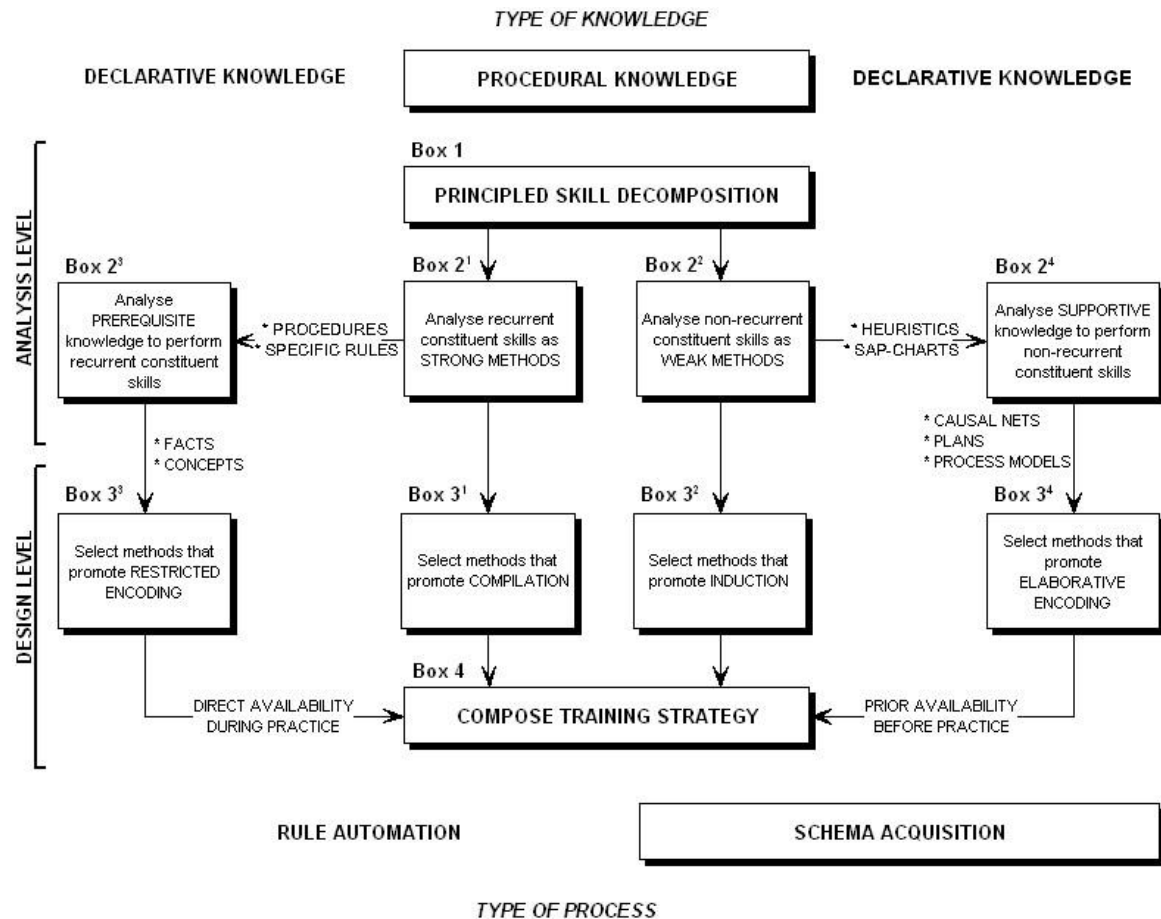


Figure 3.6. Outline of the 4C/ID model (Van Merriënboer & Dijkstra, 1997, p. 434).

Box 1 indicates that task hierarchies should be built in order to deconstruct the complex cognitive skills into their constituent skills. Depending on the required exit-skill of the learner, the constituent skills can be classified as either recurrent or non-recurrent skills. Whereas recurrent skills refer to a repeated method of solving problems, non-recurrent skills require that a variety of methods be employed to address problem situations. Once the classification of the skills has taken place, an in-depth analysis (as indicated in Box 2¹ and 2²) of each skill should be done up to the level on which the learner has already mastered the skill (Van Merriënboer & Dijkstra, 1997).

In connection with Box 2¹ the designer should also define the declarative knowledge required to perform recurrent constituent skills (Box 2³). Similarly, the designer should, in connection with Box 2² define the supportive knowledge required to perform non-recurrent constituent skills (Box 2⁴) (Van Merriënboer & Dijkstra, 1997).

With an analysis of the complex cognitive skill and each of its constituent skills completed, the designer can now develop a training strategy. On the one hand, the designer should develop practice for recurrent skills (Box 3¹), and on the other, should focus on developing practice for non-recurrent skills (Box 3²). For each of these two types of skills the 4C/ID model provides a variety of instructional strategies to build the required cognitive schemata (Van Merriënboer & Dijkstra, 1997).

In its character as a model for training of cognitive skills, the 4C/ID model also provides for the design of information presentation to support acquisition of recurrent and non-recurrent constituent skills. These develop from Box 2¹ and 2³, and Box 2² and 2⁴, respectively. Finally, the designer can set up a training strategy based on the decisions made during the previous layers indicated by the model (Box 4) (Van Merriënboer & Dijkstra, 1997).

The 4C/ID model lacks empirical validation as no existing instructional design models are similar enough to provide a basis for comparison. The usability and efficacy of the model has, however, been confirmed. It is not a very specific model, in the sense that it lacks detailed steps and is clearly aimed at the development of training strategies for practical settings. The 4C/ID model, due to its lack of a step-by-step approach is not suitable for novice designers and is furthermore a time-consuming model to follow because of its detailed task analyses (Van Merriënboer & Dijkstra, 1997).

3.3 The Critical Events Model

Although some of the models discussed in the previous section, for example, the System Dynamics Model and 4C/ID Model, appear to be more suitable for a computer-based environment, they are not regarded as applicable for this study due to the following reasons:

To be able to blend the different models, it is necessary to focus on models similar in structure. A step-wise approach is therefore the most obvious approach. Models of instructional design evolve constantly. A model with long-standing proven efficacy in its field, along with empirical validation is preferable.

The models discussed previously frequently provide an in-depth focus on only a single aspect of instructional design. Although apparently exhaustive in that particular area, the choice of model for this study is rather one that includes the complete design and development process.

The principle of Occam's Razor is followed with regard to the choice of an instructional model. Therefore, a less complex model is preferable as this will allow for easier integration with the other chosen models, resulting in a clear, linear model which could easily be adapted and expanded at a later stage.

The Critical Events Model (CEM) of Nadler and Nadler (1994) is not typically regarded as a model of instructional design but rather as an example of programme development (Cookson, Knowles, Nadler & Nadler, 1998; Scafati, 1998). It does, however, share many features with models of instructional design, while simultaneously sharing features with the developmental research model of Thomas and Rothman (1994) in the sense that it allows for modification throughout the development process (See *Figure 3.7*). It is this similarity that the Critical Events Model has, that qualifies it as the second essential component upon which the proposed model in this study will be built. This model will therefore be discussed in detail.

It should be noted that Nadler and Nadler's (1994) model focuses essentially on organisational training. Cookson et al (1998) did, however, point out that the Critical Events Model can be adapted for implementation within an educational context. Thus, in this discussion reference to an organisation will imply an educational context or professional body.

The Critical Events Model is an open model which considers the possibility that outside factors can influence the design process and is thus more descriptive by nature. Such a model therefore allows for the inclusion of unforeseen factors during the design process and is regarded as a working hypothesis. This is particularly clear from the CEM's emphasis on evaluation and feedback throughout. The model does

not attempt to predict a final outcome but rather describes the various design steps of a training program. The CEM comprises the following stages (Nadler & Nadler, 1994):

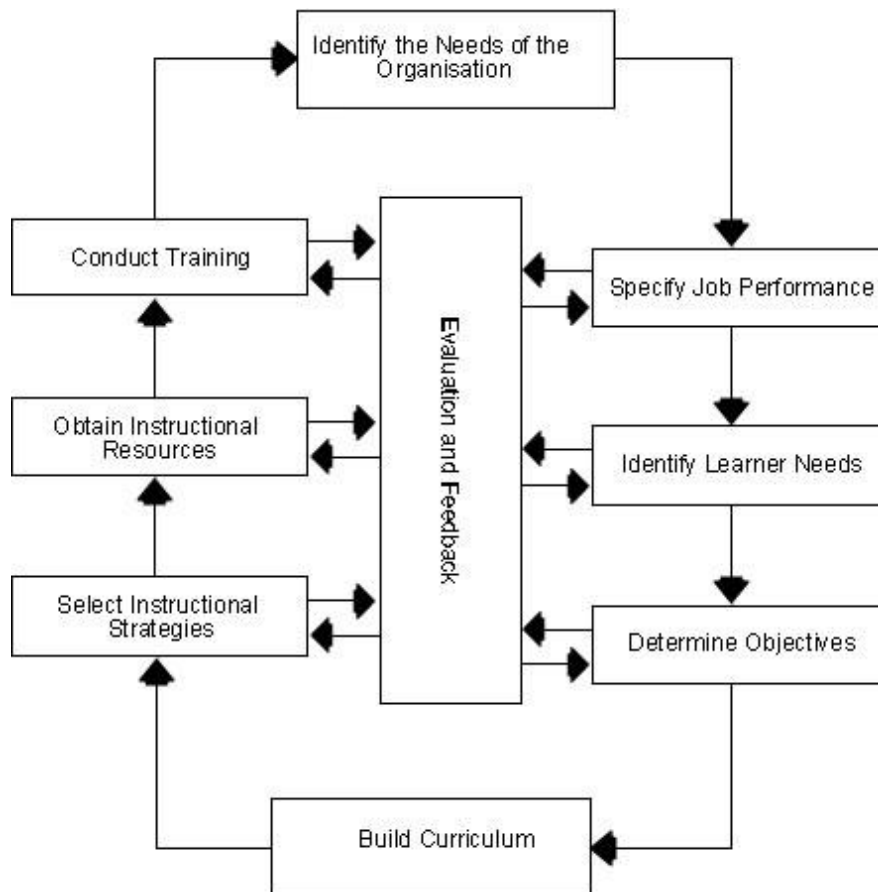


Figure 3.7. The Critical Events Model (Nadler, 1989, 12).

Identify the needs of the organisation
 Specify job performance
 Identify learner needs
 Determine objectives
 Build curriculum
 Select instructional strategies
 Obtain instructional resources
 Conduct training

Although the CEM is focused specifically on designing training programs, several elements are applicable to intervention design and Nadler's model therefore

complements the approach by Thomas and Rothman (1994) by adding the link between intervention and training or learning, especially as the Thomas and Rothman approach does not specifically focus on instructional design. The abovementioned stages are discussed in the following subsections:

3.3.1 Identify the needs of the organisation

The first stage of the CEM requires that the specific need or needs of the organisation are clarified. According to the CEM designers cannot move to the next stage until such needs have been identified and clearly described. The identification of a need or needs emphasises that there must be an agreed-upon problem and training will be a response to that problem. Furthermore, the needs of both the organisation, as well as the individual should be addressed during the training design (Nadler, 1989).

An important aspect to take into consideration during this first stage is that of performance analysis. This requires that the possible sources from which the need for training has arisen are explored. It is assumed that the organisation cannot adequately respond to the need and it is a human performance problem that should be addressed. As such, learning could be a solution to the problem (Cookson et al, 1998).

The designer of the training program should ascertain answers to the following questions (Nadler, 1989, p. 34-35):

Is there agreement on what constitutes the problem?

Is it agreed that training would be the solution to the stated problem?

Is there a specific decision to start designing a training program?

If the abovementioned three questions can be answered in the affirmative, the design of the training program can proceed.

During every other event evaluation and feedback needs to be performed. Thus, once a stage has been completed, the process is halted and evaluation, including feedback, is done. This evaluation and feedback provide the designer with information regarding the extent to which the design process meets the objectives of the training program. The designer should act on the feedback received and adjust the program development in order to address shortfalls (Nadler & Nadler, 1994)

An important aspect is the fact that evaluation is a process and not a single activity. At this stage evaluation is not concerned with evaluating the learning but rather the progress of the design. It involves several steps, namely Objectives, Action, Analysis, Feedback, and Decisions. These steps are accomplished in almost reverse order by asking the following questions (Nadler, 1989, p. 40):

Who will be asked to make the decisions?

Who must receive feedback so they can make the decisions?

Who must receive the analysis so they can provide feedback?

The Objectives and Action steps occur independently from the Analysis, Feedback and Decisions steps but they do provide the necessary information which will be utilised during the latter three steps.

3.3.2 Specify job performance

The second step of the CEM involves specifying job performance. This step focuses on people's perceptions of the job or problem on hand. Here the focus is on people's expectations of what the training program should accomplish in terms of job performance.

The designer should first attempt to identify the **sources** from which information regarding job performance can be elicited. Sources are typically people, records, and reports. Once these have been identified, the designer should decide on the **methods** to be used in order to tap into these sources of information. Nadler and Nadler (1994) pointed to questionnaires, interviews, meetings, literature surveys, observation of job performance, and the critical incident approach. The latter needs further mention as it is not self-explanatory. The critical incident approach requires that the person performing the job provide an analysis of the job that he or she is performing. It therefore involves a value judgement because the person can choose what information to include and this might not include the crucial elements. Criteria for inclusion should therefore be as specific as possible, accompanied by regular checks that the required information is provided.

As with the first stage, evaluation and feedback should also occur during this stage. The objective of this event is to specify the performance expected of a person doing a certain job. From the information received, the designer should first perform an **analysis**. Typically, a list of the steps required to perform the job can be drawn up in

a fairly detailed manner. If the job is not sequential, the information can be organised around certain identified areas or according to similarity in functions (Nadler & Nadler, 1994).

In terms of **feedback** the question is asked as to who should be involved in feedback and why. Typically, the person to be trained and his or her supervisor should be involved either directly or via a written medium. The decisions step of the evaluation and feedback procedure should address certain specific questions, namely:

Is there still agreement on the problem?

Is there agreement on job performance?

Should consideration be given to alternatives?

Will time be allocated for training (Nadler, 1989, p. 79-80)?

Once the abovementioned questions have been answered satisfactorily and addressed through the Action step, the designer can proceed to the next stage.

3.3.3 Identify learner needs

Identification of learner needs comprises the third stage of the CEM. This stage addresses the specific learning needs of the people who will be receiving the training. During this stage, the designer needs to focus on the following (Nadler, 1989, p. 82-101):

The individual

Gathering data

Sources

Methods

Evaluation and feedback

3.3.3.1 The individual

The fact that people are different and respond differently to training, presents a challenge to the designer of a training program. A successful training program will address individual differences and ensure that both the organisation and the individual are satisfied with the outcome (Cookson et al, 1998; Nadler & Nadler, 1994).

It is especially important to determine the needs of the individual as these might be different from those addressed by the planned training program. Nadler (1989) identified three groups of needs, namely stated needs, implied needs, and felt needs. **Stated needs** arise from the second stage and involve the specific needs of an individual in order to be able to accomplish a task. **Implied needs** also arise from the situation but are not stated explicitly. **Felt needs** are the strongest and learning will be more effective if a person has a felt need to learn. If the individual wishes to perform better but there is a gap between performance and expectation, then a felt need is identified (Nadler, 1989).

3.3.3.2 Gathering data

Similar to the steps during the previous stage, data are also gathered during this stage. The nature of the data being gathered is different, however, because previously data on job performance was gathered and that is a prerequisite for data gathering on needs. Nadler (1989) suggested a variety of data gathering techniques applicable to this step, such as electronic data gathering, telephone interviews, questionnaires, polls, etc. In many ways, the data gathering techniques are similar to those used during the previous stage. Similarly, the sources and methods used during the previous stage are also applicable during this stage.

3.3.3.3 Sources

Nadler and Nadler (1994) emphasised that the sources used for data gathering should be as specific as possible. Sources should reflect job performance. Examples of sources include production records, performance appraisal, as well as the employee and his or her supervisor.

3.3.3.4 Methods

Although similar methods to those mentioned for the second stage are utilised during this stage, there is an important difference. During this stage the focus is on those individuals who are actually performing the job for which the training program is being developed. Again, methods can include meetings, interviews, observation of employees, questionnaires, and, as a last resort, tests (Nadler, 1989).

3.3.3.5 Evaluation and feedback

Before proceeding to the next stage, the designer needs to perform evaluation on what has been achieved regarding learning needs. At this stage the designer should have a list of the needs of the individuals performing the job. Firstly, the designer

should compare the list of needs with the information gathered from the job performance analysis. If a discrepancy exists, a re-analysis of the job performance specification might need to be done. Should no discrepancy exist, the designer can group or categorise the list of needs and note any variations between individuals. No judgements regarding which needs will be met are made at this time.

The categorised list should now be presented to those responsible to provide feedback. These individuals should preferably be the same as those responsible for feedback during the previous stage. Privacy and confidentiality should be ensured during this process. The individuals' comments are gathered and decisions can be made based on these comments (Nadler & Nadler, 1994).

In order to make informed decisions, the designer should ensure that answers to the following questions are forthcoming (Nadler, 1989, p. 100-101):

- If the needs are met, will job performance become acceptable?
- If the needs are met, will the problem in terms of the needs of the organisation be solved?
- How important are the needs?
- Should the job be redesigned?
- Should tasks be reallocated?
- Should subordinates be transferred, rather than trained?
- What constraints are there in terms of the availability of the learners?

The decisions made based on the abovementioned questions will influence the stages which are to follow.

3.3.4 Determine objectives

Once learners' needs have been identified the CEM requires that objectives be determined. This stage requires that the designer identify the elements that should be considered when considering objectives for a training program and then list these objectives for the specific training program (Nadler & Nadler, 1994).

Nadler (1989, p. 105) regarded an objective as "the statement of what is to be accomplished by an activity". For Nadler (1989), a training program does not begin with a statement of objectives but only follows once the previous three steps of the

Critical Events Model have been completed satisfactorily. Specifically, the objectives are, in part, derived from the needs that were determined during the previous stage.

Before stating the objectives of the training program, the designer needs to envision the future state of the training design and realise that the form and content of the objectives will influence the actions taken during the stages that follows. Decisions regarding the objectives should consider the following (Nadler, 1989, p. 106):

- The learner
- The organisation
- The material to be learned
- The extent of the performance change being sought

It is important that the designer utilise the abovementioned factors to start considering which learning theory, i.e. objectivist or constructivist (*See 4.2.1 The Objectivist Learning Model, and 4.2.2 The Constructivist Learning Model*), would be adequate in addressing them. It should also be realised that clearer stated objectives will make the evaluation of the learning and performance easier and therefore the objectives should be written with evaluation in mind (Nadler & Nadler, 1994). The development of the training program objectives requires that the following be taken into consideration:

- Priorities
- Process
- Skills, knowledge, and attitudes (Cookson et al, 1998)

3.3.4.1 Priorities

Not all the needs listed can necessarily be addressed with a single training program. They therefore need to be prioritised according to certain criteria. Nadler (1989, p. 106-107) suggested that the needs could be listed according to one of the following:

- Time available
- Resources and accompanying cost
- Availability of personnel
- Learners and their availability throughout the duration of the program
- Factors outside of the organisation that could necessitate a shift in organisational goals

With the priorities in place, the needs should be listed in such a manner that they reflect these priorities. Thus, the objectives are not yet listed as these firstly depend on which needs can be addressed with the training program. At this point it might also become clear which needs can be combined or grouped together (Nadler, 1989).

3.3.4.2 Process

The determination of objectives constitutes an ongoing process which results in a statement of written objectives. The designer does not determine the list of objectives on his or her own. All relevant parties should partake in setting up the program objectives. For Nadler (1989) the most important individuals are the employee supervisors and managers, although even the learners can be involved in the process.

3.3.4.3 Skills, knowledge, and attitudes

In order to convert the listed needs into objectives, it is necessary to explore the skills, knowledge, and attitudes that relate to these needs. Typically, skills, needs, and attitudes are also known as psychomotor, cognitive, and affective activities, respectively, and are regarded as the three domains of learning. Nadler and Nadler (1994) pointed out that experience, or incidental learning, as well as training and education, or intentional learning, contribute to individual performance. As such, skills, knowledge, and attitudes, provide the intentional learning component.

Learning a skill involves practice but it is also the easiest type of objective to write because it involves an observable event and can be stated specifically. Learning must involve some kind of knowledge acquisition. Although it might not directly impact on performance, it should be considered part of a training program. Although a controversial issue in learning, individuals attitudes should be taken into consideration when setting program objectives. It is unclear whether learning changes attitudes or an attitude change is a prerequisite for learning. The debate has not been resolved and therefore it is best that the designer explore the needs that relate to individuals attitudes before setting program objectives (Nadler & Nadler, 1994).

The process should now focus on setting broad program objectives. These broad objectives need then be narrowed to specific objectives. Nadler (1989) pointed out that the statement of learning objectives should be done with consideration of how the learning will be delivered. He distinguishes between machine-mediated and

instructor mediated instruction. Today, the former will be regarded as computer-based instruction. For this type of instruction, the learning objectives need to be very specific because the machine (computer) can only do what it is programmed to do and there is thus a limit to the flexibility that can be achieved. If the instruction is to be instructor-led, the learning objectives can be stated with less specificity.

In terms of writing the learning objectives, Nadler and Nadler (1994) emphasised that a useful objective is one which is written in terms of the desired outcome and not in terms of what needs to be done in order to reach the outcome. Three components should form part of an objective:

Performance

Condition

Criterion

Performance refers to what the learner will be able to do once the learning experience has finished. This should be stated in observable and measurable terms, if possible. **Condition** indicates the limitations or constraints under which the performance is likely to take place. **Criterion** states what is important or regarded as acceptable performance (Nadler, 1989).

As with the previous stages, evaluation and feedback should again be performed once the objectives have been developed and stated. Analysis should take place by having individuals, preferably, supervisors or managers, evaluate the learning objectives. These people should also provide feedback and the potential learners can also be involved in this process. The decisions resulting from the analysis and feedback should be derived from the following questions (Nadler, 1989, p. 121-122):

Are the program objectives acceptable?

Have all the needs been reflected in the objectives?

Is the priority of the objectives acceptable?

Do the objectives relate to the information gathered on job performance specification?

Can the objectives best be met internally by designing a curriculum or externally by obtaining instructional resources?

3.3.5 Build curriculum

The fifth stage requires that the designer considers the items that will make up the training program. This step commences if the decision is taken, during the previous stage, to design the training program internally. Now curriculum building should be done in such a manner that the previously stated objectives can be met. During this stage the designer should also list the order in which the learning should take place.

Nadler and Nadler (1994) pointed to the following aspects which come under consideration during the stage of curriculum building:

- Variables which could impact on delivery of learning
- Content selection
- Types of content
- Categorizing content
- Sequencing content
- Developing lesson plans
- Evaluation and feedback

3.3.5.1 Variables which could impact on delivery of learning

Several variables can influence the way learning will be delivered. One such variable is the learner because he or she will be bringing prior learning experiences to the learning process. Thus, the designer should make an effort to gain an understanding of the culture, learning style, and past experiences of the learners before designing the training program. Another variable involves the instructor. If he or she is an expert in the field of training, more freedom can be allowed in the curriculum. A last variable to consider involves the relative distance between instructor and designer. If little contact is envisioned, the training content should be such that it can be handled independently by the instructor (Nadler, 1989).

3.3.5.2 Content selection

Although the designer brings his or her knowledge and skill regarding training design to the development of the program, it does not imply that he or she should also be a subject expert in the particular field. In fact, it is only in rare cases that the designer is also the subject matter expert and therefore appropriate skills should be brought to bear when it comes to content selection. Typically, such people could be internal to an organisation or consultants brought in, depending on budget (Nadler, 1989; Nadler & Nadler, 1994).

3.3.5.3 Types of content

Content related to program objectives can be organized into one of the following categories:

- Essential
- Helpful
- Peripheral
- Unrelated

Essential content refers to the absolute minimum information that the curriculum will have to contain in order to meet the program objectives. This content is independent from other types of information. **Helpful content**, on the other hand, supplements the essential content and provides additional, non-essential information. **Peripheral content** is very similar to helpful content and frequently no distinction is made between the two as this type of content also provides additional information, although it might be incidental to the essential content. Unrelated content usually refers to content that is included in order to ensure that nothing that might be important is omitted (Nadler, 1989).

3.3.5.4 Categorizing content

In order to be able to prioritise content, it should be categorised. The process of prioritisation is necessary because frequently not all planned content can be included. This process is time-consuming and requires that the designer, in consultation with supervisors and subject matter experts, decide what content to include. Each item of content should be checked against the following criteria (Nadler, 1989, p. 136-137):

- Will this content, when learned, meet the program objectives?
- Will this content, when learned, meet the identified needs?
- Will this content, when learned, lead to the performance required?
- Will this content, when learned, solve the previously identified problem of the organisation?

3.3.5.5 Sequencing content

Once the content of the curriculum has been decided on, the sequence of content presentation needs consideration. In this regard the designer can decide to sequence the content from general to specific or vice versa. The former moves from an overview to specifics while the latter assumes that the learners need not know the

end result but will still reach it by going through the specific items of content. Both approaches involve some assumptions about the learners but neither can be said to be the best one.

It is also possible to sequence the content from the concrete to the abstract and vice versa. The latter can be used when the content is philosophical in nature but should be utilised with caution when learning will take place within a cross-cultural context. Other variations, such as known to unknown and vice versa are also possible and frequently the content itself might dictate the sequence. It is important to bear in mind that sequencing can also be influenced by the type of delivery system that will be used. Instructor-led training, for example, needs less sequencing than computer-based training (Cookson et al, 1998; Nadler, 1989).

3.3.5.6 Developing lesson plans

Once content and sequence have been determined, the lesson plans can be developed. Content and sequence are now transformed into a deliverable format. At this stage the way learning will take place is not specifically considered, although some decisions during previous stages will have brought this to some conclusion. The format of the lesson plans will be influenced by past history, as well as the instructor (Nadler & Nadler, 1994)

Past history is a major factor that should be considered. The designer should review the format of past lesson plans and decide whether these could be used as they might have proved effective within that specific context. As mentioned previously, the instructor's skills and knowledge also play an important part in the way the lesson plans are structured. A lesson plan takes the following typical form:

- Objectives
- Preparation
- Time
- Main topic
- Instructor activity
- Learner activity
- Strategies
- Evaluating

The **objectives** mentioned here are the same as those that have been developed during the previous stage and they should still reflect performance, conditions, and criteria. **Preparation** includes that of the physical environment, equipment and materials, the instructor him- or herself, and learner preparation. The lesson plan should also state the expected duration (**time**) of each element of the lesson. The **main topic** should be stated and should coincide with the content agreed upon. It could also contain sub-topics.

The **instructor activity** topic refers to what the instructor will do during the training session and will depend on his or her qualifications. Similarly, the **learner activity** topic indicates what activities are expected of the learner. These activities should coincide with the objectives and expected performance previously stated. **Strategies** refer to the learning strategies applicable to both learner and instructor which will occur during the training session. **Evaluation** is a pervasive activity that occurs throughout the training session but there should also be a specific point of evaluation during each session (Nadler, 1989; Nadler & Nadler, 1994).

3.3.5.7 Evaluation and feedback

Once the tasks of this stage have been completed, the designer can establish whether the objectives have been met by either investigating the content and sequence decided upon or the lesson plans themselves. Analysis should indicate whether any lesson items should be removed and it must be determined whether there is congruence between the content, sequence, and assumptions about the learners. Individuals involved in feedback are again similar to those consulted during previous stages, although the learner might not necessarily be involved during this stage. Based on the feedback received, the following questions should guide the decisions (Nadler, 1989):

Does the content meet the previously determined objectives?

Will the content satisfy the needs of the learners?

Does the content relate to performance?

Does the content relate to the initially identified need of the organisation?

Will potential learners be available for the specified period of training?

3.3.6 Select instructional strategies

With the curriculum built, the designer moves to the sixth stage where he or she should select instructional strategies which are appropriate for the curriculum, the

learner, instructor, and organisation. The designer should also revise lessons, should it become necessary, as the instructional strategies come into effect.

The selection of instructional strategies is difficult because of the wide variety available. Nadler (1989, p. 163) indicated that the following factors should be taken into consideration when deciding on a strategy:

- Instructor-centred or learner centred
- Individual-based or group-based
- Abstract subject matter or concrete subject matter
- Self-instructional or group learning
- Didactic or experiential
- Low learner experience required or high learner experience required
- Short duration or long duration
- Long time for learning or short time for learning
- Low instructor competence required or high instructor competence required
- Low student motivation existent or high student motivation existent

Based on the abovementioned factors the designer can return to the lesson plans and determine an instructional strategy for each. Nadler (1989) listed a large variety of instructional strategies, amongst which are audio-visual, brainstorming, case study, television, debate, discussion, field trips, interviews, programmed instruction, role play, and a host more. Based on the chosen strategy, the sequence or elements of the content might have to be adjusted.

With the task of selecting instructional strategies completed, the designer returns to the task of evaluation and feedback. Analysis will list the selected instructional strategies and the reasons for the choices but the individuals involved in feedback could be different than those involved in previous stages. Based on the feedback received, the following questions should guide the decisions:

- Do the instructional strategies complement the curriculum?
- If the lesson plans are used, will the objectives be reached?
- Do the lesson plans reflect the identified learning needs?
- If the lesson plans are used, will they relate to current job performance?
- If the training is done with these lesson plans, will the problem be solved?
- Is it possible to implement the selected instructional strategies?

Will the selected instructional strategies be available when they are needed (Nadler & Nadler, 1994)?

3.3.7 Obtain instructional resources

The seventh stage brings together the previous stages as the designer should now ensure that all the necessary resources will be available for the program that has been designed. The resources required can be organised according to whether they are physical, financial, or human in nature (Nadler, 1989).

Physical resources refer to the equipment, materials, and facilities needed to conduct the training and the designer should ensure availability of these. At this point the designer should also be able to prepare a budget and cash outlay expectancy for the training program (**financial resources**). In terms of **human resources** the designer needs to determine which individuals will be required to administer and facilitate the training program. This is necessary, even when the program is largely machine or computer-based. Nadler (1989, p. 196-201) provided a checklist based on these three factors but it is beyond the scope of this study to include the complete list.

The evaluation and feedback procedure of this stage will first involve an analysis of the three types of resources mentioned above, as well as a reference to the lesson plans previously prepared. Feedback should be performed by the individuals involved in the previous stages and the decisions should be based on the following questions (Nadler, 1989, p. 203-205:

Is the cost acceptable?

Will the required resources be available when needed?

Has a list of potential learners been prepared?

Can specific instructors be assigned (if applicable)?

Will the training program solve the problem?

3.3.8 Conduct training

The final stage involves the implementation of the decisions made during the previous stages and thus training now starts. The program is opened to the participants and the climate is set for effective learning (Nadler, 1989).

The first task is to determine aspects regarding the learners. They might be taking part in the training due to various reasons, ranging from having been sent by their supervisor to having volunteered. The designer should, at this stage, compare attempt to determine whether these learners are the same as those who initially provided information regarding learner needs. If they are more or less the same, it can be assumed that the learners will be more likely to accept the training program and engage actively in it. If the learners are not the same as those consulted initially, the designer should attempt to determine whether these learners display the same needs as those for which the program was developed.

Once the learners have been notified and training is about to commence, certain factors should be taken into consideration. **Climate setting** is the first important factor and refers to the activities that would set an atmosphere conducive to learning. This aspect should be addressed during the opening of the training program, which can be formal or informal. Secondly, learners need to be informed of three aspects, namely the **objectives** of the program, the **requirements** of the program, and **mutual expectations** of both the learners and the instructor (Nadler, 1989).

Once the training program has run its course, the designer should prepare for evaluation of the program itself. This aspect has been anticipated during the curriculum building stage and should constitute summative evaluation. The results from this evaluation could then be used to inform the development of future training programs.

The analysis conducted at the end of the program should address the question of what the learners have learned. This analysis can be performed statistically and should also contain recommendations for program improvement. Feedback should be obtained from as wide a population as possible and the final questions to be asked should inform the following decisions (Nadler, 1989, p. 225):

Does it appear as if the program has solved the initially identified problem?

Is there a need to repeat the training program?

If the program is repeated, are any modifications necessary?

3.4 Summary

Chapter 3 focused on models of instructional design. A broad overview of some representative models was provided as background to the choice of the Critical Events Model (Nadler, 1989; Nadler & Nadler, 1994). The Critical Events Model was initially developed (Nadler, 1989) to guide the design of training programs within an organisation. It has since been revised and is regarded as suitable for a variety of educational contexts (Cookson et al, 1998). It includes valuable information regarding instructional design and the process approach allows the development of training to assume a flowchart quality. For the purpose of this study, the CEM complements the developmental research model proposed by Thomas and Rothman (1994) as it addresses finer details of the learning process and emphasises continuous evaluation and feedback.

The CEM, combined with the developmental research model does not, however, suffice as a foundation for the development of a model for online intervention design. Their typical focus is on “real-life”, traditional learning and intervention settings, whereas the focus in this study is on a Web-based environment. It is therefore necessary, in Chapter 4, to focus on models of Web-based learning and their concomitants.

Chapter 4 – Theories and Models of Web-based Learning and Instructional Design

“The World Wide Web has the technical capabilities to implement any instructional strategy.”
Sugrue, 2000, p. 133

4.1 Introduction

As no existing guidelines for the development of online psychological interventions exist, it is necessary to turn to existing knowledge regarding learning, specifically Web-based learning or training, in order to address the unique characteristics of the online environment. It should be noted, however, that there is currently no consensus regarding the most adequate or effective model of Web-based learning.

Web-based learning (WBL) makes use of World Wide Web technologies in order to deliver training or learning opportunities to Web users. Horton (2000) defined Web-based training as *“any purposeful, considered application of Web technologies to the task of educating a fellow human being”* (p. 2). The author also points out that Web-based training is, in fact, a merging of three social and technical developments, namely distance learning, computer-based education, and Internet technologies. As a technology it came to the fore by 1999 and has been increasing in popularity ever since (Horton, 2000).

A similar definition of Web-based learning was offered by Conrad (2000, p. 11): *“Web-based training is the integration of instructional practices and Internet capabilities to direct a learner toward a specified level of proficiency in a specified competency.”* This definition will be used in this study due to its emphasis on instructional design and its focus on learner skill outcome.

In Chapter 4 the emphasis is on models of learning and how they have been adapted to facilitate Web-based learning.

4.2 Models of Learning

"Course-design skills for online and other forms of open and distance learning will be brought to bear more effectively when applied within a model and based on a workable theory of instructional design." Whitbeck, 2001, p. 190

Models for the development of Web-based training are based on existing models of learning. These models can be divided into two main categories, namely behavioural and cognitive models (Lin & Hsieh, 2001). The objectivist, behavioural models of learning are the oldest while the competing cognitive models follow a constructivist approach. It is generally agreed that learning via a technological medium can benefit from the step-by-step approach of objectivist models but the Internet has brought new technologies which can utilise the approach of constructivist models effectively (Passerini & Granger, 2000).

4.2.1 The Objectivist Learning Model

The Objectivist Learning Model has, as its foundation, Skinner's theory of stimulus-response. From this viewpoint learning involves a change in the behavioural disposition of an organism. Such learning can further be shaped through selective reinforcement. This model assumes that an objective reality exists and it can be known through learning. Instruction from the objectivist viewpoint involves a transfer of knowledge from the instructor to the learner who should be able to recall the knowledge received (Wilson, 1997). Such transfer can occur via various means, for example, through the Internet.

4.2.2 The Constructivist Learning Model

In contrast to the Objectivist Learning Model, the Constructivist Learning Model does not assume an external reality independent from the learner. A learner is capable of creating knowledge and can produce its own interpretation of events (Lou, Dedic & Rosenfield, 2003). In terms of instruction this model requires that learners discover for themselves, thereby creating their own knowledge, instead of receiving it from an instructor (Pear & Crone-Todd, 2002). In other words, the instructor simply creates the context and support for learning, rather than the instruction itself. As will become clear from the discussion that follows the online environment lends itself better to a constructivist rather than an objectivist approach.

A number of derivatives from the constructivist approach exist with the cooperative, cognitive information processing, sociocultural, and computational learning models being the most influential (Lin & Hsieh, 2001).

The **Cooperative Learning Model** deviates from the constructivist approach in its emphasis on learner interaction with other learners, instead of with objects. Learning therefore occurs as learners discuss, collaborate, and share information. Knowledge is therefore created as it is shared. For this approach it is assumed that learners have prior knowledge that they can contribute and therefore participation is a key requirement for learning. For participation to occur, optimal conditions, such as small groups, should be created for learners. In line with the nature of constructivist learning, the instructor merely facilitates the cooperative process (Lin & Hsieh, 2001).

The **Cognitive Information Processing Learning Model** assumes that learners will receive information, test and refine it, and hold it in long-term memory to apply it in the solving of problems. The frequency and intensity of information input will determine the learner's pace of learning. This model argues that learners differ in their learning styles and instructional methods should therefore match these learning styles. The model further takes into consideration a learner's existing mental model of knowledge that is held in memory and assumes that this will be an important determinant of the learner's efficacy in processing new information (Lin & Hsieh, 2001). The implementation of this approach might be difficult within traditional, face-to-face learning environments but is ideally suited to an online environment which could be developed to adapt to the learner's learning style.

The **Sociocultural Learning Model** builds upon the constructivist model but simultaneously reacts against some of its assumptions. This model assumes that there is no single one external reality and further states that the constructivist and cooperative approaches force the minority culture to adopt the understanding that is accepted by the majority. The Sociocultural Learning Model therefore advocates an approach where learners are free to choose their interpretation of reality in an environment where a culturally biased interpretation of reality is not enforced (Lin & Hsieh, 2001). Whether such an environment is possible in practice is, however, debatable as it would require vast resources and input from instructors.

Lastly, the **Computational Learning Model** assumes that information exists within the learner as chunks (bits and bytes) of data. Logical patterns and relationships

exist between the chunks of data and these are independent of the physical medium that contains them. This model maintains that there is an interaction between facts, concepts, and principles and learning results when new information finds reception points and can be structured and organised (Lin & Hsieh, 2001).

4.3 Models of Web-based Learning

In recent years a number of learning models for the development of Web-based learning have appeared in the literature. These models are mostly based on existing instructional design models, such as those by Dick and Carey, Jerrold Kemp, and others (Passerini & Granger, 2000) (See *Chapter 3*). These instructional design models are, in turn, based on existing models of learning, such as those discussed above. Passerini and Granger (2000) emphasised, however, that traditional instructional design models do not accommodate the cognitive flexibility that is allowed through Web-based (hypermedia) instruction.

Although existing models of Web-based learning can therefore be argued to be insufficient to guide the development of Web-based learning materials, they all contain valuable elements and point toward the requirements for a comprehensive model. These models are therefore discussed in this section.

4.3.1 The McManus Model

The McManus Model (McManus, 1996) (See *Figure 4.1*) proposes that the designer defines the learning domain and a series of cases within that domain that will lead to several learning paths. Simultaneously, a path, parallel to the instructor-determined path, encourages learner-controlled navigation. Both paths lead to the final goal of providing feedback and review questions that will enable the learner to self-reflect on the learning objectives reached.

The McManus Model focuses mainly on the deliverance of instructional material. An important shortcoming lies in the exclusion of a consideration of learner characteristics and an indication of the specific flow in which content would be made available. The model also does not allow for either formative or summative evaluation to take place. Its main strength lies in the allowance for user navigation through the instructional material.

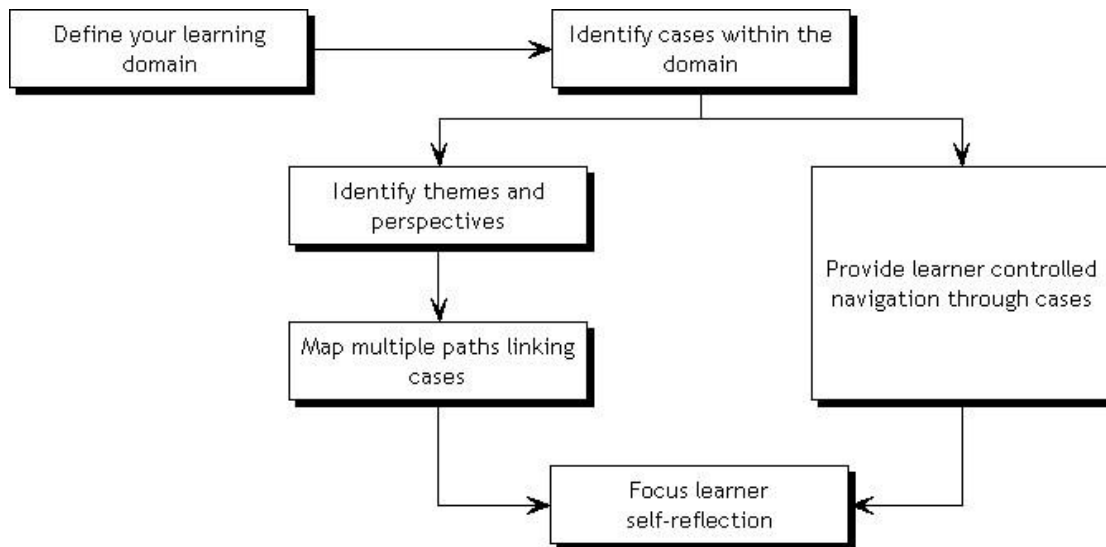


Figure 4.1. The McManus Model (Passerini & Granger, 2000, 7).

4.3.2 Conrad's Training Development Cycle and Model of Instructional Design

Conrad (2000) presented a training development cycle (See Figure 4.2) developed from a variety of models, such as that of Jerrold Kemp. This training development cycle forms the foundation for an instructional design model of Web-based learning design already utilised in practice by a company called TrainingLinks (Conrad, 2000).

The Training Development Cycle consists of stages, each with a number of tasks which are to be completed before the next stage of development can be entered. These stages are shown in Figure 4.2 and discussed in the subsections that follow.

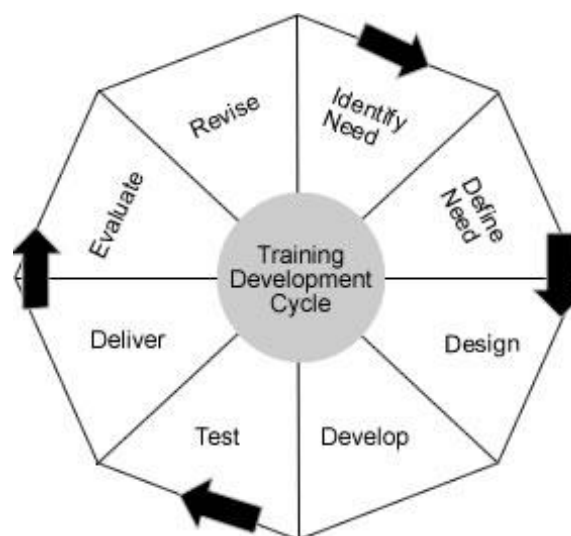


Figure 4.2. The Training Development Cycle (Conrad, 2000, p. 222).

4.3.2.1 Stage 1: Identify Need

The first stage requires that the need for training be identified. Such a need is indicated if a target group of individuals lack certain skills and/or knowledge. Conrad (2000) warned against the identification of a training need when performance deficiency can rather be attributed to other causes, for example, organisational issues, such as lack of incentive. Genuine training needs can be identified in one of the following ways:

An apparent performance deficiency exists

A new product, procedure, service or policy, requiring new skills or knowledge, is to be introduced

Current courseware cannot address the training requirements of the users

Users request a need to expand their skills and knowledge

4.3.2.2 Stage 2: Define Need

When a training need has been identified, it should be defined in terms of organisational goals, current skills, and desired skills. This is needed in order to focus the design process. The following questions can serve to clarify these issues (Conrad, 2000, p. 223):

What are the organisation's business goals and organisational objectives?

How does the organisation expect the training to contribute to its goals?

What factors contribute to the apparent need for training?

What circumstances prompted the request for training?

Based on the answers to the above questions, a needs assessment can be drawn up and this should provide insight into the causes of performance problems and highlight the target users' strengths and weaknesses in terms of skills and knowledge.

4.3.2.3 Stage 3: Design

The design stage should commence with a study of the needs assessment completed during the previous stage. This information is then used to identify the areas where gaps in skills and knowledge exist. This will provide an indication of any prerequisite training that should be conducted. To bridge the gap, course objectives, practice activities, content organisation, and instructional strategies are designed. Based on these course elements, the designer now decides on the appropriate

delivery system. This delivery system should be such that it can accommodate the users learning styles and encourage effective learning to take place. The design stage is finalised by documenting all decisions. This documentation will guide the remainder of the process (Conrad, 2000).

4.3.2.4 Stage 4: Develop

Based on the documentation drawn up during the previous stage, training content can now be developed. This content should then be reviewed by the relevant individuals and a second draft be prepared, if necessary. The second draft should also be reviewed and revised before any form of evaluation is done (Conrad, 2000).

4.3.2.5 Stage 5: Test

Stage 5 denotes the point where formative evaluation of the designed training content is done. This type of testing should, according to Conrad (2000), preferably be done in two stages:

Alpha testing, which involves an organised approach through all the course materials, done by content experts and instructors. Course objectives, activities, tests, and content should be evaluated in terms of effectiveness and adequacy in meeting overall training goals.

Beta testing, which requires that the course be delivered to a small target audience while the designers, content experts and other relevant parties act as observers.

4.3.2.6 Stage 6: Deliver

With formative evaluation completed successfully, a course delivery plan is decided upon. This decision will depend on the delivery system, which should match the needs of the learners and the training goals. Specifically, the users attitudes, their computer skills (in the case of computerised presentation), the size of the target audience, and the time available for training, should be taken into consideration (Conrad, 2000).

4.3.2.7 Stage 7: Evaluate

Evaluation should involve an assessment of training effectiveness. This can be done by measuring the learners achievement of course objectives and their overall satisfaction with the course. Results from the evaluation should be used to improve the course. Conrad (2000) suggested following Kirkpatrick's four-level model of

evaluation in order to determine the efficacy of the training course. This model denotes the following levels:

Level 1 - Reactions: This level requires that learners' satisfaction with the training course be determined. A wide variety of questions can be asked to gauge the level of satisfaction, including (for Web-based delivery) organisation of learning material, level of detail of material, level of learner control provided, and effectiveness of user interface.

Level 2 - Learning: This level involves measurement of student performance during the course in terms of their accomplishment of course objectives.

Level 3 - Behaviour: This level of evaluation will typically only occur about 60 to 90 days after training has been completed. Behaviour evaluation is done in order to determine whether learners have been able to transfer the skills and knowledge they have gained in the training course to a practical level.

Level 4 - Results: This level requires that an investigation be made into whether the training was successful overall.

4.3.2.8 Stage 8: Revise

By analysing the results of the evaluation done during the previous stage, the course can be refined and adjusted. This should be done by a maintenance team, which should ensure that the training program maintains its effectiveness (Conrad, 2000).

Conrad's Model of Instructional Design is placed within the Training Development Cycle as part of its design stage. The model indicates that 21 steps are required, of which the first 5 steps are considered pre-design tasks (Conrad, 2000). A brief overview of the 21 steps is provided below.

4.3.2.8.1 Training Development Cycle: The Predesign Stage

The predesign stage is primarily concerned with needs assessment and task analysis and consists of 5 steps. The **first step** involves an analysis of data regarding the learners' existing skills, knowledge, attitudes, expectations, and any other relevant factors. During the **second step**, the designer further analyses the target learners and, through this investigation, comes to a comprehensive understanding of the learners' skills, knowledge, attitudes, expectations, and other factors (Conrad, 2000).

The **third step** involves task analysis. Through this process the correct methods and techniques for performing the required tasks can be determined. Task analysis is

best achieved via interviews and observation of individuals performing the specified tasks. The **fourth step** involves the identification of skill and knowledge gaps. Thus, the gap between the learners existing knowledge and skills, and the required knowledge and skills, is determined by studying the data acquired during the first three steps. The **fifth and last step** during the predesign stage builds upon the analysis and results of the previous four steps. Now the designer should investigate whether prerequisite skills and knowledge would be necessary for learners to master before entering the planned training programme (Conrad, 2000).

4.3.2.8.2 Training Development Cycle: The Design Stage

With the tasks of the predesign stage completed, the designer should commence with **Step 6** which requires that course objectives be prepared in such a manner that they are measurable. These course objectives should be designed in such a manner that the previously identified gaps can be bridged. Specifically, they should indicate what skills or knowledge should be demonstrated upon completion, the conditions under which these skills or knowledge should be demonstrated, and the required level of achievement (Conrad, 2000).

Step 7 now follows and involves description of cumulative and criterion tests. These tests are aimed at measurement of overall performance and are based on the course objectives defined during Step 6. The description of the tests should include a projected view of the process for administration of the tests, the test content, criteria for measurement of achievement, and the means whereby the data will be captured and processed (Conrad, 2000).

The next step, **Step 8**, requires the formulation of the modules, which make up the course. Learning should be measured and reinforced at the end of each module, according to the stated objectives. Closely related to the formulation of modules, is the process of module sequencing, which is done during **Step 9**. Sequencing typically, follows the order in which tasks would ideally be mastered (Conrad, 2000).

Step 10 can be considered a decision phase whereby the designer should determine whether past design actions and those intended to follow will be influenced by specific constraints, such as the delivery system. These constraints need to be clarified with the client which requested the training programme and this is done during **Step 11**. With client approval, the designer can continue, in **Step 12**, to develop logical units to make up the different modules. Thus, learning is now

grouped to facilitate reinforcement of concepts and behaviours. Similar to the process followed during module development, the logical units must now be sequenced according to a logical progression of behavioural tasks mastered. This is done during **Step 13** (Conrad, 2000).

With the course and its modules and units in place, the designer can, in **Step 14**, determine where practice exercises and tests will be placed. Typically, these practice exercises and tests are placed at the end of the logical units and modules. **Step 15** will now require that the appropriate types of practice exercises and tests be decided on. The designer should ensure that these address the course objectives. In **Step 16** the primary sources of information used during training, should be determined. These sources can range from material that can be studied independently, to activities that need to be instructor-led (Conrad, 2000).

With all the decisions required during the previous steps settled, the designer can now organise the content and create a detailed course outline containing the informational content, as well as practice exercises and tests. This is done during **Step 17** and will form the foundation for the development of the course content itself. **Steps 18, 19, and 20** now involve the decision regarding delivery techniques, systems, and media. Additional requirements might need to be met or alternative facilities made available, for example, to facilitate group discussion or small-group exercises. The final step involves the creation of a blue-print for the complete course (Conrad, 2000).

It should again be noted that Conrad's (2000) model focuses on the design of the course itself and is to be placed within the larger framework of the Training Development Cycle.

4.3.3 Lewis and Whitlock's Framework for Developing E-learning Programs

Lewis and Whitlock (2003) proposed a simple chronological sequence of Web-based learning design (See *Figure 4.3*). They did acknowledge that the different stages overlap and pointed out that an earlier decision might have to be reconsidered and even changed. They admitted the limitations of their approach but pointed out that it provides a means of making planning systematic. Lewis and Whitlock's stages are discussed in the subsections that follow:

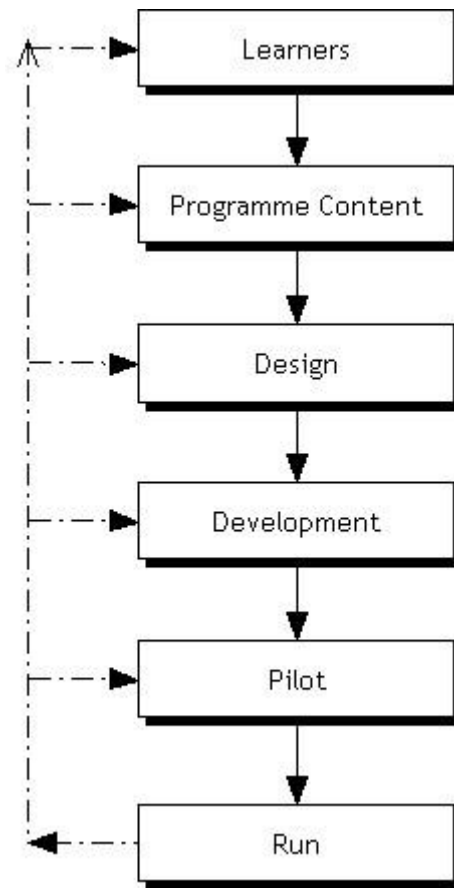


Figure 4.3. Lewis and Whitlock's (2003, p.2) Framework for Developing E-learning Program.

4.3.3.1 The Learners: Characteristics and Context

Other than the models previously discussed, Lewis and Whitlock (2003) started their development process with a consideration of learner characteristics and context (See *Figure 4.4*). They emphasised that this point of departure is especially important in e-learning because, other than in a conventional instructional setting, it would not be possible to adapt the instructional style later.

The designer should, first of all, be clear as to who the learners would be. The characteristics of the group of learners need to be understood, as well as the context in which they will be learning. Lewis and Whitlock (2000, p. 4) provided the following checklist of learner characteristics which can be used to discover similarities and differences between them:

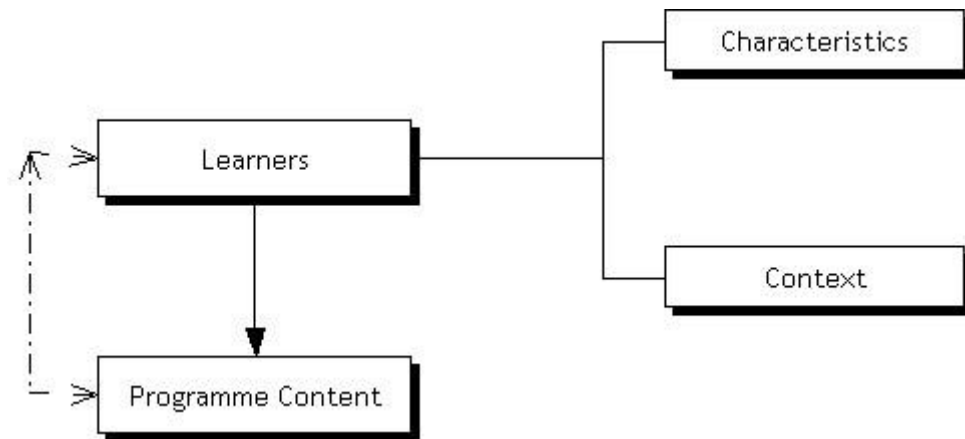


Figure 4.4. The relationship between learner characteristics and context and programme content (Lewis & Whitlock, 2003, p. 3).

Age

Physical characteristics, such as visual acuity required

Likely confidence in learning new things

Likely level of skill in handling words, numbers, diagrams, and equipment, such as a computer mouse

Qualifications they already possess

Learning methods they are familiar with

Likely attitude toward electronic learning

Motives for learning

Occupation

Cultural background and attitudes, such as prejudices

Interests

Based on learner similarities and differences the designer can adapt his or her planning. For example, different modules might be developed for learners with different learning styles or needs. A second consideration for the designer is the learner context. The following checklist provides pointers regarding this (Lewis & Whitlock, 2003, p. 5):

Where and when will they learn?

How much time will they have to learn?

What equipment, in terms of computer hardware and software, will they have?

What difficulties might they experience?

The designer should again analyse the answers to these questions and draw up a list of similarities and differences between the users. Only once users characteristics and their context have been analysed, can programme content come under consideration.

4.3.3.2 Programme Content

Lewis and Whitlock (2003) regarded programme content as a broad issue that also includes the needs the programme should meet, the objectives the learners will try to achieve, the activities they will have to perform in order to meet the objectives, as well as the way in which learners performance will be assessed (*See Figure 4.5*). All these factors interact and the designer can address any one of them as a starting point.

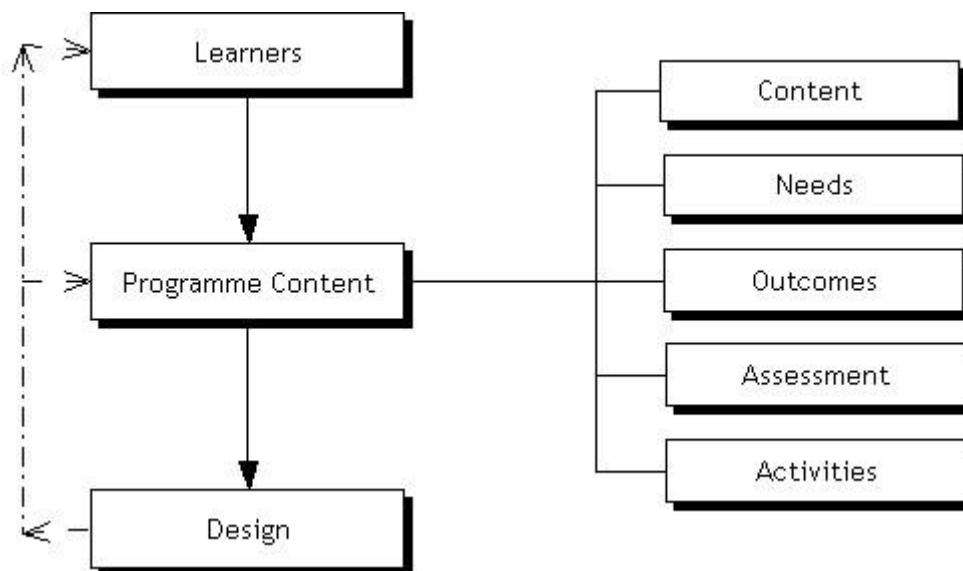


Figure 4.5. The relationship between programme content and learners (Lewis & Whitlock, 2003, p. 6).

The designer should, based on the analysis of needs, objectives, activities, and proposed assessment make a decision regarding the programme content to be included. The decision of content will also, to a large extent, be influenced by the context within which the learning will take place. Apart from the context, the content must be relevant to the learners needs. These needs can be ascertained in a variety of ways, amongst which is observation of the intended learners, for example, in the workplace. An analysis of needs will also assist in determining the outcomes of the

programme. These outcomes should be stated in behavioural terms (Lewis & Whitlock, 2003).

Activities provide the methods through which the learners will learn. These activities will depend on the type of learning involved and how this learning will be assessed.

Even though the development of the training programme is in its initial phases, it is already important to consider assessment methods. Two types of assessment can be considered:

Formative assessment, which is ongoing and assist the learner in acquiring the requisite knowledge and skills.

Summative assessment, which indicates to the learner whether he or she has successfully completed the learning programme and attained the learning outcome.

Finally, the designer should ensure that the following questions are answered:

How will the assessment be done?

What will be assessed?

When will assessment take place?

Who will be responsible for assessment?

What issues should be considered, for example, plagiarism (Lewis & Whitlock, 2003)?

4.3.3.3 Design

By the time the design stage is reached, the programme designer should be clear on whom the programme is aimed at, what needs will be met, what should be learnt, and how learning will be assessed. The design stage will consider how the programme will be managed, specifically (Lewis & Whitlock, 2003, p. 11):

4.3.3.3.1 Programme structure and length

Regarding programme structure and length, the designer needs to determine the divisions in the content, the units, modules and sections, as well as variations in the route the learner can take through the material. Further considerations include (Lewis & Whitlock, 2003, p. 12):

Can learners start the programme at any time?

Can learners enter the programme at different starting points?

Will learners be allowed to navigate through the programme via routes of their own choice?

Will the learning process be paced?

4.3.3.3.2 Sequencing of content and activities

With the initial decisions regarding programme content settled, the sequence through which the different topics will be presented needs to be determined, as well as whether any topics will stand on their own. Sequencing can be done chronologically or via topic interdependency, or by placing more interesting topics first, thereby increasing motivation to learn, or by level of difficulty (placing easier topics first). Alternative pathways through the learning content should now also be considered in order to accommodate learner differences or learning difficulties (Lewis & Whitlock, 2003).

4.3.3.3.3 Resources and constraints

Certain limitations will always be imposed on the designer. He or she should determine the best way in which it would be possible to work within the constraints of time, people, learning materials, equipment, budget, expertise, and other facilities. To be able to do this, the designer will have to conduct an analysis of resources and constraints and decide how to bridge any gaps that may exist. In terms of Web-based learning, technological constraints should receive special emphasis. The following aspects need clarification (Lewis & Whitlock, 2003, p. 14):

How will the content be integrated into the Web?

What facilities would the learners need?

How will the facilities integrate with existing facilities, such as email?

How many people will be needed to support the system?

What ongoing support will be provided?

4.3.3.3.4 Delivery of the programme

The way in which the learning programme will reach the learner, should also be considered. Two aspects are important, namely the learning material itself and additional support, such as a helpline. In terms of delivering the learning material, it is important to determine how the learner's interaction with the material can be facilitated and whether additional delivery methods, apart from electronic media,

should be considered. In terms of support, any learning programme should provide additional resources, apart from the learning content, to the user. This could include an orientation section, feedback facilities, technical help, etc (Lewis & Whitlock, 2003).

4.3.3.4 Development

Once the designer has decided how the learners needs will be met, consideration should be given to the development of three interrelated factors, namely learning materials, support, and management. Specifically, learning materials should be considered in terms of already existing content and its efficacy, content that still needs to be developed, monitoring of effectiveness of learning material, and updating material. In terms of support, the designer should decide what additional requirements learners might have. Aspects such as an induction to the programme, tutors and their skills, and monitoring of support, should receive attention. Lastly, the responsibility for the management of the programme should be decided, along with decisions regarding the choice of management staff (Lewis & Whitlock, 2003).

4.3.3.5 Pilot

With the decisions pertaining to development settled and the necessary materials and resources available, the programme, or part of it, should be offered to a small group of learners. This pilot run should provide the developer with an opportunity to test the various elements of the programme and receive feedback from the learners. Based on the feedback received, alterations and refinements can be done (Lewis & Whitlock, 2003).

4.3.3.6 Run

With all modifications completed, the programme can be implemented on a full-scale level. At this stage, monitoring the programme, ensuring quality standards, and future programme modification become important. In terms of monitoring, the following should receive attention (Lewis & Whitlock, 2003, p. 26):

- Identification of critical activities

- Setting standards for critical activities

- Identifying information which could indicate whether standards are being met

- Analysing data received

Quality assurance, apart from the monitoring activities indicated above, should also be set in place. Criteria determining quality satisfaction should therefore be determined and monitored throughout the run of the programme (Lewis & Whitlock, 2003).

4.3.4 Passerini and Granger's Hybrid Design Model

In order to consolidate existing models, Passerini and Granger (2000) suggested a hybrid design model (See *Figure 4.6*) encompassing characteristics of both objectivist and constructivist approaches, thus forming a structured waterfall systems development life-cycle model. This model follows the objectivist step-by-step approach (traditionally considered more suitable to technology-supported instruction) with a constructivist viewpoint (considered more suitable for the flexibility that the Internet allows) and consists of five main phases, namely:

1. Analysis
2. Design
3. Development
4. Evaluation
5. Delivery

Open navigation and learning objective re-adjustments, based on learners choices, form the core of the hybrid model and are implemented via a feedback loop generated through formative evaluation that exists throughout the development process.

During the analysis phase the designer takes into consideration the target population, while considering the content that should be developed. This phase requires that learners cognitive, social, physical, and personal characteristics be considered, as well as learning objectives (Passerini & Granger, 2000).

The design phase requires that the designer delineates the preferred strategy for the development of instructional content. This phase includes a decision regarding the learning model that will be utilised, as well as how this model should be implemented in an asynchronous learning environment. Once a learning model has been decided on, a storyboarding technique should be used to design the hypermedia approach.

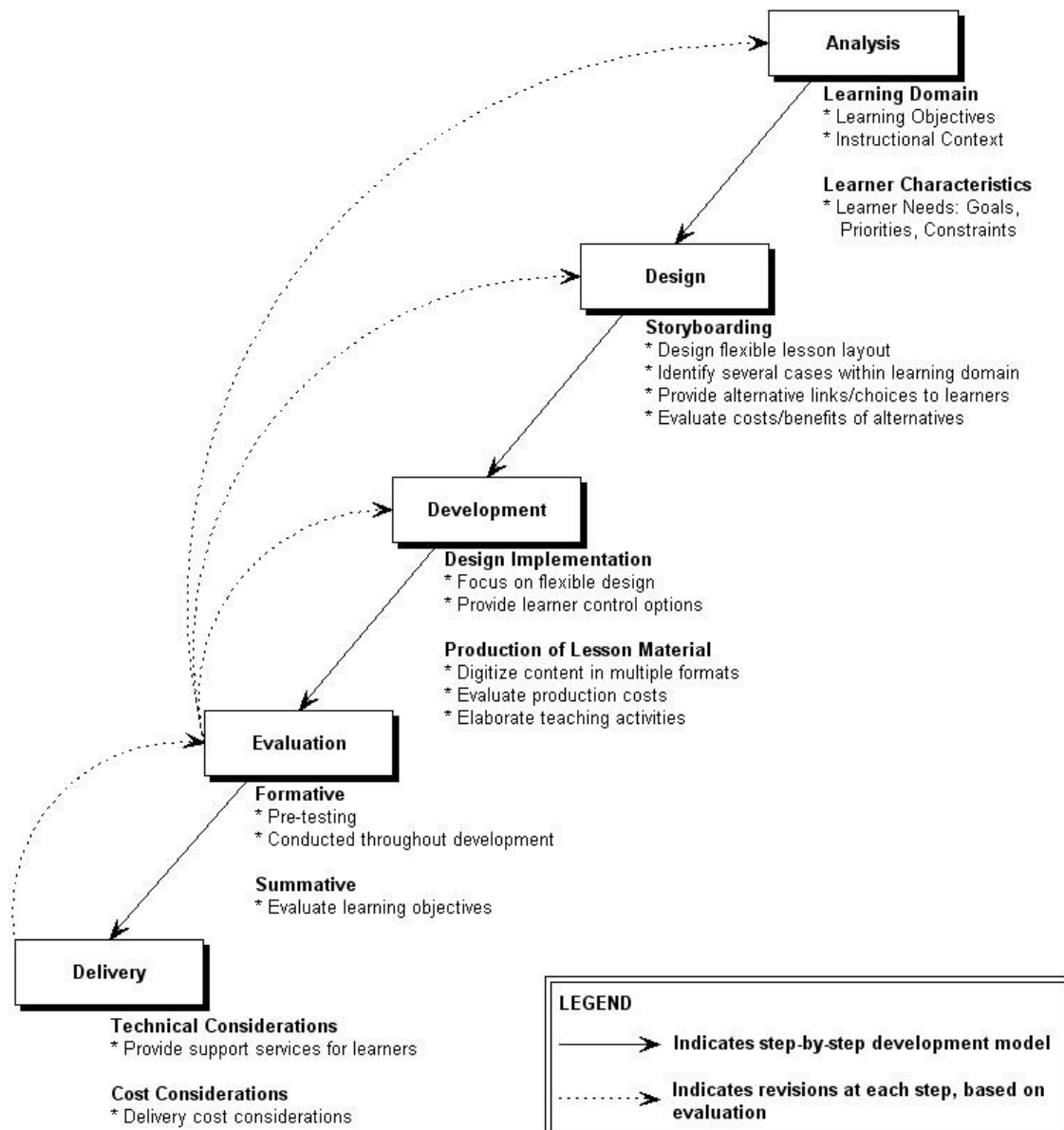


Figure 4.6. Hybrid Design Model (Passerini & Granger, 2000, 9).

All the elements and links will therefore be flowcharted, thereby allowing flexibility in lesson layout. Included during the design process is due regard for the design guidelines which will advance learning within an online environment. The designer's objective should be to enhance coherence and reduce cognitive load.

The development phase follows once the storyboarding process has been completed and involves the generation of lesson plans and materials. This phase therefore involves the development of all digital materials, as well as their integration into an

application that can be delivered via the online environment (Passerini & Granger, 2000).

Once the development phase has been completed, the evaluation phase will involve a product review with formative and summative evaluation. The formative evaluation process occurs throughout development and should be used to improve the product before delivery. Summative evaluation will occur after the final version of the product is implemented and should be used to assess the overall effectiveness of the product. Both types of evaluation should include assessment of the following:

- Navigation
- Screen design
- Information presentation
- Media integration
- Overall functionality

The final phase of the hybrid model refers to the delivery of the instruction. Effective delivery will require that learners understanding is promoted and objectives are mastered (Passerini & Granger, 2000).

The Hybrid Design Model clearly incorporates the most crucial elements from other models of Web-based learning. It does, however, present a more functional model, conducive to development of especially interventions, due to its emphasis on revisions during each step.

4.3.5 Commentary

The various models presented in this section mainly indicate a complete development process from initiating the request for Web-based learning content through to the deployment or delivery of that content. They all tend to follow the sequence of analysis, design, development, evaluation, and delivery. In terms of the steps involved in each of the broad stages, there also appear to be some similarities. Most indicate an analysis of needs and user characteristics, identification of objectives, selecting an instructional strategy, and both summative and formative evaluation steps.

In a similar fashion, the models differ in certain aspects regarding the requirements indicated for each stage. The different models differ, for example, in terms of the emphasis they place on the various factors to be taken into consideration. A crucial weakness of these models, in this writer's opinion, is the absence or low level of interrelatedness indicated between the various stages. These models also do not appear to allow re-evaluation of previous stages to take place as a matter of course – such a procedure appears to be regarded as an exceptional course of action to take. This perspective creates the impression that stages, once completed, are, to a large extent, set in stone, with only small refinements allowed. An exception is Passerini and Granger's (2000) Hybrid Design Model which, through its so-called waterfall structure allows for development to occur continuously in both a forward and backward direction, based on evaluation.

An important factor that could influence achievement of learning in an online environment is that of user characteristics. Although many of the models indicate the importance of user characteristics, none indicate how, or to what extent, these characteristics will influence the learning process. With the exception of Passerini and Granger's (2000) Hybrid Model, none adequately emphasise the continuous need for revision that should form part of an instructional design process. There is a clear absence of reported research findings which could support each model. Although the authors of some of the models claim to have developed them from practical experience, it might not constitute an adequate assessment of their efficacy. In the case of Passerini and Granger's (2000) Hybrid Model, no research validation has been undertaken, although the authors did request that such an undertaking be embarked upon.

4.4 User Characteristics and the Online Environment

The importance of user characteristics in terms of Web-based learning has been mentioned above. In the subsections that follow some of the more poignant of these characteristics are discussed and considered. To provide a context for these variables, the discussion will commence with a theory of information processing and how the mind develops and represents knowledge.

4.4.1 Information Processing and Representation of Knowledge in the Mind

Piaget originally provided a comprehensive theory of the development of thought through the different life stages. He did not, however, focus enough on the

processing aspects of cognition and how self-regulation occurs. Neo-Piagetian models were developed to address these shortcomings but were still inadequate in their description of how self-understanding leads to self-regulation. Demetriou (1999) attempted to provide a theory that would be more comprehensive.

Demetriou's (1999) theory stated that the mind is an open system and this system's functioning is subject to the following:

The **principle of domain specificity**, which refers to the fact that the mind and the environment are attuned to one another in terms of structural and functional attributes. The mind therefore has domain-specific systems capable of representing and processing domains in the environment. These systems are known as Specialised Capacity Spheres (SCSs).

The **principle of procedural specificity**, which specifies that the different SCSs will represent different kinds of information. Thus, each domain-specific system possesses the operations and processes necessary to deal with the kind of information it represents.

The **principle of symbolic bias** refers to the fact that each domain-specific system will be biased towards the symbolic systems which will allow it to represent its kind of information best.

The **principle of self-mapping**, which indicates the difference between human and machine or animal. While computers and animals could possess the first three principles of functioning, only humans have minds and are therefore capable of self-mapping. The principle of self-mapping reminds of Descartes' "I think, therefore I am", as it implies that mind can only exist if a person is capable of "knowing" his or her cognitive experiences. This principle further implies that humans constantly create and update maps and models of their own mental functions (Demetriou, 1999). It is this last aspect that is especially important in learning which requires that a person either create a new model of knowledge or adapt an existing one. This aspect is discussed in more detail in the next subsection when the role of rich media in learning is considered.

Demetriou's (1999) theory is mostly concerned with the development of thinking but the discussion here will rather focus on his approach to the processing of information. The processing system is hypothesised to receive input from the environment, including skills and processes and this input is relevant to a specific SCS. A working

hyper-cognition system manages the processing system and is involved in self-directed processes and processes directed at other minds. The processing system functions along three dimensions:

Speed of processing, which refers to the minimum speed with which a certain mental act may be executed efficiently. Memory traces tend to decay and therefore mental processes must be completed before these traces drop below a certain threshold.

Control of processing refers to a filter mechanism which permits only goal-relevant information to be processed. Such a mechanism is important because it regulates, rejects, or postpones information according to the processing speed system. An efficient control mechanism will ensure that interconnections are made timeously.

Storage refers to the maximum amount of schemes the person can keep active for the time necessary to interpret their meaning or relationships in terms of a goal.

Demetriou's (1999) theory is plausible and concurs with many similar theories proposed by Neo-Piagetians (See, for example, the Cognitive Complexity Learning Model of Tennyson & Breuer, 1997). According to Demetriou (1999) it has also been supported by empirical validation.

With an understanding of cognitive processing of information, an overview of the process of learning as it is hypothesized to occur within a rich-media environment, such as the Internet, is provided next. The discussion will specifically focus on the way information is represented in the mind and how initial presentation of information influences its subsequent representation.

4.4.2 Learning through Rich Media

"... new information technologies are new means with the potential to fulfil totally new instructional functions." See I & Winn, 1997, p. 320

Human learning can be regarded as an active process of knowledge construction. This process is dependent on how the learner manages and organises available information resources. It is here that information already stored in memory plays an important role, along with information presented from external sources. In the latter regard, media is important because learners are sensitive to the characteristics of the

environment, for example, whether specific information is available at a specific moment, how long the information is available, how the information is presented, and how easily the information can be searched (Seel & Winn, 1997).

During the extraction of information from external sources, the learner must internalise both the content and the modality of the mediated information. It is in this regard that the effects of the interaction between individual and medium come under consideration because this interaction influences mental representations and cognitive processes (Seel & Winn, 1997).

To understand how the interaction between learner and medium can influence learning it is important to realise the importance of symbol systems and processing capabilities. To learn or mediate knowledge the learner must make use of signs. These signs are used to represent, mediate, and acquire knowledge. Knowledge is, however, not only represented but also processed, as, for example, described by Demetriou (1999) and therefore cognitive processes need also be considered in the interaction between learner and mediated information (Seel & Winn, 1997).

Seel and Winn (1997) emphasised that the evolution of human culture was strongly influenced by the ability to use signs to represent real and imagined objects. The authors take the position that thinking and communication can only occur when objects of thought can be represented by signs. Thus, instruction, too, is dependent on signs due to its communicative nature.

The use of signs involves a mental system with three processes, namely a selection, an assertion, and communication. Thus, a sign is selected because it is accessible and relevant, then it is confirmed to be representative of an object, and finally it is used within a specific context. Learning takes place through the manipulation of signs presented to the learner within a specific medium. Through this process these signs become internalised and “tools for thought”. This process of internalisation was described by Vygotsky (1986) as the process of transformation of external actions, symbolic tools, and social relations into internal psychological functions. The tools for thought will influence the way people interact with their environment and this shaping of the external environment will influence the shape their internal environment will take (Esnault & Zeiliger, 2000; Sternberg, 2003).

When considering learning through a rich medium, such as the Internet, perceptual processes need to be considered because any sign is perceptible by the human senses. Perceptual processes impose a structure on any collection of signs and thereby influence the interpretation of these signs. It is also important to bear in mind that perceptual processes are pre-attentive and are considered to operate rapidly in parallel (Willingham, 2004). These characteristics make them impossible to manipulate wilfully (Seel & Winn, 1997).

The interpretation of sensations requires the meaningful association with what is already known and understood. Yet, because perceptual processes impose structure to precepts, the learner will be predisposed to interpret messages in a particular manner. For example, a particular pattern of light and sound will predispose a person to make a certain, unique interpretation rather than another (Seel & Winn, 1997).

Learning can only truly take place if the learner can assimilate new information with already existing knowledge. Thus, signs presented through media must facilitate the perceptual organisation of new information and also the identification of relevant existing knowledge with which the new information can interact (Seel & Winn, 1997).

The learning environment and the way in which media is integrated into the environment could influence how the learner learns and thinks. To understand this issue better, it is necessary to focus on three categories of media conceptions. Firstly, media can be described in terms of the **mode of appearance**. This feature involves technical devices and physical conditions, such as videos and electromagnetic fields which can carry light waves, respectively. Secondly, media can be conceptualised in terms of **biological organs and code-related aspects**. This notion refers to the role of information processing, which includes various cognitive and psychological aspects, and the use of signs to think or communicate. The last conception refers to media in terms of **culture-related and sociological aspects**. Here, the focus is on the intention (genre) of the message and the context within which the message is provided, for example, an instructional context (Seel & Winn, 1997).

An important aspect to bear in mind is that the use of the Internet is typically associated with the technical aspects, such as computers, of media. Although technical equipment forms an important part of a medium, it is not the only characterising aspect. In fact, the medium can only carry information and therefore can only have an indirect influence on learning. Yet, media, irrespective of content,

can still affect cognitive processes and the interpretation of the message (Mayer, 2003). Thus, for example, attributes of colour, animation, and sound can influence learning of geometric symbols by acting as cues which attract learners selective attention (Seel & Winn, 1997).

In summary, therefore, rich media can mediate the way content is learned and can be manipulated by the designer in such a way that the perceptual organisation of the content allows learners to construct reality through their view and manipulation of the content. The designer of Web-based interventions should, therefore, consider information processing factors and perceptual processes of learners when developing the intervention content.

The abovementioned factors are, however, not the only aspects to be taken into consideration regarding possible users of a Web-based intervention. A variety of characteristics have tentatively been associated with successful learning experiences in an online environment and these are briefly discussed in the subsection that follows.

4.4.3 General Learner Characteristics

Users will respond differently to the stimuli presented during Web-based learning. The easier users find it to learn, the fewer demands they will make (Lewis & Whitlock, 2003). Typical characteristics to be taken into consideration include the following (Clarke, 2001):

- Age
- Computer literacy
- Previous experience of computer-based learning
- Education experience
- Learning skills
- Gender
- Physical characteristics
- Reading age
- Knowledge of the topic
- First language

Although Clarke (2001) listed the abovementioned aspects, he did not explain their relevance. Some are self-explanatory, while others require an understanding of the

Web-based environment. It is to be assumed that users of a very young or advanced age might find a Web-based environment daunting and will have limited computer literacy and experience. However, Muse (2003) found that older people are more likely to complete a Web-based course, presumably because of higher levels of self-discipline and regulation.

Previous exposure to education is a prerequisite, along with reading age to be able to utilise the visual and verbal components of the World Wide Web effectively. The designer will have to consider the length of modules, style and level of language used, based on the expected educational background of the users (Lewis & Whitlock, 2003). The impact of these issues on psychological functioning is discussed later in further detail when the design of the intervention content is considered.

Learning skills refer to a broad topic that will be discussed in a later subsection (*See 4.4.4 Learner Types and Learning Styles*). In terms of gender differences, Clarke (2001) mentioned that men are more likely than women to be colour-blind and would therefore find colour-changes in a Web-based environment of little informative use. It is also commonly assumed that more men than women utilise the Internet.

Physical characteristics come into play when aspects such as dexterity are considered. Dexterity is, for example, necessary for the adequate use of input devices, such as a keyboard or computer mouse (Lewis & Whitlock, 2003). **Knowledge of the topic** can be addressed through design considerations but simultaneously the learning content should be provided in a language comprehended by the user.

Characteristics, not mentioned by Clarke (2001), were highlighted by Lewis and Whitlock (2003) and supported by Seale and Cann (2000):

- Likely confidence in learning new things
- Learning methods with which users are already familiar
- Likely attitude towards computer-based learning
- Motives for learning
- Occupation
- Cultural background- and attitudes
- Interests

Likely confidence in learning new things is assumed to make learning within an online environment more amenable to learners but, simultaneously, even online learning should be presented in a ways that are familiar to learners. Factors such as **likely attitude towards computer-based learning** relate to computer self-efficacy (Muse, 2003). Learners, especially adults, who are internally motivated to study, appear to succeed more in online courses. White-collar workers are frequently more computer literate and therefore more successful in an online learning environment. **Positive attitudes towards computer and online learning** are further regarded as contributors to success within such an environment and an interest, both in the Internet, as well as in the subject material, also enhances learning.

A study by Muse (2003) appears to confirm Clarke's (2001) characteristics. Muse (2003) found that the most important mediating factors predicting success in Web-based learning were the following:

- Computer skills and confidence

- Study environment, with home-based online access leading to more success

- Internet skills

- Age, with older people being more successful

A study conducted by Chin (1999) confirmed the abovementioned characteristics but also adds that a feeling of isolation and a lack of support and feedback lead to early dropout in online learners. It is interesting to note that learners in Chin's (1999) survey did not feel that Web-based learning should replace traditional classroom teaching. This attitude might have changed in the six years since Chin's (1999) study, especially as the Internet has increased in popularity and everyday use.

The lack of any logically ordered list of characteristics that could mediate the experience of Web-based learning, has prompted researchers, such as Martinez (2000; 2001) to attempt a categorisation of users and their associated learning styles.

4.4.4 Learner Types and Learning Styles

Martinez (2000; 2001) pointed out that Web-based learning environments should differ depending on the type of user or learner that will be utilising it. She distinguishes between three types of users, namely **transforming**, **performing**, and **conforming** learners. For each of these types of learners Martinez suggested a different learning environment (*See Table 4.1 below*).

Learning Issues	Transforming Learners (Transformance)	Performing Learners (Performance)	Conforming Learners (Conformance)
General Relationship	Prefer loosely structured, mentoring relationships which can promote challenging goals, discovery, and self-managed learning.	Prefer semi-complex, semi-structured, coaching relationships which can increase personal value and lead to creative interaction.	Prefer safe, structured, guiding relationships which can help to avoid mistakes and lead to easy learning goals.
Goal-Setting and Standards	They set and achieve personal short- and long-term goals that may exceed goals set by others; they maximize effort to reach personal goals.	They set and achieve short-term, task-oriented goals that meet average-to-high standards; they minimize efforts and standards to reach assigned standards.	They try to achieve simple, task-oriented goals assigned by others; try to please and conform; maximize efforts in supportive relationships with safe standards.
Learner Autonomy and Responsibility	They are self-motivated to assume learning responsibility and self-direct goals, learning, progress, and outcomes. Frustrated if restricted or given little learning autonomy.	They are situationally self-motivated to assume learning responsibility in areas of interest. Willingly give up control in areas of less interest.	They are cautiously motivated, prefer less responsibility and self-directed learning, like to be more compliant, and are ready to follow others.
Knowledge Building	They commit great effort to discover, elaborate, and build new knowledge and meaning.	They selectively commit effort to assimilate and use relevant knowledge and meaning.	They commit careful effort to reproduce knowledge to meet external requirements.
Problem Solving	They prefer case studies and complex, whole-to-part, problem-solving opportunities.	They prefer competitive part-to-whole problem solving.	They prefer scaffolded support for simple problem solving.
User Interface	Open learning interface to facilitate high stimulation and processing capacity	Hands-on learning interface to facilitate medium stimulation and processing capacity	Consistent and simple interface to facilitate minimal stimulation and processing capacity
Adapted Presentation	Occasional mentoring and interaction for achieving goals.	Continual coaching and interaction for achieving goals.	Continual guidance and reinforcement for achieving short-term goals.
Strategies to Achieve Objectives	Enable high-standard, strategic goal-setting and planning, support realistic personal goals, and ensure putting theory into practice.	Foster personal value (intrinsic benefits) and holistic thinking, and offer hands-on, practical support to encourage planning and effort into continual improvements.	Provide time and comprehensive, structured support for adapting training and transitioning skills for improved performance.
Feedback	Inferential feedback.	Concise feedback.	Explicit feedback.
Motivational Feedback	Discovery.	Guided discovery.	Reflective.
Learning Module Size	Concise picture, with links to more detail if necessary.	Medium, brief overview with focus on practical application.	Longer, detailed guidance, in steps.
Information Need	Holistic, specific information needed to solve a problem	General interests, practice, short-term focus	Guidance to fill a requirement
Content Structuring	Prefer freedom to construct own content structure.	Prefer a general instruction, limited ability to reorganize.	Prefer to let others decide content structure.

Sequencing Methods	Hypertext, adaptive, multiple access. Avoid step-by-step instruction.	Semi-linear, logical branching, access by subtopic. Limit exploration.	Linear, general access. Avoid learner control and exploration.
Inquiry	Ask probing, in-depth questions about content.	Ask questions to complete assignments.	Ask mechanistic questions about assignments.

Table 4.1. Strategies and guidelines for three learning orientations (adapted from Martinez, 2001, 7).

The approach suggested by Martinez (2000; 2001) is not considered a feasible approach for the designer of Web-based interventions. The Internet is accessed by people from all over the world, while the delineation suggested by Martinez (2000; 2001) appears to be biased towards Western users. An attempt to classify them into three, albeit broad, groups would appear to indicate that all users can be accommodated in three ways in the Web-based environment. The Web-based learning environment has the capability to accommodate users in a variety of ways and this type of technology should be utilised optimally, especially as it is doubtful that all Internet learners can be neatly classified into one of only three groups. Martinez's (2000; 2001) approach also lacks empirical validation and has received little mention in the literature since its publication.

This author would rather suggest that designers consider a variety of aspects, proven to be related to learning and/or the Web-based environment. If possible, the designers should focus on the population that they are specifically targeting. Some of these aspects are discussed below.

4.4.5 Attitudes

Attitude change can be regarded as a frequent goal of intervention approaches. The role of attitudes should therefore be considered carefully and its importance appreciated by the designer. This aspect has already been mentioned by Nadler and Nadler (1994) in their Critical Events Model but will receive detailed attention here.

Simonson (1995) stated that attitudes are predispositions to respond and therefore they have the potential to influence learning. He noted that attitudes have long been considered important in the educational field because they are considered an important part of effective instruction. Attitudes allow people to organise or direct their behaviour and they influence the way in which situations are perceived. Typically,

attitudes are described in terms of three aspects, namely **direction** (positive or negative), **degree** (amount of positivity or negativity), and **intensity** (amount of commitment with which a certain position is held). Attitude position can further be described in terms of four components, namely **affective responses**, **cognition**, **behaviours**, and **intentions**. Together these components form an attitude system (Simonson, 1995).

Instruction is typically aimed at cognitive goals and attitude change. Although no conclusive evidence indicates a relationship between a positive attitude and achievement, attitudes appear to play a mediating role in the impact that instruction has. The role of attitudes in learning is also considered in other regards. It is, for example, agreed that learners will accept knowledge if their attitude toward that knowledge is positive. Attitude change is not always desirable and therefore an understanding of factors that could influence attitudes is important.

Simonson (1995) pointed to a number of guidelines which the designer of instructional technology should follow to promote attitude formation or change:

- Attitude change is likely when learners react favourably to instructional technologies where messages are authentic, relevant, and stimulating

- Learners react favourably in situations where discovery of useful new information is likely

- A positive reaction occurs when messages are encountered in authentic and credible situations

- Learners who are involved in the planning, production or delivery of instruction react positively

- A learning situation where open criticism is welcomed brings about a positive response from learners

- Learners who experience emotional involvement during instruction are likely to change their attitudes in the direction indicated in the learning situation

4.4.6 Adaptation Styles

Lee (2001) indicated that learners need to utilise different learning styles, according to their adaptation processes, in order to learn within a new instructional environment, such as the World Wide Web. It has been found that different learning styles could influence successful learning. To explain this phenomenon researchers (Lee, 2001)

have concluded that learners change their perceptions within a new learning environment and this leads to a change in learning style.

Lee (2001) stated that the adaptation process required for learners within the Web environment is directly influenced by their perceptions and these perceptions, in turn, are a result of the interaction between the learners personal characteristics and the learning context. Personal characteristics are, for example, motives, self-esteem, and past experiences. Factors within the learning are, for example, facilities and learning culture. Diagrammatically the learning process within a new learning environment can be illustrated as in Figure 4.7.

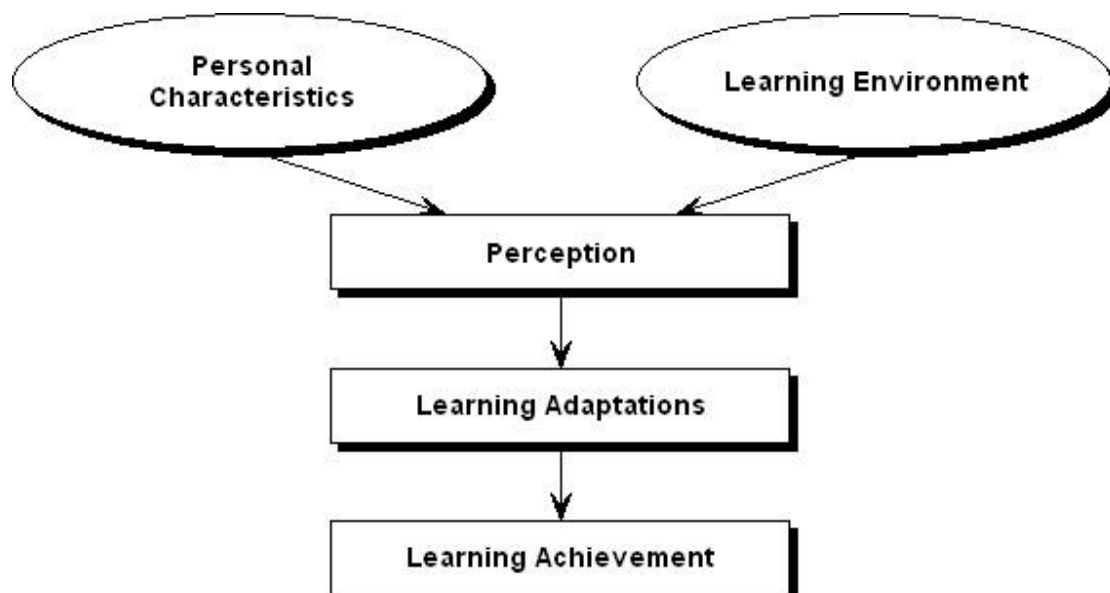


Figure 4.7. Learning adaptation process in a new learning environment (Lee, 2001, p. 4).

4.4.7 Cognition

Hess (1999) focused a discussion on cognitive factors of learners on aspects such as information seeking, processing, communication, and retrieval. Hess (1999) emphasised that learners engage in a process of information construction in order to formulate meaning. During this process, thoughts, emotions, and actions influence the construction of meaning.

The **Anomalous State of Knowledge** (ASK) hypothesis explains the process of knowledge construction as beginning with a learner's search for information due to

his or her experience of a problem. An information need is then defined as the gap between the learner's knowledge about the problem and what he or she needs to know in order to solve the problem. An important aspect here is the fact that the user's knowledge is dynamic and will change during the search for information process.

Cognitive style refers to the form of cognitive activity and can be distinguished from learning style, which also includes affective and physiological styles. Cognitive style is typically regarded as a personality dimension, which has an influence on attitudes, values, and social interaction. It is relevant for the way in which a person processes information and the most well-known division of cognitive style is that of field dependency (FD) and field independency (FI) (Larsen & Buss, 2002; Triantafillou, Pomportsis & Demetriadis, 2003).

Although most learners fall on a continuum between field dependent and independent, certain cognitive processing differences do emerge, depending on the style towards which they lean. Field independent learners tend to be more autonomous in terms of development of cognitive restructuring skills and less autonomous regarding development of interpersonal skills. The opposite is true for field dependent people. Whereas field independent learners approach their environment in an analytical manner, field dependent learners are more global in their perception of the environment. An important distinction is the fact that field independent learners are usually intrinsically motivated and focused on individualised learning, while field dependent learners are extrinsically motivated and prefer cooperative learning activities (Triantafillou, et al, 2003). Larsen and Buss (2002) also pointed out that field-independent learners tend to benefit more from hypermedia-based instruction systems than field-dependent learners. Further differences in terms of learning emerge between field dependent and independent learners. These differences are summarised in Table 4.2.

Field independent learners	Field dependent learners
Serialistic thinkers	Holistic thinkers
Use internal cues to help solve problems	Require external help
Develop self-defined goals and reinforcements	Require externally defined goals

Table 4.2. Learning differences between field dependent and field independent learners.

An important consideration for the designer of Web-based interventions is the fact that field dependent users will require that the programme itself take control of the process, whereas field independent learners prefer to take control themselves. Field dependent learners will, furthermore, find it difficult to impose a meaningful structure on a field which lacks clear structure and will experience difficulty with conceptual learning when cues are absent. Field independent learners, on the other hand, would prefer to impose their own structure rather than accept the structure presented by the programme (Triantafillou, et al, 2003).

Field dependence and independence can be addressed within an online learning situation by initially assessing learners tendencies towards one or the other cognitive style and then directing them along a suitable navigational structure. Alternatively, additional help, such as navigational aids and supplemental instructions can be made available for field dependent learners but in such a manner that it remains the learner's choice whether he or she would like to access such aids.

4.4.8 Learner Expectations

Lewis and Whitlock (2003) pointed out that learners expectation of a programme should be considered by the designer. These expectations will be based on previous experiences of training, education, and interventions and would typically be based on traditional settings, such as a classroom. It is clear, therefore, that the transition to an online environment might be experienced as daunting. Furthermore, individuals from different cultures might have different expectations of the learning environment and what their role should be (Horton, 2000).

To address the issues that such learners or users will bring to an online intervention, the designer should ensure that he or she fully understands these expectations and can provide adequate measures for them. For example, the fear of information overload needs to be addressed and countered during the design of the intervention programme itself.

4.5 Summary

A variety of models of learning has been developed to explain the process of learning. No consensus has yet been reached regarding the relative utility of these different models, yet a number of instructional design models have been developed based on these models of learning. These models of instructional design appear to have a

similar broad approach, although each subsequent model attempts to address the shortcomings of the previous one. Models of Web-based design have been developed from these models of instructional design and, again, at present none seem to be the model of choice among designers.

A large number of Web-based courses are designed on a daily basis and apparently without any specific guiding principles being applied or user characteristics considered. This might be due to the fact that the development of Web-based courses requires an interdisciplinary team, including instructors, designers, and programmers, none of which might wish to impose a specific paradigm on the development process. Judging by the swift emergence of a number of models of Web-based learning design, the need for a model to provide guidelines during this development process might be considered important. A model can provide checkpoints during the development process and would help to avoid common omissions, mistakes, and pitfalls.

In Chapter 5 an attempt will be made to formulate an integrated model of Web-based intervention design by utilizing the models of Thomas and Rothman (1994), Nadler (1989), as well as Passerini and Granger's Hybrid Design Model (2000). As there are still shortcomings with the latter model, certain functional aspects will be borrowed from the other models discussed in this chapter.

Chapter 5 - An Integrated Developmental Model for Web-based Intervention Design

“... self-help psychoeducational resources, including career decision making, parent skills training, and conflict resolution, could be effectively provided using the Internet.” Sampson, Kolodinsky & Greeno, in Childress & Asamen, 1998, p. 23

5.1 Introduction

The discussion in Chapters 2 to 4 focused on the foundation to be used for the development of an integrated developmental research approach to Web-based intervention design, which is the aim of this study. To this end, Chapter 2 provided an in-depth study of the intervention design strategy developed by Thomas and Rothman (1994) and Thomas (1984; 1994). Chapter 3 focused on representative models of instructional design and concluded with a detailed description of the Critical Events Model (CEM), initially developed by Nadler (1989) and primarily used within an organisational context. Chapter 4 provided an overview of models of Web-based learning and rationalised the choice of Passerini and Granger's (2000) Hybrid Model for inclusion in the foundation of the integrated model proposed in this chapter.

5.2 An Integrated Developmental Model for Web-based Intervention Design

This study will approach the design of a model by integrating the seven phases of the Thomas and Rothman (1994) model of intervention research, elements from Nadler and Nadler's (1994) Critical Events Model, as well as the five phases of Passerini and Granger's (2000) hybrid design model. As will be discussed in Chapter 6, the steps from the resulting developmental model will be followed in order to design a simplified online psychological intervention. By utilising the developmental characteristic of the model, alterations can be made throughout as additional issues emerge. The three models and their proposed interrelationship and integration are indicated in Table 5.1 below. Equivalent or complementary phases appear on the same row.

As is clear from Table 5.1, the developmental research approach of Thomas and Rothman (1994) can accommodate the phases of both the Critical Events Model, as well as the Hybrid Design Model. To simplify the initial developmental approach,

however, the stages of the Hybrid Design Model, which are very similar to those of Thomas and Rothman (1994), will be used to provide the broad framework into which the stages of the other two models will be integrated if and where appropriate. The outline and initial considerations of this integrated approach are discussed below from the viewpoint of the most explicit model, namely that of Thomas and Rothman (1994).

Developmental Research Approach of Thomas and Rothman (1994) and Thomas (1984; 1994)	Critical Events Model of Nadler and Nadler (1994)	Hybrid Design Model of Passerini and Granger (2000)
Problem analysis and project planning Information gathering and synthesis	Identify the needs of the organisation Specify job performance Identify learner needs Determine objectives	Analysis
Design		Design
Early development and pilot testing	Build curriculum Select instructional strategies Obtain instructional resources	Development
Evaluation and advanced development		Evaluation
Dissemination	Conduct training	Delivery

Table 5.1 Comparison of models.

5.2.1 Problem Analysis and Project Planning and Information Gathering and Synthesis

This phase is characterised, according to Thomas and Rothman (1994), by the identification and analysis of key problems, while also determining the feasibility of the project. They further emphasised the importance of a review of current technology and the setting of a development goal. Nadler and Nadler (1994) followed a similar approach at this stage, except that their focus is on determining whether an organisation has specific needs that require a training program to be developed.

The problem analysis and project planning phase of the Thomas and Rothman (1994) approach can further be equated with three more stages of the Critical Events Model of Nadler and Nadler (1994), namely that of specifying job performance, identification of learner needs, and determination of objectives. When viewed as such this integration between Thomas and Rothman's work and Nader and Nadler's model can

be equated with the Analysis phase used by Passerini and Granger (2000). Their model includes an analysis of the learning domain in terms of learning objectives and instructional context during this stage, as well as a focus on learner characteristics. Thomas and Rothman (1994) were more explicit about the information gathering and synthesis phase, however, by focusing on the identification of possible sources of information, establishing retrieval procedures for this information, as well as gathering and synthesising the information in order to form conclusions.

5.2.2 The Design Phase

For Thomas and Rothman (1994) the design phase involves the identification of design problems and intervention requirements. They also, amongst others, included the formulation of an initial intervention and the initiation of proceduralisation. This stage can be complemented by Nadler and Nadler's (1994) stages of building curriculum, selecting instructional strategies and obtaining instructional resources. In terms of designing for an online environment, Passerini and Granger's (2000) design stage of the hybrid model complements that of Nadler by adding the process of storyboarding and content research. In this regard the focus is on lesson layout, selection of alternatives (similar to Thomas and Rothman's generation and selection of solution alternatives), as well as selection of a learning model and elaboration of teaching activities. The Design stage of the System Dynamics Model (See 3.2.5 *Tennyson's System Dynamics Model to Instructional Systems Development*) also complements this stage and confirms Passerini and Granger's (2000) emphasis on sequencing of instructional material.

5.2.3 Early Development and Pilot-Testing

The early development and testing stage of Thomas and Rothman (1994) is included in Nadler and Nadler's (1994) stages of building curriculum, selecting instructional strategies, and obtaining instructional resources but coincides with, and is complemented by, Passerini and Granger's (2000) stage of development.

During this stage Thomas and Rothman (1994) focused on developing an initial plan for pilot testing and the creation of a limited operational model of the intervention to be implemented. They utilised this stage to identify and address design problems, as well as revise the intervention if necessary. Passerini and Granger (2000) also focused on design implementation and emphasised flexibility of design and the provision of learner control options. Their development stage also includes

digitization of content and further elaboration of teaching activities as part of the production of lesson material.

5.2.4 Advanced Development and Evaluation

Thomas and Rothman's (1994) stage of evaluation and advanced development can also be equated with Nadler and Nadler's (1994) stages of building curriculum, selecting instructional strategies, and obtaining instructional resources, although Nadler and Nadler (1994) included evaluation as a continuous activity throughout the Critical Events Model. Thomas and Rothman (1994) focused during this stage on the planning of evaluation as determined by the degree of development of the intervention. They add the selection of evaluation methods and also emphasise that a pilot and later systematic evaluation should be conducted. Their stage ends with the possible revision of the intervention if necessary.

Passerini and Granger (2000) divided the evaluation phase into two sections, namely a formative evaluation that is conducted throughout the process (similar to Nadler and Nadler's (1994) evaluation and feedback process), as well as a summative evaluation that will evaluate learning objectives in terms of the overall effectiveness of the instruction.

5.2.5 Dissemination

Thomas and Rothman (1994) used this stage to focus on points of dissemination, design and implementation of dissemination procedures, initial testing of the innovation and ultimately large-scale deployment of the intervention. This stage equates well with Nadler and Nadler's (1994) stage of conducting training and Passerini and Granger's (2000) stage of delivery. For Passerini and Granger (2000) the delivery stage included an assessment of the efficacy and efficiency of the delivery of the instruction in terms of students' mastery of objectives.

The integration of this model is summarised in Table 5.2. Note that the stages are named according to the hybrid model of Passerini and Granger (2000).

5.3 Tasks and Implications of the Integrated Developmental Research Approach

This section describes the initial tasks and procedures implied by the proposed integrated developmental research approach as outlined in Table 5.2. As the approach is developmental in nature it can be anticipated that modifications to the tasks can occur (See Figure 5.1) and therefore they are initially stated broadly. As will become clear from the discussion that follows, the stages overlap and are interdependent. Thus, movement through the stages can occur both forward and backward.

Stage	Tasks	Formative evaluation and feedback
Analysis	Identification of a problematic human condition	
	Description of existing interventions/technologies	
	Identification of information and resources	
	Identification of user characteristics	
	Identification of intervention environment variables and constraints	
	Statement of feasibility and ethical compliance	
	Statement of intervention objectives	
Design	Description of design problems and instructional strategy	
	Utilisation of information sources and content research	
	Storyboarding, sequencing and content layout	
Development	Creation of prototype and application of design criteria	
	Field implementation of prototype intervention	
	Conducting pilot testing	
	Pilot testing data analysis	
	Refining of intervention	
Evaluation	Summative evaluation in terms of intervention objectives	
	Evaluation of ethical compliance	
	Advanced refining of intervention	
	Statement regarding intervention objectives and ethical compliance	
Delivery	Technical and cost considerations	
	Preparation for implementation	
	Encouragement of appropriate adaptation	
	Implementation of innovation	

Table 5.2. An Integrated Developmental Model for Web-based Intervention Design.

5.3.1 The Analysis Stage

Initially the Analysis stage consists of seven tasks. The tasks accomplished during the Analysis stage should provide an in-depth understanding of the problem to be addressed and whether an intervention programme would be feasible. The seven tasks of this stage set the foundation for the Design stage and are therefore crucial to the efficacy and comprehensiveness of the intervention under development.

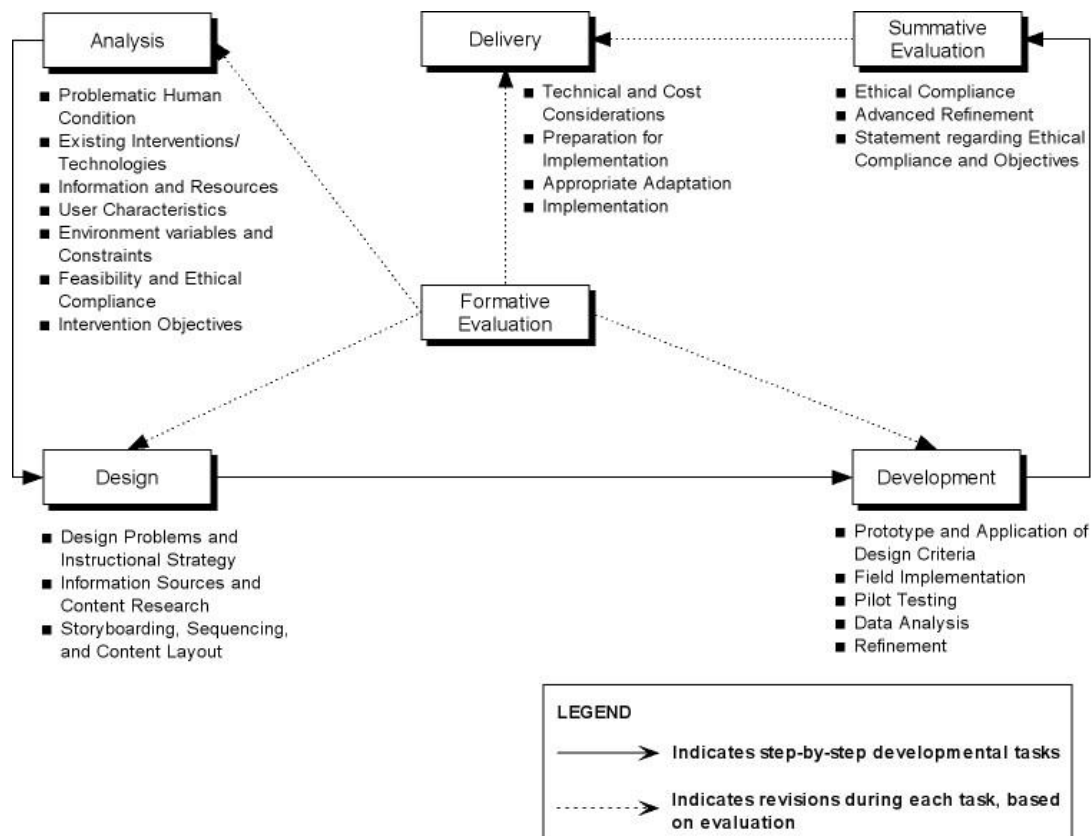


Figure 5.1. Stages and Tasks of the Proposed Integrated Developmental Model for Web-based Intervention Design.

The seven tasks of the analysis phase are:

5.3.1.1 Identification of a problematic human condition

The need for an intervention should not exist without an indication that some problematic human condition exists. In this regard, Thomas and Rothman's (1994) contention that such a problematic condition can exist within any context, is accepted for this model. However, Thomas view that a problematic condition would be indicated if a discrepancy between the acceptable levels and the actual levels of

behaviour exist appears to exclude certain human problems because of its emphasis on norms or standards. For example, an individual suffering from stress or career indecision isn't necessarily deviating from so-called appropriate levels of behaviour. For the purposes of this study problematic human conditions will therefore be regarded in a broader light to encompass any human aspect that creates discomfort for the individual. For example, an individual requiring vocational guidance might be experiencing doubt regarding his or her future career path. Thus, a career guidance intervention would be aimed at alleviating such cognitive discomfort experienced. In this regard Nel and Prinsloo (1999) pointed out that career counselling typically involves problem identification and analysis.

During this phase, the designer should ask the questions set by Thomas (1994) and already mentioned in Chapter 2, namely:

What is the extent or severity of the problem, for example, the prevalence?

What are the component aspects of the problem and how could they be translated into intervention objectives?

What possible causal factors can be identified and what are the implications for treatment?

What are the effects of the problem, for example, in terms of behavioural, social, and economic concomitants?

The answers to these questions should provide the designer with an indication of the scope and severity of the problem.

5.3.1.2 Description of existing interventions or technologies

With an understanding of the scope and severity of the identified problem it is necessary that the designer ascertain to what extent and how the problem has been addressed already. Thus, he or she should determine whether any interventions exist in the field of the identified problem. If such interventions do exist, it is necessary to determine their efficacy and strengths and weaknesses. In this way, the designer can attempt to improve on existing interventions or might even make use of the existing intervention as it is, or adapt it for a new context or user. This is especially relevant in terms of determining whether it is possible to adapt an existing intervention for Web-based delivery.

5.3.1.3 Identification of information and resources

With a description of the problem and an understanding of existing interventions, if any, established, the designer should conduct an in-depth study of the field of the problematic condition. Such an in-depth study will typically involve a literature review, as well as a review of practical situations and examples. From such a review, the designer should gather enough information to be able to address all requirements throughout the intervention development process. Thus, the information reviewed during this stage should guide the remainder of the development process.

5.3.1.4 Identification of user characteristics

"Failure to provide for differences among students is perhaps the greatest single source of inefficiency in education." Skinner, 1968

The identification of user characteristics probably forms the most important consideration of the development process and is therefore not included as part of the information gathering process but rather indicated as a separate step. The designer should consider user characteristics carefully before moving on to the next step. An understanding of user characteristics will enable the designer to approach the development of the Web-based intervention in such a manner that learning is optimised through the design and presentation of the intervention content. It must be remembered that the designer communicates mostly with users via the user interface or what the user views on a computer screen. Thus, presentation of material should maximise efficacy of the intervention. Further design considerations related to user characteristics will be discussed later.

The designer should first of all determine the **target group**. Within a Web-based environment this can be difficult as essentially anyone can participate in an online intervention. Reference to the nature of the identified problem might provide the designer with some indications as to the nature of the user who will be likely to enter the intervention. In other instances, for example, in a closed intervention aimed at a particular context, such as an organisation, the designer might be more successful in determining the target group of users. It is, however, important to note that design for a typical learner might be impossible. Especially, in the Web-based environment the atypical user should also be considered by focusing on a broader range of characteristics.

Three broad groups of characteristics should be considered, regardless of situation, problem, or need (Rothwell & Kazanas, 1998):

Situation-related characteristics

Decision-related characteristics

Learner-related characteristics

Situation-related characteristics emerge from events surrounding the decision to design and deliver instruction. Thus, the designer should attempt to determine the relationship between the user and the problem. It is possible that users displaying the problem have some unique characteristics that need to be discovered and addressed during the intervention (Rothwell & Kazanas, 1998).

Decision-related characteristics relate to the people determining that learners should participate. Thus, the designer should clearly distinguish between participants and those who commit users to partake. The latter will also be able to provide information regarding those users who will participate in the intervention programme (Rothwell & Kazanas, 1998).

Learner-related characteristics emerge from the learners themselves. These characteristics can be divided into two categories, namely prerequisite knowledge, skills and attitudes (already mentioned by Nadler and Nadler (1994)), and other learner-related characteristics. The prerequisite knowledge, skills, and attitudes refer to characteristic abilities or traits that users already possess and will not gain from the intervention, while other characteristics refer to aspects such as demographics, physiological factors, aptitudes, experience, learning styles, attitude formations, value systems, and life cycle or career stage (Rothwell & Kazanas, 1998).

Due to the nature of the Web-based environment, which is mostly visual and to a lesser extent auditory, a large number of additional factors come into play in terms of user-computer interaction and these factors have been the subject of several studies (e.g. Hess, 1999; Kirschner, 2002; Lee, 2001; Martinez, 2001; Muse, 2003; Triantafillou et al, 2003) on Web-based learning which attempted to identify the key characteristics for successful learning (*See 4.3 User Characteristics and the Online Environment for a discussion of these studies*).

A variety of learner characteristics appear to play a role during the process of Web-based learning. The designer of Web-based learning materials should therefore also be aware of these characteristics and the influence they could have on learning retention and learners general experience of the online learning environment. As mentioned before, a number of studies have attempted to identify these characteristics but as yet no conclusive mediating variables have been identified. The designer of a Web-based intervention is, however, urged to consider as many variables as possible, based on the specific context within which he or she is working.

With a proper analysis of the target users of the population completed, the designer of the intervention can consider variables and constraints in the intervention environment that could influence how the intervention should be developed and deployed.

Physical and contextual characteristics	Psychological characteristics
Age	Previous experience of computer-based learning
Gender	Reading age
Physical characteristics	Learning skills and methods
Computer literacy and confidence	Likely confidence in learning new things
Education experience	Motives for learning
First language	Interests
Knowledge of the topic	Learning and adaptation styles
Occupation	Attitudes
Cultural background	Adaptation styles
Study environment	Cognitive styles
Internet skills	Learner expectations

Table 5.3. Summary of user characteristics.

The user characteristics discussed in Chapter 4 appear diverse and should therefore be consolidated into a meaningful framework which can be utilised when user characteristics are analysed during the Analysis phase. It is therefore proposed that these characteristics be categorised according to two dimensions, namely physical and contextual characteristics on the one side, and psychological characteristics on the other. A summary of the above discussion is provided in Table 5.3. It should be

noted that Table 5.3 is not intended to be a comprehensive list of all mediating user characteristics but rather proposed as a guideline along which more characteristics can be analysed.

5.3.1.5 Identification of intervention environment variables and constraints

Online interventions are uniquely different from their traditional counterparts due to the environment within which they function. Due regard for mediating variables within this online environment is therefore of the utmost importance. Mention has previously been made of the unique nature of the Internet and some aspects have been mentioned briefly. The task of identification of intervention environment variables and constraints now requires that an in-depth review of known and foreseen variables be conducted.

As with user characteristics, the nature of the online learning environment has attracted much attention among instructional designers and others. Some researchers contend that user characteristics interact with environmental characteristics in order to determine learning outcomes (Lee, 2001). Studies on environmental characteristics have focused on aspects such as transactional distance (Chen, 2001a; 2001b), navigational analysis (Hall, Balestra & Davis, 2000), content layout (Horton, 2000), and so forth.

Wallace, Jagose and Gunn (2003) cautioned that, although it is frequently promised that the Internet can provide an environment that enhances learning, it has yet to come close to achieving this objective. At this stage it is therefore important to determine which factors of the intervention lie outside the bounds of existing technology or may not be most suitable or beneficial to the user.

For the sake of organisation, the constraints and variables under consideration will be discussed as either related to the virtual space created by the Web-based environment or the technical limitations caused by limitations in technology. The latter will only be dealt with briefly as it is beyond the scope of this study to focus on computer hardware and the hosting of virtual space.

5.3.1.5.1 Virtual constraints

“... a key goal for psychology is doing more thinking and theorizing about how to get people to make better connections between cyberspace and the rest of their lives.” Riva & Galimberti, 2001, p. 1

The unique nature of the Internet has been mentioned previously. When consideration of environmental constraints and limitations come under discussion this uniqueness is especially important. The World Wide Web provides an environment that does not exist in reality but only as a partial virtual representation of reality (Riva & Galimberti, 2001). This representation can be that of a newspaper, a classroom, library, or interventional setting. Due to this difference between real-world representation and virtual representation of reality, the way in which people experience any form of learning in an online environment should be scrutinised carefully before the feasibility of the intervention is decided upon. During the design stage this analysis of virtual constraints will play an important role in the way the intervention is presented to the user.

A number of studies have investigated the nature of navigating and learning on the Internet. Their findings are reported in the subsections that follow.

a. Transactional distance

The concept of transaction was initially conceived by John Dewey and it refers to the interplay between environment, individuals, and patterns of behaviour in a situation. This concept was further developed by Moore (in Chen, 2001a) to describe distance education as consisting of the *“interplay between people who are teachers and learners, in environments that have the special characteristic of being separate from one another, and a consequent set of special teaching and learning behaviours”* (p. 327). In this regard distance is viewed as pedagogical and not geographic. This distance, the transactional distance, consists of understandings and perceptions that could cause the emergence of a psychological gap of possible misunderstandings between teacher and learner. Transactional distance can also exist in face-to-face situations because it occurs within all educational contexts (Chen, 2001a).

It should be clear that the problem of transactional distance is greater when instruction takes place via the Internet, yet transactional distance as a source for misunderstanding can be overcome by planning learning effectively so that interaction occurs frequently.

Chen (2001a) investigated the nature of transactional distance in Web-based learning environments and came to the conclusion that it is multidimensional within this environment, consisting of learner-instructor, learner-learner, learner-content, and learner-interface transactional distance. These dimensions reflect the relationships between instructor and learner, among learners, between learners and course content, and between learners and the online environment.

Chen's (2001a) study found that only two factors were apparently successful in lessening the effect of transactional distance, namely the learners' skill level in using the Internet, and the extent of online interaction. It was suggested by Chen (2001b) that the different dimensions of transactional distance could have an influence on learners' persistence, success, and learning outcomes.

It should be clear from the abovementioned discussion that the designer should take the concept of transactional distance into consideration when analysing how the intervention will function within an online environment. Due regard for this issue should then lead to appropriate measures to be introduced when the intervention is designed.

b. Navigational analysis

The discussion surrounding transactional distance highlighted the importance of interaction within an online environment. Users will interact with the online intervention via navigation through various stages, each containing various types of content. Navigation on the Internet involves the use of hypermedia linking various concepts, stages, or pages. It should be clear that most of the content will involve words and graphical displays.

Given the dependence that users will have on hypermedia navigation, it is important that the designer considers the possibilities and constraints imposed by hypermedia navigation. A typical problem occurs, for example, when users "get lost" during their navigation through a website or, in this case, an online intervention programme. Hall, Balestra and Davis (2000) analysed users' progress using hypermedia and came to a number of conclusions:

The interface or contents page acts as an anchor point to which users prefer to return.

Some users prefer to also use the contents page as a study aid which indicates all the information that needs to be learned.

Contents supplied in list form caused users to only access pages of immediate interest.

Contents supplied as a graphical map also acted as a study aid for integration of material.

Clarke (2001) provided a number of guidelines to be considered when designing for the online environment whereby users will find it easier to navigate through a Web-based programme. These guidelines will be considered during the design and development stages.

c. Usability Issues

As discussed in the previous subsection, the intervention should be designed in such a manner that it facilitates users navigation through the programme. Closely related to navigational analysis is the issue of usability. Squires and Preece (1996) indicated the following factors as important in the design of instructional media:

- User control
- Effective presentation of content
- Good navigation
- Feedback and progress monitoring
- Intuitive and consistent design
- Clear graphical representation
- Incorporation of useful metaphors

The abovementioned issues should be addressed during the design and development of the intervention and will be further discussed at that stage.

5.3.1.5.2 Technical constraints

Technical constraints refer to computer hardware and software and limitations in technology (Horton, 2000). It can be assumed that such limitations will necessarily impose boundaries on the complexity of the intervention to be developed but initial studies have not found technical constraints to have an impact on use of online programmes (Hill & Chidambaram, 2000).

Technology, at this stage, can already make use of adaptive learning systems which are able to analyse users' motivation and navigation through an online programme and adapt the content accordingly (Hanisch & Straßer, 2003). A variety of models have been developed (See Papanikolaou, Grigoriadou, Magoulas & Kornilakis, 2002, amongst others, for an overview) to represent this process but a discussion of adaptability falls outside the scope of this study.

5.3.1.6 Statement of feasibility and ethical compliance

"To thine own self be true... Thou canst not then be false to any man." Hamlet, Act I, Scene III

With due regard to the aforementioned tasks and considerations, this task requires the designer to consider whether the intervention is **feasible** and **ethical**. A statement of feasibility can only be made once full attention has been given to all factors delineated during the previous tasks. Similarly, all factors need to be considered before a statement of ethical compliance can be made.

General considerations for feasibility should include the following:

Can the proposed intervention offer a better solution than existing interventions (if any)?

Can user and environmental constraints sufficiently be overcome during development of the intervention?

Would an online-only intervention be adequate or should it be supported with traditional resources?

Is the intervention amenable to communication via a Web-based environment?

Due to the nature of an intervention ethical dilemmas should also be considered at this stage. The following ethics-related principles derive from traditional intervention design practice. They are, however, still relevant for the online environment and should, in fact, receive additional emphasis due to the unique challenges offered by online intervention design. For example, the online interventionist will probably never meet the participants of his or her intervention in reality. These participants might be spread across the world and from diverse cultures with different language and value systems.

It is especially the possible diverse target group at which an online intervention is aimed that brings about an ethical dilemma. Different cultures have different value

and norm systems and therefore an ethically developed intervention within one culture might not be to the benefit for an individual from another culture. Furthermore, acting in the best interests of society is an important guideline when an intervention will function within a specific society or community but an online intervention could easily function internationally, reaching diverse societies. Acting in the best interest of one society might not be to the best interest of another society.

There are currently no fixed ethical principles for the development of Web-based psychological interventions. The following principles are therefore supplied as broad guidelines to be implemented and refined by practise and as the context demands.

For the purposes of this model, ethical considerations are regarded broadly to include aspects such as social and cultural diversity, as well as geographical diversity. The considerations listed here are intended as guidelines for practical implementation and are neither comprehensive nor mentioned as a moral or philosophical debate.

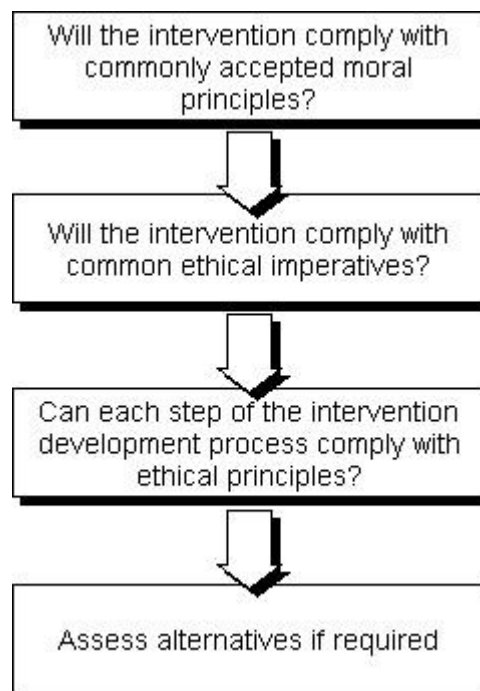


Figure 5.2. The ethical decision-making process.

It is suggested that the designer follow a flowchart of ethical issues in order to determine whether the proposed intervention would comply with ethical criteria. In addition the designer could consult various sources, such as ethical codes,

colleagues, other designers, etc in order to create a greater awareness of possible ethical dilemmas and solutions. This flowchart is represented in Figure 5.2.

Commonly accepted moral principles
Common ethical imperatives
Ethical issues relevant to each step of the intervention development process
Assessment of alternatives

The first step requires that the designer consider **commonly accepted moral principles**. These principles are (Rudolph, 1995, p. 365):

Truthfulness
Fairness
Equality
Accountability
Nondiscrimination
Autonomy
Confidentiality
Justice

The second step ties in closely with the first but is more specific. The designer should now consider the following **ethical imperatives** (Lewis, 1992):

Respect for persons: individuals' autonomy should be recognised, along with their right to decide what course of action they wish to take. From this imperative comes the individual's right to privacy and informed consent (American Psychological Association, 2002)

The harm principle: individuals' right to be protected from harm should always be considered.

Beneficence: actions considered by the interventionist should be aimed at the welfare and best interests of others. This imperative requires that benefits and potential risks be balanced in such a manner that the course with the most benefit and least risk be followed.

Justice: benefits and burdens should be distributed equably between all relevant parties.

For the third step during ethical decision-making, Loewenberg and Dolgoff (1995, p. 372) presented a list of **ethical aspects to consider during each step of the intervention design process**:

What are the ethical issues involved? What are the principles, rights, and obligations that have an impact on the ethical question?

What additional information is needed to properly identify the ethical implications?

What are the relevant ethical rules that can be applied? Which ethical criteria are relevant in this situation?

If there is a conflict of interest, who should be the principal beneficiary?

How would you rank-order the ethical issues and ethical rules you have identified?

What are the possible consequences that result from utilising different ethical rules?

When is it justified to shift the ethical decision obligations to another person? To whom should it be shifted in this case?

Should ethical issues not be satisfactorily resolved, the designer will have to **examine and assess various alternative solutions**. Loewenberg and Dolgoff (1995) proposed the following assessment criteria:

Efficiency and effectiveness: whenever two options will lead to the same objective, the one that requires less budget, staff, and time will be the more efficient. An effective option is that one which leads to the best achievement of the objective.

Protection of individuals' rights and welfare: this aspect should receive primary consideration when a conflict of interests occurs.

Protection of society's interest: when clients and society's interests conflict, the interventionist has to determine how both could be balanced in such a manner that the client can still achieve the intervention outcomes.

The least harm principle: if all options would lead to harm for the individual, the interventionist should choose the option that would lead to the least harm. It is this author's opinion that the interventionist should also consider an alternative option, such as another intervention, if harm cannot be avoided for a particular individual.

5.3.1.7 Statement of intervention objectives

An intervention has, as a broad aim, the solving of some problem or concern, or enhancement of life. An online intervention has these same aims, although the methods and medium of reaching these objectives are different. The intervention objectives stated during this task will influence and direct the actions taken during the Design stage and should therefore be as comprehensive as possible. In this regard any sub-objectives to be achieved throughout the program should be stated explicitly (Thomas & Rothman, 1994).

5.3.2 The Design Stage

The Design stage builds upon the foundation laid by the Analysis stage by utilising the information gathered during the first stage as a guide. Similarly, the Design stage forms the basis for the key tasks to be performed during the Development stage. The Design stage consists of three broad tasks:

5.3.2.1 Description of design problems and instructional strategy

A design problem is regarded as a specific aspect of a helping strategy that is undeveloped, unspecified, or otherwise unresolved. This task therefore requires the description of unresolved issues as identified during the Analysis stage. For example, during the discussion of user characteristics frequent mention was made of the fact that these characteristics must be addressed during design of the intervention in order to facilitate learning. For online interventions it is initially assumed by this writer that such unresolved issues can be identified along three factors:

5.3.2.1.1 Technological constraints

The description of technological constraints derives from the Analysis step of identification of environmental variables and constraints. At this stage, however, the technological constraints previously identified should be converted into practical guidelines to be followed during the development of the intervention. Thus, for example, where computer hardware or software cannot accommodate an adaptable system, the intervention should be developed in such a manner that adaptability is not required.

5.3.2.1.2 The online environment

“The World Wide Web provides significant benefits when applied to the classroom. At the same time, instructors, trainers, developers, and researchers need to recognise that the World Wide Web has limitations. Everything that is feasible is not necessarily useful, and

everything that is useful is not necessarily feasible.” Butler, in Graham, McNeil & Pettiford, 2000, p. 23

The unique nature of the Internet has often been mentioned throughout this study. However, the Internet is not appropriate for all types of training (and intervention) needs (Conrad, 2000) and might therefore not always be the best option. At this stage it is assumed that the interventionist has decided, based on decisions during the Analysis stage, that the Internet, specifically the World Wide Web, is a viable, ethical, and feasible medium for the implementation of the proposed intervention.

Although the intervention might be considered viable, certain aspects need to be identified and described at this stage as they could present design difficulties later. In the absence of existing guidelines, it is proposed that possible design problems for an online intervention be categorised according to the components that make up the delivery of the intervention process:

Content

Quality

Interaction

Feedback

Content needs to be developed in such a manner that it can be translated into an electronic version and “chunked” into deliverable modules that would be acceptable to the online user. More issues regarding content design, such as navigation, will be discussed during the storyboarding step.

An important issue facing the designer is the maintenance of **quality** while delivering the intervention in an online environment. The quality of Web-based instruction has been frequently criticised (Aggarwal & Bento, 2000) and depends largely on how instruction is designed, delivered and maintained, as well as which target group will receive the instruction.

Interaction on the Internet can only occur via visual contact with instructional material. Although video-conferencing is a possibility, bandwidth restrictions make it difficult to implement this technology on a large scale. The value of online interactivity should therefore emerge through the extent to which the user can manipulate the environment to meet his or her needs (Simms, 2003). Thus, the designer should bear

in mind that the target group of the intervention will receive the intervention content mainly via the reading of presented material and should take steps to increase the interactivity of the material presented.

Keeping users motivated throughout an intervention programme is difficult (Thomas & Rothman, 1994) and even more so when delivered via the Internet as there is no face-to-face interaction (Graham, et al, 2000). A successful method of motivating learners is via frequent **feedback** (Horton, 2000) and therefore the designer should incorporate this aspect during the Design stage.

5.3.2.1.3 User characteristics

An overview of possible mediating user characteristics has already been undertaken during the discussion of the Analysis stage (*See 4.4.1.4 Identification of User Characteristics*). At this point the designer should consider the characteristics identified in the target group and establish means whereby any design problems that could develop as a result of these characteristics can be addressed.

For example, if the target group would consist of culturally diverse people, the content and graphics of the intervention should be developed in such a manner that no individual is offended. In this regard, Horton (2000) pointed out that different cultures interpret symbols (graphics) differently and might be inadvertently offended. Similarly, slang words might be incomprehensible to certain users.

At this point, and with due regard for the preceding factors, it is also important to identify the instructional strategy to be used. The strategy used will be determined by the specific objectives of the intervention and the degree to which user inputs are required. Thus, a clear step-by-step approach will focus more on an objective design strategy, while an intervention program utilising adaptive features and a high degree of interactivity will rather follow a constructivist approach. It can be anticipated, though, that a blend of objectivist and constructivist strategies will be used.

5.3.2.2 Utilisation of information sources and content research

Once design problems have been highlighted and addressed, the previously identified information sources should be utilised to inform the design process from this point on. Specifically, the content to be included in the intervention itself should now be determined by consulting the necessary information sources. This task can also be used to address the previously identified design problems.

5.3.2.3 Storyboarding, sequencing, and content layout

Storyboarding involves the layout of the content and flow that will appear during the intervention process. This task should be informed by the instructional design strategy chosen, as well as issues particular to Web-based instructional design processes. By storyboarding the different sections of the intervention, it becomes possible to add ideas as the process continues. The storyboard is therefore also a repository for ideas but not, however, the product. It is rather an outline of the planned content and structure (Sinclair, Sinclair & Lansing, 2002).

As the storyboarding technique allows for new ideas, it becomes (and should be) flexible in design while showing the integration of all the proposed elements, e.g. text, images, hyperlinks, sounds, and so forth. The aim of the storyboard technique should ultimately be one of advancing the delivery of the content in an online environment (Passerini & Granger, 2000).

The storyboarding process should also take into consideration the various identified user characteristics and environmental constraints, as these will influence the success of the intervention. Ideally a set of principles should be followed, depending on the objectives of the intervention. These principles guide learner orientation and navigation through the intervention program and, as such, increase local (current position in the program,) and global (overall position in the program) coherence (Passerini & Granger, 2000).

A brief overview of sequencing and content layout will be provided below. It is, however, outside the scope of this study to discuss design for the Internet, specifically the World Wide Web, in detail.

According to Clarke (2001) storyboarding should illustrate the content, navigation, and structure of the material to be presented. This storyboard should also indicate the relationships between the various elements (Graham et al, 2000). When the structure of the material is to be decided, it is important to consider navigational issues. The user should be able to view the whole product as a coherent entity (Graham et al, 2000). In terms of navigation Clarke (2001) and Graham et al (2000) pointed to the following guidelines:

- Use a straightforward, consistent, predictable structure
- Make navigation intuitive

Limit the number of links per page

Provide standard links to important anchor points, such as the Welcome or Home page

Provide a visual overview of the complete structure of the intervention to enable users to form a mental map

Various content layout issues should also be considered. For example, Clarke (2001) and Horton (2000) pointed to page layout requirements, placement of elements, effective use of colour, animation, and graphics, etc. It is suggested that the designer of the intervention make use of current knowledge regarding online design principles in order to both create an effective intervention and address design problems identified earlier. For example, Nadler and Nadler s (1994) guidelines pointed to the following procedure regarding content:

Consider variables which could impact on delivery of learning

Select content

Decide on types of content

Categorize content

Sequence content

Develop content plans

5.3.3 The Development Stage

The Development stage consists of four tasks that are guided by the decisions made during the Analysis and Design stages. This stage involves the actual creation of the intervention in trial form and involves the following tasks:

5.3.3.1 Creation of prototype and application of design criteria

Once the storyboard has been completed, the development of a prototype intervention program can commence, based on the determined flow and content. During this task consideration should be given to a procedure that will facilitate implementation (Thomas & Rothman, 1994). The required content is generated and digitized for online delivery. Throughout this task all applicable design criteria should be taken into consideration.

5.3.3.2 Field implementation of prototype intervention

This step requires that the prototype intervention should be implemented and opened to pilot users. In line with the suggestion of Thomas and Rothman (1994) the

designer should consider the extent of the trial field implementation. The more extensive the implementation, the more confidence can be gained in the intervention. In this regard, the designer should also consider the target users who will form part of the pilot study. Ideally, the pilot users should be representative of the target group at which the final intervention is aimed. Feedback from pilot users will indicate whether content design and flow adhere to the principles of effective delivery. This feedback can be obtained via online questionnaires, assessments, interviews, etc.

5.3.3.3 Conducting pilot testing

Once a prototype intervention has been created it should be placed within the online environment where it will eventually be implemented. This is an important consideration as various technical considerations, as identified during the Analysis stage, come into play. For example, access time, server speed, database connectivity, technical design of the program, and so forth may influence user access. Pilot testing allows for the rectification of these issues. The Designer should also bear in mind Thomas (1984) admonition to limit the number of cases when conducting pilot testing so as to avoid a superficial intervention (*See 2.2.4.1.1 Scope of anticipated development*).

5.3.3.4 Pilot testing data analysis

As part of the evaluation process any data gathered during the pilot testing tasks should also be brought into consideration in order to determine the overall quality of the intervention. Data might have been gathered via feedback forms, structured or unstructured questionnaires, group discussions, and so forth. Based on observation of the trial implementation, along with the data analysis, the questions posed by Thomas (1984) should now be considered, namely:

What innovations need to be developed further to counter design problems?

What revisions and changes are required during redesign?

What is the operational feasibility of the intervention?

Is the intervention appropriate and adequate for the task it has been developed for?

What appear to be some of the outcomes for the client?

The evaluation of the intervention during trial use should also provide answers regarding the way the intervention has been designed and how this design meets the

requirements specified initially. Questions are therefore asked regarding frequency and characteristics of use, as well as obstacles to implementation.

5.3.3.5 Refining of intervention

Based on the pilot testing and field implementation any further technical, design or content issues can be addressed. Repeated testing is of the utmost importance due to the fact that an intervention can cause harm if not adequately designed. Once the intervention has been refined, it can be regarded as the final product, pending the outcome of the evaluation stage.

5.3.4 The Evaluation Stage

Although formative evaluation occurs throughout the developmental research process, the Evaluation stage halts this process to perform summative evaluation. This stage consists of four tasks related to, or triggered by, evaluation:

5.3.4.1 Summative evaluation in terms of intervention objectives

In line with the importance of repeated testing is the issue of stringent evaluation. Formative evaluation throughout should have highlighted some problematic issues, as well as successful components and will have guided the development of the intervention. Summative evaluation occurs once the intervention has been refined during the Development phase and is intended to evaluate the overall efficacy of the intervention in terms of its objectives.

5.3.4.2 Evaluation of ethical compliance

Ethical compliance should emerge from the guidelines for ethical implementation and use provided during the Analysis stage. At this stage, the interventionist should therefore evaluate the completed intervention product in terms of the steps delineated earlier. Should any ethical discrepancies emerge, they should be addressed during the next step, which involves advanced refining of the intervention.

5.3.4.3 Advanced refining of intervention

Based on the results of the summative evaluation, pre-testing data, evaluation of intervention objectives and compliance with ethical considerations, the intervention should now be refined for final release.

5.3.4.4 Statement regarding intervention objectives and ethical compliance

Based on the results of the evaluation and subsequent refinement, the interventionist should now be able to issue a statement to the effect that the intervention should be able to meet the objectives stated initially. A statement of ethical compliance should also be formulated and it is suggested that such a statement be made available online as part of the intervention content.

5.3.5 The Delivery Stage

The final stage involves full-scale deployment of the developed intervention. This stage assumes that advanced refinement of the intervention has been completed successfully and that the intervention will reach its design objectives. This stage involves four tasks:

5.3.5.1 Technical and cost considerations

Technical considerations have previously been considered but should now be viewed in the light of full-scale deployment. Initial considerations and requirements for full-scale deployment should have guided the development of the intervention but now becomes of practical importance. It is not within the scope of this study to focus on the technological requirements of servers and software for deployment to large numbers of users.

Due to the use of technological systems cost considerations will now come into play. The speed of delivery and continuous availability of the intervention will depend on the dissemination technology chosen. The discussion of this technology falls outside the scope of this study.

5.3.5.2 Preparation for implementation

Once all technical and cost considerations have been finalised and a decision regarding the dissemination equipment has been made, the intervention should be prepared to be ported for full-scale online delivery. The practical and technical implications of this process fall beyond the scope of this study.

5.3.5.3 Encouragement of appropriate adaptation

An important consideration when distributing an innovation, such as an intervention, especially in a less conventional form, regards user acceptance of the innovation. During this task it is important to make users aware of the following aspects regarding the intervention:

Why it has been developed (Thomas, 1984)

Its relative advantage in comparison to alternatives

Its compatibility with existing values, past experiences, and user needs

Its simplicity in terms of understanding and using it

Its trialability, which refers to the fact that users will (should) be allowed to experiment with the intervention without committing themselves to it

Its observability in terms of its results being visible to others (Rogers, 1983)

The context within which the intervention is to be implemented will also determine the strategy used to encourage appropriate adoption. Implementation within a corporate environment will require a different approach than one within schools or aimed at private individuals.

5.3.5.4 Implementation of innovation

Once the task of encouraging adoption of the intervention has been initiated, the intervention can be implemented and made available for field use. It is, however, important to note that continuous involvement from the interventionist is still required throughout the run of the intervention. Part of the interventionist's activity during this stage, involves the monitoring of target behaviour. Should users not approximate the objectives of the intervention, steps should be taken to refine the intervention or otherwise determine the causes of the lack of user compliance.

5.4 Summary

In Chapter 5 an integrated developmental approach or model for the development and implementation of online interventions was formulated. Due to the fact that there is a lack of information regarding online interventions and because knowledge regarding Web-based learning is, as yet, inadequate, the sources from which this model was constructed originate mainly from traditional intervention design, instructional design, and a hybrid model of Web-based learning design. These sources alone were not enough, however, and therefore additional information was gleaned from published studies regarding Web-based learning and the mediating variables that influence this process.

As this model was mainly derived from other models and theories, it is necessary to test its practical use by applying it to the development of an online psychological intervention. Results from this application can be then be used to refine the model where necessary.

In Chapter 6 the stages and steps formulated for the developmental model in this chapter will be applied to a limited career guidance intervention which will be deployed on the World Wide Web.

Chapter 6 – An Online Career Guidance Intervention

*"The Internet may be described as a proverbial sleeping giant that has enormous potential for the career counselling profession. We are beginning to tap the resources that are available now, but the future use of the Internet will be an important subject of the career counselling profession in the generations to come."*Zunker, 2002, p. 267

6.1 Introduction

It is only by applying the proposed model that insight into its usability, applicability, value, and practicality can be gained. In line with the developmental nature of this study, a practical implementation of the model will allow for changes and refinements to be made.

In this chapter the proposed developmental model will be applied to the development of a limited career guidance intervention. The intervention will be limited as it is developed purely to evaluate and refine the proposed model and to illustrate its application. Career guidance was chosen as a topic as many authors and studies agree that the Internet is an adequate environment for career guidance (see, for example, Barak & Cohen, 2002; Gati, Kleiman, Saka & Zakai, 2003; Gore & Leuwerke, 2000).

6.2 The Problem Analysis Stage

In general the Analysis stage allows the interventionist to develop an understanding of the problem to be addressed, as well as the ethicality and feasibility of such an undertaking. Table 6.1 indicates the steps proposed for this stage.

Stage	Tasks	
Analysis	Identification of a problematic human condition	Formative evaluation and feedback
	Description of existing interventions/technologies	
	Identification of information and resources	
	Identification of user characteristics	
	Identification of intervention environment variables and constraints	
	Statement of feasibility and ethical compliance	
	Statement of intervention objectives	

Table 6.1. Tasks during the Analysis stage of the developmental process.

6.2.1 Existing Problem

Career assessment has to face new challenges as the nature of the workplace and technology changes. According to Gore and Leuwerke (2000) vocational specialists will have to familiarise themselves with new developments, especially the Internet, as it features most prominently among 21st century technological developments.

Barak and Cohen (2002) pointed to the fact that Internet-based testing is an especially promising area for vocational psychology. Advantages include increased standardization of test administration, better accuracy in scoring, easy design and modification of tests, immediate feedback to user, effective collection of group data, etc. Barak and Cohen (2002) did, however, also indicate certain limitations, such as a need for specialists in design and implementation, cost of implementation, difficulty in monitoring users, the effect of computer anxiety, etc.

In order to assess the advantages and disadvantages of online career assessment the aim of this intervention will be to adapt an existing paper-and-pencil career assessment instrument for online use. The requirements for such a conversion can then be evaluated, as well as the efficacy of the intervention itself.

6.2.2 Existing Technologies in the Field of Career Assessment

Paper-and-pencil career assessment instruments have been in existence for quite some time (De Bruin, 1999). During the last 25 years computer-based assessment has come into use and this can be regarded as the forerunner of Internet-based assessment.

According to Pretorius (1999) computerized career guidance systems can be classified in terms of generations. Different generations indicate different capabilities. First generation systems are described as indirect inquiry systems. With these systems the user does not have any contact with the computer. Typically, the user would complete a questionnaire, which would be entered into a computer for analysis. A printout with the results of the analysis would be presented to the user.

Second generation systems and onwards are known as direct inquiry systems as the user interacts directly with the computer. Career information systems are regarded as second generation career guidance systems. Pretorius (1999) mentioned CHOICES (Computerized Heuristic Occupational Information and Career Exploration System), CIS (Career Information System), and GIS (Guidance Information System) amongst

others, as examples. These systems don't, however, focus on career decision-making to the extent that the user develops an understanding of the process.

Career guidance systems constitute the third generation and address the shortfalls of the second generation systems. According to Pretorius (1999) only two systems, DISCOVER and SIGI, are truly third generation career guidance systems. These third generation systems have their theoretical roots in several career theories, such as the trait-and-factor theory, classification theory, decision theory, etc.

Fourth generation systems are those found on the Internet. It is the nature of these systems that need careful consideration before an effective career assessment intervention can be developed. Thus, the section on information and resources should focus exclusively on Internet-based career guidance and assessment.

6.2.3 Information and Resources

Online career counselling and assessment has generated a vast amount of literature. Several studies have investigated the efficacy of online assessment (see, for example, Barak & Cohen, 2002; Gati & Saka, 2001; Gati, Kleiman, Saka & Zakai, 2003; Levinson, Zeman & Ohler, 2002) and guidelines and future expectations (see, for example, Gore & Leuwerke, 2000; Lent, 2001; O'Halloran, Fahr & Keller, 2002; Oliver & Chartrand, 2000; Prince, Chartrand & Silver, 2000; Sampson, 1999; Sampson & Lumsden, 2000) have been published. The Journal of Career Assessment has devoted an entire issue (Volume 8, Number 1, Winter 2000) to online career counselling and assessment. In general, the authors of these studies have been cautiously optimistic about the future of online career guidance and assessment. A comprehensive discussion of the literature is, however, beyond the scope of this study.

6.2.4 User characteristics

As the intervention developed here is aimed at validating the proposed developmental model, the target group will be postgraduate students at the University of Johannesburg. As such situational and learner-related variables appear to be favourable as these students will be familiar with computers and the Internet and should have some career certainty.

Decision-related variables refer to the people who decide who'll partake in the intervention (*See 4.4.1.4 Identification of user characteristics*). In this case these

variables are not applicable as the intervention is not designed on the instruction of a third party.

6.2.5 Intervention Environment Variables and Constraints

In terms of environmental variables and constraints that can be foreseen, the overall assessment is favourable. The intervention will involve a basic adaptation of an existing paper-and-pencil assessment that will be converted for online use. Specifically, an already validated instrument, the SNUG Guide, developed by Scheepers (1996), will be partly utilised. This instrument is based on the theory of Holland, has proven reliability and validity and, due to its step-by-step nature, it is ideal for conversion to the World Wide Web.

Therefore, existing technology will be able to manage the intervention. Problems in terms of transactional distance are countered by the fact that users will have the prerequisite skills to cope with the intervention and they will have direct access to the designer of the intervention. Care will, however, be taken to ensure that navigation through the intervention remains intuitive and user-friendly. This aspect can be effectively managed by ensuring that content is presented consistently, feedback is provided throughout, and graphical representation remains clear.

6.2.6 Feasibility and Ethical Compliance

The issue of feasibility will be addressed in terms of the questions stated in Chapter 5:

Can the proposed intervention offer a better solution than existing interventions (if any)?

The intervention to be developed will be a basic adaptation of Scheepers (1996) SNUG Guide. The first two sections of the SNUG Guide involve an assessment of interests and abilities, while the later sections require input from the user. Due to time and cost constraints only the first two sections will be adapted for online use. The purpose is to evaluate the proposed developmental model and the intervention to be designed will not be used outside an evaluative environment.

Can user and environmental constraints sufficiently be overcome during development of the intervention?

This issue has been discussed in sections 6.2.4 and 6.2.5. A major problem that emerges when designing for online use, is the fact that the potential users of the intervention can be largely unknown. As this intervention will be implemented among a limited number of

known postgraduate students, user and environmental constraints aren't considered problematic.

Would an online-only intervention be adequate or should it be supported with traditional resources?

The issue at hand is the development of an online intervention, based on a developmental model. The focus is therefore mainly on the online intervention.

Is the intervention amenable to communication via a Web-based environment?

As mentioned above, only an assessment of interests and abilities will be undertaken. Based on the SNUG Guide, this will be done by retrieving questions from a database and displaying them to the user who must choose a single answer, e.g. „Like , „Unsure , or „Dislike as an answer to each of the Interests questions. As these answers will be scored automatically while user responses are saved, it will be well-suited to a Web-based environment.

In terms of ethical compliance common ethical concerns in research practice will be adhered to, especially in terms of the tentative nature of the intervention assessment. Thus, users will be informed about the nature of the study and that the intervention results can't be used to make informed career decisions.

6.2.7 Intervention Objectives

Intervention objectives and sub-objectives can be stated as follows:

A simplified career assessment intervention will be developed to evaluate the adaptation of a paper-and-pencil instrument to an online assessment instrument. This development process will evaluate the usefulness of the developmental model developed in this study and will aid in refining or adapting the model.

6.3 Design Stage

Broadly speaking the Design stage expands the Analysis phase in the sense that the information and statements made during analysis are now brought to bear in the actual design decisions that need to be made. Table 6.2 indicates the steps proposed for this stage.

Stage	Tasks	Formative evaluation and feedback
Design	Description of design problems and instructional strategy	
	Utilisation of information sources and content research	
	Storyboarding, sequencing and content layout	

Table 6.2. Tasks during the Design stage of the developmental process.

6.3.1 Design Problems and Instructional Strategy

In Chapter 5 mentioned was made of design problems that should be considered in terms of technological constraints, the online environment, as well as user characteristics. Technological constraints have been ruled out as a problem but due consideration will be given during design to typical problems emerging from the online environment. Similarly, user characteristics will be considered, although, in this case, the user characteristics should simplify design issues.

As the intervention will be delivered in a simplified, step-by-step format, the design and development of the intervention will benefit most from an objectivist approach (*See 4.2.1 The Objectivist Learning Model*).

6.3.2 Utilisation of Information Sources and Content Research

With due regard to the existing literature regarding career assessment and especially current online career guidance and assessment sites, the design process will utilize an adaptation of an existing career assessment instrument, the SNUG guide, initially developed by Scheepers (1996).

6.3.3 Storyboarding, Sequencing and Content Layout

In line with a step-by-step, objectivist instructional strategy, the content will initially be laid out as illustrated in Figure 6.1. It is important to note that navigational aids, such as hyperlinks, will be added on all pages, even though such links are not indicated in Figure 6.1. As storyboarding is flexible by nature, it is envisioned that the pilot phase intervention might appear substantially different from the one proposed below. The overall process is illustrated in Figure 6.2.

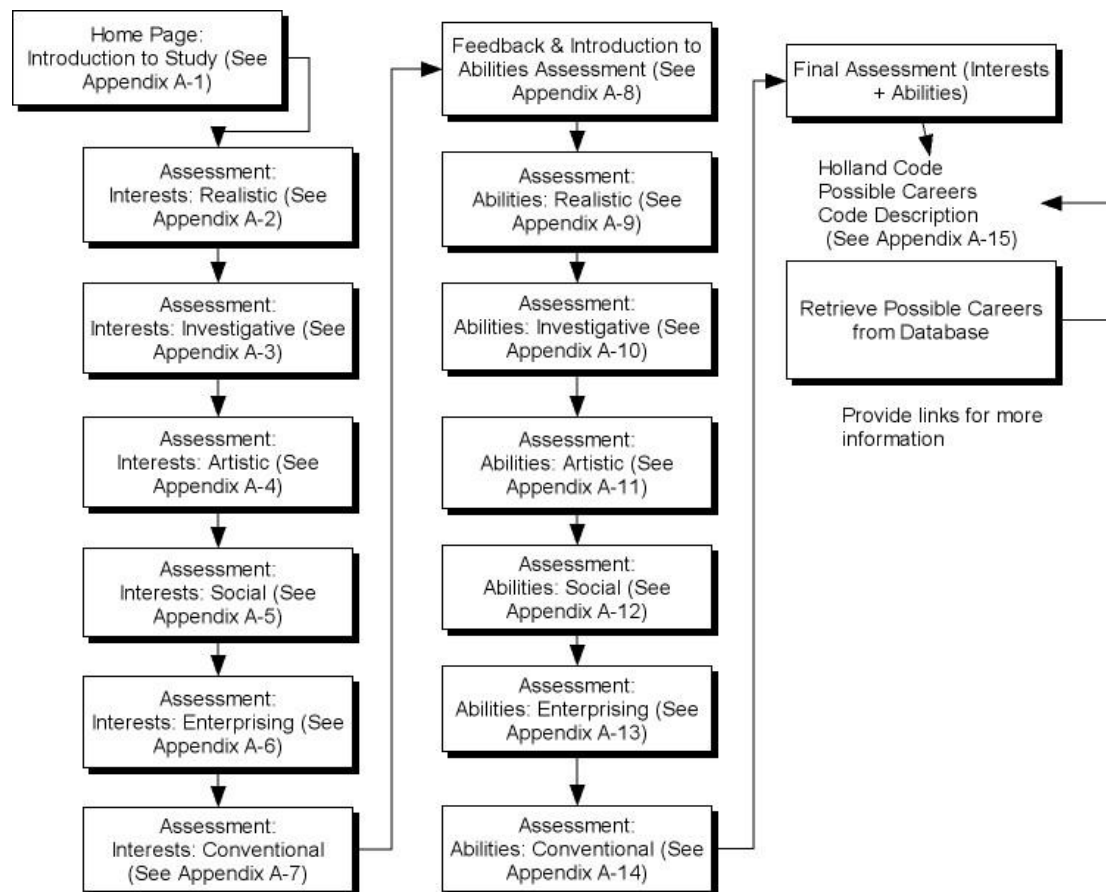


Figure 6.1. Proposed intervention flowchart.

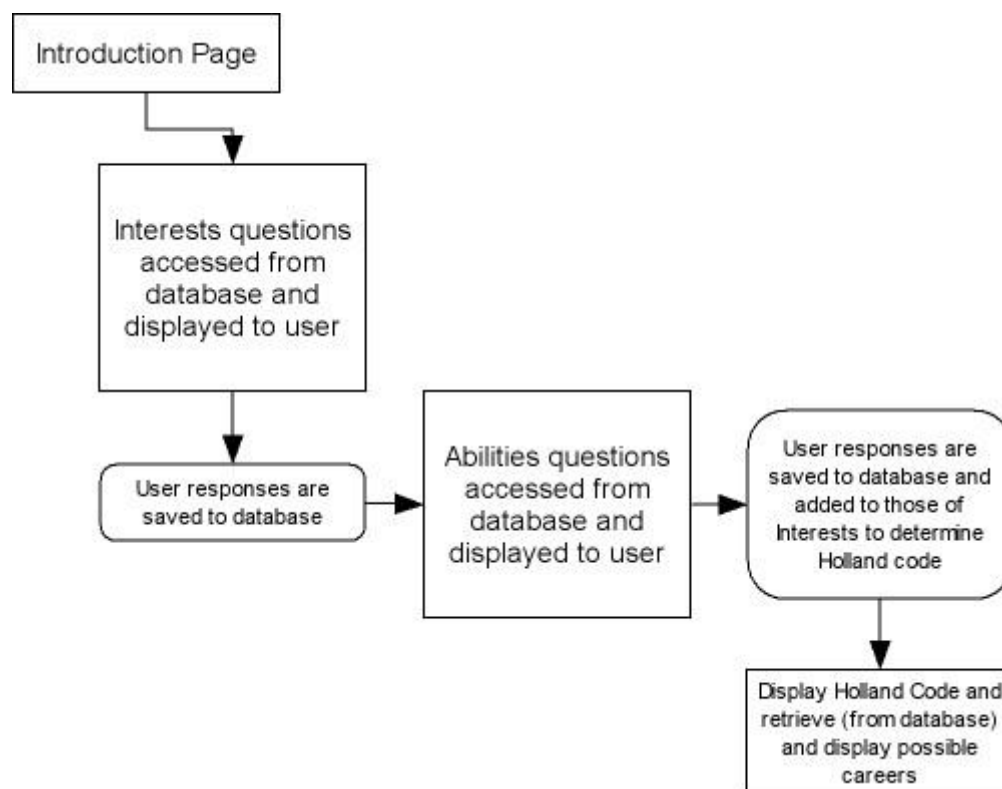


Figure 6.2. Proposed intervention process.

6.4 The Development Stage

The Development stage constitutes the logical arrival point once the Analysis and Design stages have been considered. During this stage the actual intervention is created, albeit in trial form. The aim here is to develop a working prototype that could be implemented in the field. Table 6.3 indicates the steps proposed for this stage.

Stage	Tasks	
Development	Creation of prototype and application of design criteria	Formative evaluation and feedback
	Field implementation of prototype intervention	
	Conducting pilot testing	
	Pilot testing data analysis	
	Refining of intervention	

Table 6.3. Tasks during the Development stage of the developmental process.

6.4.1 Creation of Prototype and Application of Design Criteria

The prototype intervention has been storyboarded and, based on the storyboard, complete draft web pages have been created. Where necessary assessment questions, codes, and feedback responses have been placed into a database from where they can be retrieved and displayed to users. A Web programmer has coded all the dynamic pages of the intervention.

6.4.2 Field Implementation, Pilot Testing, and Data Analysis

The prototype intervention was opened to postgraduate students who completed the intervention at their leisure. Two focus groups of five people each were set up. Participants in the focus groups were both male and female and between the ages of 21 and 25. The participants in Focus group 1 were observed as they completed the intervention while the participants in Focus group 2 were allowed to complete the intervention on their own. Upon completion of the intervention feedback in terms of content design and flow was requested from participants in both groups in order to refine or adapt the intervention, where necessary.

From observations of the participants in Focus group 1 it became clear that the participants wished to have the instructions presented as briefly as possible – they sometimes started answering questions before they have read the instructions. Overall, however, participants from this group proceeded through the intervention with ease and no uncertainty regarding navigation or process was evident. User

responses from both groups focused on the following aspects and unless otherwise stated these suggestions would be implemented:

Purpose of the intervention: It was felt that the objective of the intervention isn't clearly stated and that the "experimental nature" thereof should be given more prominence.

Assessment: One participant mentioned that she sometimes became confused when having to answer the Abilities questions. The Abilities questions require an answer on a scale from 0 to 6, where 0 indicates an inability or poor ability at a task and 6 indicates excellence at a task. The scoring structure of the Abilities questions will therefore be indicated on each page where these questions are presented.

Navigation: Some participants felt that a step-by-step approach eases navigational difficulties but they wanted more direct links to certain stages in the intervention. Users would also have liked to be able to save their assessment session and return later to complete it. Saving sessions would require that users log into the assessment; this feature would not be implemented due to time and cost restraints.

Feedback: Users wished to see more information on their results, for example, job availability and associated salary. Again, time and cost restraints will make this feature impossible to implement.

Links to further sites: Users would like links to be supplied for them to visit more career-related sites, especially ones with a South African focus. These links should always be available and not only once the assessment has been completed.

6.4.3 Refining of Intervention

Based on user feedback additional navigational aids, such as a consistent menu bar with descriptive hyperlinks, were added, the objective of the intervention was stated more clearly, some pages were optimised for faster loading, and more links to additional career information web sites were added, especially in terms of South African career information.

6.5 The Evaluation Stage

The proposed model emphasises the role of evaluation. While formative evaluation is an ongoing process during the development of an intervention, the Evaluation stage requires that summative evaluation be performed. Table 6.4 indicates the steps proposed for this stage.

Stage	Tasks	
Evaluation	Summative evaluation in terms of intervention objectives	Formative evaluation and feedback
	Evaluation of ethical compliance	
	Advanced refining of intervention	
	Statement regarding intervention objectives and ethical compliance	

Table 6.4. Tasks during the Evaluation stage of the developmental process.

6.5.1 Summative Evaluation in terms of Intervention Objectives

Based on user feedback and the refinements that have been made to the intervention, it is believed that the intervention is effective in terms of the objectives stated initially. In other words, it is believed that the intervention will attain its initial stated objectives.

6.5.2 Evaluation of Ethical Compliance

By applying the criteria as described under *5.1.1.6 Statement of feasibility and ethical compliance*, no ethical oversights emerged and pilot users did not report any career anxiety emerging after completion of the intervention. It is therefore believed that the intervention complies with ethical requirements in terms of the limited role within which it is implemented.

6.5.3 Advanced Refining of Intervention

No further changes will be made to the intervention as a summative evaluation and ethical compliance are satisfactory. Appendix A displays the pages of the intervention assessment as they appear to the user. Appendix B displays the informative pages of the intervention.

6.5.4 Statement regarding Intervention Objectives and Ethical Compliance

As already mentioned, it is believed that the intervention is effective and ethical within the area in which it is implemented for this study.

6.6 The Delivery Stage

The Delivery stage will not be discussed here as the developed intervention, although ready for implementation, will not be opened to general use as this was not the original aim of the study. For completeness the tasks making up the Delivery stage are displayed in Table 6.5.

Stage	Tasks	
Delivery	Technical and cost considerations	Formative evaluation and feedback
	Preparation for implementation	
	Encouragement of appropriate adaptation	
	Implementation of innovation	

Table 6.5. Tasks during the Delivery stage of the developmental process.

6.7 Summary

In Chapter 6 the proposed developmental model was given practical application. This resulted in hands-on experience of the applicability and usefulness of the model. The strengths and weaknesses emerging from this application will be discussed in Chapter 7 and a final, refined model will be proposed.

Chapter 7 – Summary and Recommendations

“Internet interventions are not meant to replace face-to-face treatments but rather to provide an alternative for individuals who might otherwise choose not to receive treatment (e.g. because of embarrassment) or who might be unable to obtain treatment (e.g. because of location) or to find appropriate treatment (e.g. because no provider is available).” Ritterband et al., 2003, p. 532.

7.1 Introduction

The nature of a developmental research approach is such that continuous refinements and other changes can occur throughout the process. This study involved the development of a model to be used for the creation of online interventions. As an assessment of the usefulness and usability of the model, an online career assessment intervention was developed. Based on the experience gained from this process, a final, refined model can now be proposed. In this chapter the final model is presented, along with recommendations for further studies in this field.

7.2 Changes to the Developmental Model for the Design and Implementation of Web-based Psychological Interventions

In general the explicit nature of the proposed model proved useful in most instances. Explicit statement of the tasks involved in each stage prevented oversights and served as reminders to refer back to certain tasks, especially between the Analysis and Design stages where frequent cross-referencing occurs.

Overall the model proved useful and practical but stating certain events as separate tasks has proved superfluous, for example, in practice the identification of user characteristics and intervention environment variables are so intertwined that they occur almost simultaneously. The initial model separated user characteristics and environment variables.

Certain tasks also implied procedures but never stated them explicitly as part of the task name, for example the third task of the Analysis stage stated „Identification of information and resources without indicating that these resources should be

consulted. It should be noted, however, that none of the changes will cause any of the previously discussed events and tasks to be removed from the overall developmental process. The refined model presented in Table 7.1 is simply a more integrated and refined version of the one previously proposed (See Table 5.2).

Stage	Tasks	Formative evaluation and feedback
Analysis	Identification of a problematic human condition	
	Description of existing interventions/technologies	
	Identification and consultation of information and resources	
	Identification of user characteristics and intervention environment variables and constraints	
	Statement of feasibility, ethical compliance, and intervention objectives	
Design	Description of design problems and instructional strategy	
	Utilisation of information sources and content research	
	Storyboarding, sequencing and content layout	
Development	Creation of prototype and application of design criteria	
	Field implementation of prototype intervention and pilot testing	
	Pilot testing data analysis	
	Refining of intervention	
Evaluation	Summative evaluation in terms of intervention objectives	
	Evaluation of ethical compliance	
	Advanced refining of intervention	
	Statement regarding intervention objectives and ethical compliance	
Delivery	Technical and cost considerations	
	Preparation for implementation	
	Encouragement of appropriate adaptation	
	Implementation of innovation	

Table 7.1 Refined Integrated Developmental Model for Web-based Intervention Design.

The refined model is graphically illustrated in Figure 7.1 (See Figure 5.1 for the original proposed model).

7.2.1 Changes to the Analysis Stage

The Analysis stage requires the most refinements to be made. The third task of the Analysis stage requires that information and resources be identified. It was found that existing knowledge and resources need already be consulted at this stage, although not in as much depth as the Design stage would require. This task is therefore

renamed to „Identification and consultation of information and resources and a description of the task should point to the fact that an overview of the existing knowledge and resources should be done.

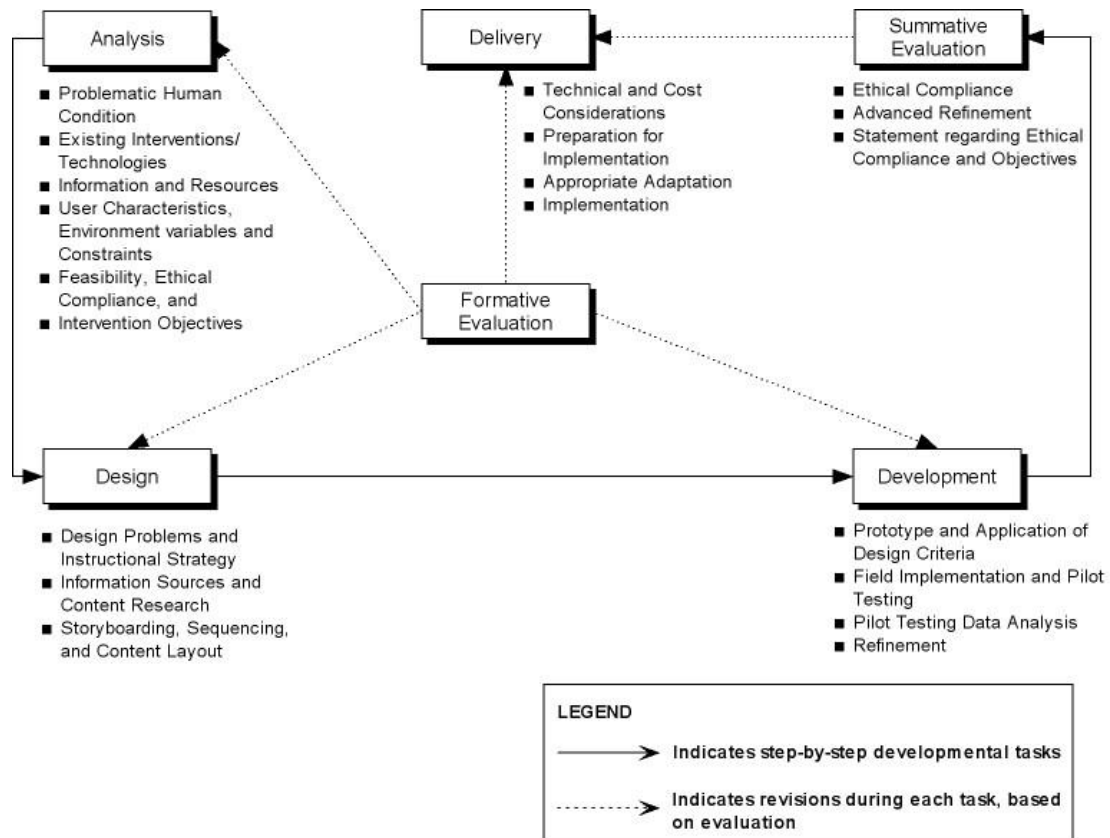


Figure 7.1. Stages and tasks of the refined Integrated Developmental Model for Web-Based Intervention Design

As already mentioned, in practice it appears superfluous to distinguish between the identification of user characteristics and the identification of intervention environment variables and constraints. Initially it was that thought that separating a consideration of user characteristics from that of environment variables will serve to emphasise the importance of user characteristics when designing for an online setting. However, these two tasks occur simultaneously in practice as they seem to have an interdependent, reciprocal relationship. They should therefore be integrated and named „Identification of user characteristics and intervention environment variables and constraints.

There does not seem to be much point in separating a statement of intervention objectives from statements regarding feasibility and ethical compliance. In practice these two tasks occur almost simultaneously and it would be more practical to integrate them. The designer should therefore consider these aspects together, although, in general, it can be assumed that the intervention can only be regarded as feasible if it is considered ethical. Thus, these two tasks should be integrated and named „Statement of feasibility, ethical compliance, and intervention objectives.

7.2.2 Changes to the Design Stage

The Design stage remains unchanged as it is succinct in its current form. More explicit cross-reference to the Analysis stage appears to be required, especially between the identification tasks and the description of design problems. More explicit cross-referencing would also be beneficial as part of the description of the utilisation of information sources and content research.

7.2.3 Changes to the Development Stage

An important refinement is required in the Development stage. In practice it proves impossible to separate the field implementation of the prototype intervention from the task of conducting pilot testing. These two tasks should therefore be integrated and named „Field implementation of prototype intervention and pilot testing.

7.2.4 Changes to the Evaluation Stage

The tasks of the Evaluation stage lent themselves well to practical implementation and facilitated the development process. No changes should therefore be made to the Evaluation stage.

7.2.5 Changes to the Delivery Stage

The Delivery stage was not evaluated in practice. It is therefore proposed that this stage remains unchanged until it could be refined from practice.

7.3 Recommendations for Further Studies

The developmental research approach requires that the final product be reviewed and questioned. Therefore, it is firstly questioned whether a developmental research design was indeed the best approach for this type of study. In other words, might a more experimental or pure exploratory approach not have provided a more adequate design? However, these designs would have been flawed for the type of question

that needed to be addressed. Firstly, the focus was on the development of a model according to which online interventions could be designed and not on the development of an intervention itself. Therefore, an experimental approach with a pre-test and post-test design would only have yielded an indication of whether change has taken place. Similarly, a pure qualitative approach would not have enriched the study as it also would not have led to the formulation of a model.

The model produced from this study is based on an integration of existing models and literature. Apart from this theoretical derivation, it was subjected to a practical evaluation in terms of its application value. This practical evaluation indicated that some changes are desirable. It is therefore clear that extensive practical application of the proposed model is required before it can be accepted in its intended role as a guideline for the development of Web-based psychological interventions.

Related to this is the nature of the intervention developed in this study. It is doubtful whether a career assessment intervention is representative of the various types of interventions already available on the Internet. The career assessment intervention was also limited in scope and only available to a small number of users from a specialised group.

Thus, it is recommended that the model be applied to the development of a variety of interventions, for example, health-related, such as asthma, headaches, and smoking cessation, as well as psychological, such as stress management, leadership assessments, etc.



Full delivery of an intervention developed according to the model is also required. Not only will this allow for assessment of the Delivery stage but such a step will also expose the resulting intervention to a vast variety of users. It is anticipated that the model will require further refinement and will probably become simplified and perhaps more practical with further trials.

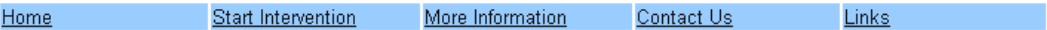
In general, the nature and efficacy of Internet-based interventions require further study. The technology underlying Internet-based applications is constantly improving and online interventions are benefiting. The challenge to health-care professionals will be one of ensuring that the benefits to the consumer outweigh the costs.

ooOOoo

Appendix A – Limited Career Assessment Intervention

Appendix A-1:





myOnlineCareerGuide is an experimental career guidance system. Currently all **myOnlineCareerGuide** users are participating in a research study.

This system is not available to the public.

Results from the career assessment should not be used to make career choices!

If this is your first time visiting this page and:

- You are a participant in this research study, either [click here](#) to start or [click here](#) for more information.
- You are not a participant but curious about the nature of this study, [click here](#) for more information.

For more information, contact: Gert Kruger

Appendix A-2:



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INTERESTS

This section will help you to find out what your interests are and how they relate to the world of work.



Note that this is not an assessment of what you can do, but what you might be interested in doing. Also remember that an interest does not mean that you will be good at that activity, for example you might **like** science, but you may not be good at it.

In this section you will find 6 tables with lists of different interests. Read each item and then decide whether you **Like** or **Dislike** this activity, or whether you are **unsure** of your like or dislike. Tick either the Like, Dislike or Unsure box to indicate your interest.

Question	Like	Unsure	Dislike
Build kitchen cabinets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guard money in an armored car	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Operate a dairy farm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lay brick or tile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monitor a machine on an assembly line	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Repair household appliances	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drive a taxi cab	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Install flooring in houses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Raise fish in a fish hatchery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Build a brick walkway	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assemble electronic parts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drive a truck to deliver packages to offices and homes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Paint houses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enforce fish and game laws	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Operate a grinding machine in a factory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work on an offshore oil-drilling rig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform lawn care services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assemble products in a factory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Catch fish as a member of a fishing crew	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Refinish furniture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fix a broken faucet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do cleaning or maintenance work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maintain the grounds of a park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Operate a machine on a production line	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spray trees to prevent the spread of harmful insects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Test the quality of parts before shipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Operate a motorboat to carry passengers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Repair and install locks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Put out forest fires	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Set up and operate machines to make products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Appendix A-3:


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Question	Like	Unsure	Dislike
Study space travel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make a map of the bottom of an ocean	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Study the history of past civilizations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Study animal behavior	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop a new medicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plan a research study	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Study ways to reduce water pollution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop a new medical treatment or procedure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determine the infection rate of a new disease	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Study rocks and minerals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diagnose and treat sick animals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Study the personalities of world leaders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conduct biological research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Study the population growth of a city	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Study whales and other types of marine life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Investigate crimes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Study the movement of planets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Examine blood samples using a microscope	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Investigate the cause of a fire	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Study the structure of the human body	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop psychological profiles of criminals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop a way to better predict the weather	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work in a biology lab	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Invent a replacement for sugar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Study genetics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Study the governments of different countries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do research on plants or animals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do laboratory tests to identify diseases	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Study weather conditions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conduct chemical experiments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Appendix A-4:






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Question	Like	Unsure	Dislike
Conduct a symphony orchestra	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Write stories or articles for magazines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Direct a play	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Create dance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Write books or plays	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Play a musical instrument	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform comedy routines in front of an audience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform as an extra in movies, plays, or television shows	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Write reviews of books or plays	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compose or arrange music	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Act in a movie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dance in a Broadway show	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Draw pictures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sing professionally	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform stunts for a movie or television show	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Create special effects for movies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conduct a musical choir	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Act in a play	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Paint sets for plays	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audition singers and musicians for a musical show	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Design sets for plays	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Announce a radio show	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Write scripts for movies or television shows	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Write a song	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform jazz or tap dance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Direct a movie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sing in a band	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Design artwork for magazines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Edit movies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pose for a photographer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Appendix A-5:






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Question	Like	Unsure	Dislike
Teach an individual an exercise routine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform nursing duties in a hospital	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Give CPR to someone who has stopped breathing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Help people with personal or emotional problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teach children how to read	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work with mentally disabled children	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teach an elementary school class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Help people with family-related problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform rehabilitation therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do volunteer work at a non-profit organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Help elderly people with their daily activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teach children how to play sports	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Help disabled people improve their daily living skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teach sign language to people with hearing disabilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Help people who have problems with drugs or alcohol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Help conduct a group therapy session	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Help families care for ill relatives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide massage therapy to people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plan exercises for disabled patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Counsel people who have a life-threatening illness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teach disabled people work and living skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organize activities at a recreational facility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Take care of children at a day-care center	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organize field trips for disabled people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assist doctors in treating patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work with juveniles on probation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide physical therapy to people recovering from an injury	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teach a high-school class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix A-6:






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Question	Like	Unsure	Dislike
Buy and sell stocks and bonds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manage a retail store	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sell telephone and other communication equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Operate a beauty salon or barber shop	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sell merchandise over the telephone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Run a stand that sells newspapers and magazines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Give a presentation about a product you are selling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Buy and sell land	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sell compact disks and tapes at a music store	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Run a toy store	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manage the operations of a hotel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sell houses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sell candy and popcorn at sports events	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manage a supermarket	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manage a department within a large company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sell a soft drink product line to stores and restaurants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sell refreshments at a movie theater	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sell hair-care products to stores and salons	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Start your own business	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Negotiate business contracts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Represent a client in a lawsuit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Negotiate contracts for professional athletes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be responsible for the operation of a company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Market a new line of clothing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sell newspaper advertisements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sell merchandise at a department store	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sell automobiles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manage a clothing store	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sell restaurant franchises to individuals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sell computer equipment in a store	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix A-7:

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Question	Like	Unsure	Dislike
Develop a spreadsheet using computer software	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proofread records or forms routines for a show	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use a computer program to generate customer bills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Schedule conferences for an organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keep accounts payable/receivable for an office	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Load computer software into a large computer network	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transfer funds between banks using a computer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organize and schedule office meetings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use a word processor to edit and format documents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Operate a calculator	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Direct or transfer phone calls for a large organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform office filing tasks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compute and record statistical and other numerical data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generate the monthly payroll checks for an office	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Take notes during a meeting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keep shipping and receiving records	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Calculate the wages of employees	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assist senior level accountants in performing bookkeeping tasks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Type labels for envelopes and packages	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inventory supplies using a hand-held computer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop an office filing system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keep records of financial transactions for an organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Record information from customers applying for charge accounts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photocopy letters and reports	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Record rent payments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enter information into a database	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keep inventory records	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maintain employee records	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stamp, sort, and distribute mail for an organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Handle customers' bank transactions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Appendix A-8:



myOnlineCareerGuide

Career Assessment



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In the next section you will find a couple of descriptions of different activities that are performed within certain careers. You have to decide how well you can do the various activities that are described. The better you are at something, the higher the score you give yourself. If you are:

Not able or very poor at the activity, award yourself **0**

Poor at the activity, award yourself **1**



Average at the activity, award yourself **2, 3, or 4**

Good at the activity, award yourself **5**

Excellent at the activity, award yourself **6**

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assessment

Appendix A-9:





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Question	0	1	2	3	4	5	6
I can use an electrical saw.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can do small repairs on radios.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can work with animals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can repair a leaking tap.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can survive in the veld for a couple of days.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can understand an architect's plans.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am good at setting up equipment for experiments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I used to be good at building toy cars.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can cook tasty food.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Continue

Not able or very poor at the activity, award yourself **0**
Poor at the activity, award yourself **1**
Average at the activity, award yourself **2, 3, or 4**
Good at the activity, award yourself **5**
Excellent at the activity, award yourself **6**

Appendix A-10:



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Question	0	1	2	3	4	5	6
I can determine why a radio will not work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I often explain science/ maths to younger children.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I understand articles about the creation of the universe.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can fill in quizzes that test your logical ability.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My marks in Biology are:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I understand how the digestive system works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like taking part in discussions on very theoretical topics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can always understand what is going on in another's mind.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am very good at understanding my friends and giving them advice about their relationships.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Continue

Not able or very poor at the activity, award yourself **0**



Poor at the activity, award yourself **1**

Average at the activity, award yourself **2, 3, or 4**

Good at the activity, award yourself **5**

Excellent at the activity, award yourself **6**

Appendix A-11:



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Question	0	1	2	3	4	5	6
I can write essays:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My reading habits are:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find it exciting to perform in front of an audience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can draw landscapes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I write music which should be played by good musicians	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can rearrange all the furniture in our house.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like telling stories to younger children.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like performing in front of my friends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am good at writing poems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Continue

Not able or very poor at the activity, award yourself **0**



Poor at the activity, award yourself **1**

Average at the activity, award yourself **2, 3, or 4**

Good at the activity, award yourself **5**

Excellent at the activity, award yourself **6**

Appendix A-12:





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Question	0	1	2	3	4	5	6
Other pupils often ask me to help them with their homework	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am understanding when a friend is upset.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When somebody is new at school, I can make them feel at home.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I often help old people when they have difficulty climbing stairs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When somebody in the family is sick, I usually comfort them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I understand why some people get aggressive when you tease them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I usually understand a person's logic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If someone is dishonest in a test, I will always tell the teacher.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If a child is bullied by an older pupil, I will do something to stop it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Continue

Not able or very poor at the activity, award yourself **0**
Poor at the activity, award yourself **1**
Average at the activity, award yourself **2, 3, or 4**
Good at the activity, award yourself **5**
Excellent at the activity, award yourself **6**

Appendix A-13:



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Question	0	1	2	3	4	5	6
I am good at selling different things to people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a natural ability for talking to strangers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I convince people quite easily of my point of view	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When it comes to working in a group, I often make the decisions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am very good at saving money.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am good at the selling of newspapers or magazines to different people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am a class representative or prefect in my school and I handle problems on the playground.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am a very good public speaker and I quite often enter debates at school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a talent for the training of other pupils in skills required for writing exams.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Continue

Not able or very poor at the activity, award yourself **0**
Poor at the activity, award yourself **1**
Average at the activity, award yourself **2, 3, or 4**
Good at the activity, award yourself **5**
Excellent at the activity, award yourself **6**

Appendix A-14:



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Question	0	1	2	3	4	5	6
Before handing in essays I write, I always check them a couple of times for spelling errors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The neatness of my work is usually:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am very patient and think I will be good at answering queries the whole day in a doctor's rooms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a good mind for the systematic filing of different documents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can do the same thing for hours and hours.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I organise my study time and social activities so I can get everything done	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whether it is books, tools or clothes, I have a specific place for it in my room.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a natural talent for the adding up of big amounts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have successfully helped with the packing away of books in our library at school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Continue

Not able or very poor at the activity, award yourself **0**
Poor at the activity, award yourself **1**
Average at the activity, award yourself **2, 3, or 4**
Good at the activity, award yourself **5**
Excellent at the activity, award yourself **6**

Appendix A-15:



Career Assessment: Done!

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Well done! You have completed the assessment.

Your three letter code is **RAS**



Possible careers are:

food stylist, musical instrument tuner

Code	Description
R	<p>THE REALISTIC TYPE (R): Realistic types of people show an interest in activities in which they have to make use of systematic, ordered, and explicit control of, amongst other things, plants and animals, machinery, tools, and other objects, and they show a strong dislike towards educational or therapeutic activities like for instance working with people. In other words, they like working in technical careers, careers in the engineering field; they like fixing and maintaining machinery and tools; they like working on the construction of buildings; and they normally like working outdoors. Because they prefer these careers, they tend to learn handwork skills, mechanical skills, about agriculture, electrical skills, as well as technical skills of different types. Careers representative of the REALISTIC TYPE, are the following: electrician, mechanical engineer, farmer, sheet metal worker, waiter or waitress, repairer of electrical appliances, carpenter, tailor, bricklayer, shop supervisor, crane operator, and nature conservationist.</p>
A	<p>THE ARTISTIC TYPE (A): Artistic people normally show an interest in one or more of the following fields: the study of language and the creative use thereof; the design of works of art, houses, furniture, advertisements, clothes, and so forth; different forms of entertainment such as singing, dancing, the telling of jokes, doing tricks, and so on. Because artistic people are interested in these things, they are eager to learn about the creative use of language as used in the writing of poetry or novels, they like learning musical skills, they like learning skills needed for the writing of dramas and plays, and they have a dislike for clerical or business-related activities. Careers representative of the ARTISTIC TYPE, are the following: actor or actress, model, interior decorator, photographer, signwriter, clothing designer, public relations officer, copywriter entertainer, writer and musician.</p>
S	<p>THE SOCIAL TYPE (S): Social types of people tend to show an interest in one or more of the following fields: the maintaining of law and order, educational personal, end social services, nursing human care, etc. Because social types of people are interested in some of the fields mentioned above, they tend to learn skills related to the training and healing of people, and this in turn leads to the fact that they place quite a high premium on the learning of good interpersonal relationships. Social types of people are not interested in the acquiring of handwork and technical skills, because they have a greater interest in people. Careers representative of the SOCIAL TYPE, are the following: dental hygienist, hairdresser, physiotherapist, customs inspector, caterer, housekeeper, high school teacher, quality control inspector, psychologist, dietician and medical clerk.</p>

Now that you know your code and possible careers, you can [investigate them further](#).

APPENDIX B – INFORMATIVE PAGES OF CAREER ASSESSMENT INTERVENTION






Links

Home	Start Intervention	More Information	Contact Us	Links
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CareerJunction	A South African career site with job listings and related information.
PNet	A South African career site with job listings and related information.
Careers.co.za	South African site focused on career development.
Career Solutions	South African site offering help with cv's and job searching.
Career Web	South African site similar to Career Solutions.
GradX.net	South African career site focusing on graduates.
Careers Beyond 2000	Career information for South Africans.

Note: These sites will open in a new window and are not affiliated with the experimental **myOnlineCareerGuide** site.

More Information

Home	Start Intervention	More Information	Contact Us	Links
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myOnlineCareerGuide was designed as part of a doctoral study. The study aimed at developing a model according to which online interventions can be developed.

In order to evaluate the efficacy of the model, it was necessary to actually design an intervention according to the guidelines set out by the model. This site is the result of that process. A number of people have volunteered to test the intervention and provide feedback.

The site is not open to the general public and results from the career assessment should not be used to make career choices.

REFERENCE LIST

Aggarwal, A. & Bento, R. (2000). Web-based education. In A. Aggarwal (Ed.), **Web-based learning and teaching technologies: Opportunities and challenges (pp. 2-16)**. London: Idea Group.

American Psychological Association (2002). Ethical principles of psychologist and code of conduct. **American Psychologist**, **57**, 1060-1073.

American Psychological Association (2005). **APA statement on services by telephone, teleconferencing, and Internet**. Retrieved January, 13, 2005 from: <http://www.apa.org/ethics/stmnt01.html>

Amig, S. (2001). Internet dilemmas. **Behavioral Health Management**, **21** (3), 48-51.

Andrews, D. H. & Goodson, L.A. (1995). Comparative analysis of models of instructional design. In G.J. Anglin (Ed.), **Instructional technology: Past, present, and future (2nd Ed.) (pp. 161-182)**. Colorado: Libraries Unlimited.

Archer, M., Rossouw, W., Lomofsky, L. & Oliver, P. (2004). Assessment in an inclusive classroom. In P. Engelbrecht, L. Green, S. Naicker & L. Engelbrecht, **Inclusive education in action in South Africa (pp. 97-126)**. Van Schaik: Pretoria.

Atherton, M. (2000). Outcome measures of efficacy associated with a Web-enabled asthma self-management programme: Findings from a quasi-experiment. **Disease Management & Health Outcomes**, **8** (4), 233-242.

Barak, A. (1999). Psychological applications on the Internet: A discipline on the threshold of a new millennium. **Applied and Preventive Psychology**, **8**, 231-246.

Barak, A. & Cohen, L. (2002). Empirical examination of an online version of the Self-Directed Search. **Journal of Career Assessment**, **10** (4), 387-400.

Bessel, T.L., McDonald, S., Silagy, C.A., Anderson, J.N., Hiller, J.E. & Sansom, L.N. (2002). Do Internet interventions for consumers cause more harm than good? A systematic review. **Health Expectations**, **5**, 28-37.

Chen, Y. (2001a). Transactional distance in World Wide Web learning environments. **Innovations in Education and Teaching International**, **38** (4), 327-338.

Chen, Y. (2001b). Dimensions of transactional distance in the World Wide Web learning environment: A factor analysis. **British Journal of Educational Technology**, **32** (4), 459-470.

Childress, C.A. & Asamen, J.K. (1998). The emerging relationship of psychology and the Internet: Proposed guidelines for conducting Internet intervention research. **Ethics & Behavior**, **8** (1), 19-35.

Chin, K. L. (1999, July). A **study into students' perceptions of Web-based learning environment**. Paper presented at the annual meeting of the HERDSA: Melbourne.

Christensen, H., Griffiths, K.M. & Jorm, A.F. (2004). Delivering interventions for depression by using the Internet: Randomised controlled trial. **British Medical Journal**, **379**, 1-5.

Clarke, A. (2001). **Designing computer-based learning materials**. Hampshire: Gower.

Conrad, K. (2000). **Instructional design for Web-based training**. Massachusetts: HRD.

Cookson, P.S., Knowles, M.S., Nadler, L. & Nadler, Z. (1998). Prototypical program planning models. In P.S. Cookson, **Program planning for the training and continuing education of adults (pp. 29-75)**. Florida: Krieger.

Copeland, J. & Martin, G. (2004). Web-based interventions for substance use disorders: A qualitative review. **Journal of Substance Abuse Treatment**, **26**, 109-116.

Corrigan, P.W., MacKain, S.J. & Liberman, R.P. (1994). Skill training modules: A strategy for dissemination and utilization of a rehabilitation innovation. In J. Rothman & E.J. Thomas (Eds.), **Intervention research (pp. 317-352)**. New York: Haworth.

De Bruin, G.P. (1999). Career counselling assessment. In G.B. Stead & M.B. Watson (Eds.), **Career psychology (pp. 142-160)**. Pretoria: Van Schaik.

Demetriou, A. (1999). Cognitive development. In A. Demetriou, W. Doise & C. van Lieshout (Eds.), **Life-span development psychology (pp.179-270)**. New York: Wiley.

Devineni, T. & Blanchard, E.B. (2005). A randomized controlled trial of an Internet-based treatment for chronic headache. **Behaviour Research and Therapy**, **43**, 277-292.

Dick, W. (1997). A model for the systematic design of instruction. In R.D. Tennyson, F. Schott, N. Seel & S. Dijkstra (Eds.), **Instructional design: International perspective (pp. 355-359)**. New Jersey: Lawrence Erlbaum.

Dick, W. & Carey, L. (1990). **The systematic design of instruction**. New York: Harper Collins.

Esnault, L. & Zeiliger, R. (2000). Web learning with Nestor: The building of a new pedagogical process. In A. Aggarwal (Ed.), **Web-based learning and teaching technologies: Opportunities and challenges (pp. 79-102)**. London: Idea Group.

Fawcett, S.B., Suarez, Y., Balcazar, F.E., White, G.W., Paine, A.L., Blanchard, K.A. & Embree, M.G. (1994). Conducting intervention research: The design and development process. In J. Rothman & E.J. Thomas (Eds.), **Intervention Research (pp. 25-54)**. New York: Haworth.

Gati, I. & Saka, N. (2001). Internet-based versus paper-and-pencil assessment: Measuring career decision-making difficulties. **Journal of Career Assessment**, **9** (4), 397-416.

Gati, I., Kleiman, T., Saka, N. & Zakai, A. (2003). Perceived benefits of using an Internet-based interactive career planning system. **Journal of Vocational Behavior**, **62** (2), 272-286.

Gore, P.A. & Leuwerke, W.C. (2000). Information technology for career assessment on the Internet. **Journal of Career Assessment**, **8** (1), 3-19.

Graham, D.T., McNeil, J. & Pettiford, L. (2000). **Untangled web: Developing teaching on the Internet**. Harrow: Prentice Hall.

Grasso, A.J. & Epstein, I. (1992). **Research utilization in the social services: Innovations for practice and administration**. New York: Haworth.

Gravetter, F.J. & Forzano, L.B. (2006). **Research methods for the behavioural sciences (2nd ed.)**. Australia: Wadsworth.

Gustafson, K.L. & Tillman, M.H. (1992). Introduction. In L.J. Briggs, K.L. Gustafson, M.H. Tillman (Eds.), **Instructional Design: Principles and applications (2nd ed.) (pp. 451-467)**. New Jersey: Educational Technology.

Gustafson, K.L., Tillman, M.H. & Childs, J.W. (1992). The future of instructional design. In L.J. Briggs, K.L. Gustafson, M.H. Tillman (Eds.), **Instructional Design: Principles and applications (2nd ed.) (pp. 451-467)**. New Jersey: Educational Technology.

Hall, R.H., Balestra, J. & Davis, M. (April, 2000). **A navigational analysis of linear and non-linear hypermedia interfaces**. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

Hanisch, F. & Straßer, W. (2003). Adaptability and interoperability in the field of highly interactive Web-based courseware. **Computers & Graphics**, **27**, 647-655.

Hartzenberg, L.M. (2002). **A cross-cultural counselling programme for adolescents traumatised by family violence**. Unpublished dissertation. University of Pretoria.

Hess, B. (1999). Graduate student cognition during information retrieval using the World Wide Web: A pilot study. **Computers and Education**, **33**, 1-13.

Hill, T. & Chidambaram, L. (2000). Web-based collateral support for traditional learning: A field experiment. In A. Aggarwal (Ed.), **Web-based learning and teaching technologies: Opportunities and challenges (pp. 282-292)**. London: Idea Group.

- Horton, W. (2000). **Designing Web-based training**. New York: Wiley.
- Kemp, J., Morrison, G.R. & Ross, S.M. (1994). **Designing effective instruction**. New York: Merrill.
- Kirschner, P.A. (2002). Cognitive load theory: Implications of cognitive load theory on the design of learning. **Learning and Instruction**, **12**, 1-10.
- Krishna, S., Francisco, B.D., Balas, E.A., König, P., Graff, G.R. & Madsen, R.W. (2003). Internet-enabled interactive multimedia asthma education program: A randomized trial. **Pediatrics**, **111** (3), 503-510.
- Larson, R.J. & Buss, D.M. (2002). **Personality psychology: Domains of knowledge about human nature**. Boston: McGraw-Hill.
- Lee, M. (2001). Profiling students' adaptation styles in Web-based learning. **Computers and Education**, **36**, 121-132.
- Lent, R.W. (2001). Vocational psychology and career counselling: Inventing the future. **Journal of Vocational Behavior**, **59**, 213-225.
- Levinson, E.M., Zeman, H.L. & Ohler, D.L. (2002). A critical evaluation of the Web-based version of the Career Key. **The Career Development Quarterly**, **51** (1), 26-35.
- Lewis, H. (1992). The ethics and utilisation of interpersonal practice research. In A.J. Grasso & I. Epstein (Eds.), **Research utilization in the social services: Innovations for practice and administration (pp. 117-132)**. New York: Haworth.
- Lewis, R. & Whitlock, Q. (2003). **How to plan and manage an e-learning programme**. Cornwall: Gower.
- Lin, B. & Hsieh, C. (2001). Web-based teaching and learner control: A research review. **Computers and Education**, **37**, 377-386.
- Loewenberg, F. & Dolgoff, R. (1995). Guides to making ethical decisions. In J.E. Tropman, J.L. Erlich & J. Rothman (Eds.), **Tactics and techniques of community intervention (pp. 370-385)**. Illinois: Peacock.

Lou, Y., Dedic, H. & Rosenfield, S. (2003). A feedback model and successful e-learning. In S. Naidu (Ed.). **Learning and teaching with technology (pp. 249-259)**. London: Kogan Page.

Martinez, M. (2000). Foundations for personalised web learning environments. **ALN Magazine**, 4 (2).

Martinez, M. (2001). Key design considerations for personalized learning on the Web. **Educational Technology & Society** 4 (1).

Mayer, R.E. (2003). The promise of multimedia learning: Using the same instructional design methods across different media. **Learning and Instruction**, 13, 125-139.

McManus, T.F. (1996). **Delivering instruction on the World Wide Web**. Retrieved August, 6, 2002 from:
<http://www.svsu.edu/~mcmanus/papers/wbi.html>

McPherson, A.C., Glazebrook, C. & Smyth, A.R. (2005). Educational interventions: Computers for delivering education to children with respiratory illness and to their parents. **Paediatric Respiratory Reviews**, 6, 215-226.

Merrill, M.D. (1997). Instructional transaction theory: An instructional design model based on knowledge objects. In R.D. Tennyson, F. Schott, N. Seel & S. Dijkstra (Eds.), **Instructional design: International perspective (pp. 381-394)**. New Jersey: Lawrence Erlbaum.

Merrill, M.D., Li, Z. & Jones, M.K. (1991). Instructional transaction theory: An introduction. **Educational Technology**, 31 (6), 7-12.

Mullen, E.J. (1994). Design of social intervention. In J. Rothman & E.J. Thomas (Eds.), **Intervention Research (pp. 25-54)**. New York: Haworth.

Muse, H.E. (2003). The Web-based community college student: An examination of factors that lead to success and risk. **Internet and Higher Education**, 6 (3), 241-261.

Nadler, L. (1989). **Designing training programs: The critical events model**. New York: Addison-Wesley.

Nadler, L. & Nadler, Z. (1994). **Designing training programs: The critical events model (2nd Ed.)**. Texas: Gulf.

Nel, Z.J. (1999). The career choice theory of John Holland. In G.B. Stead & M.B. Watson (Eds.), **Career psychology (pp. 47-66)**. Pretoria: Van Schaik.

Nel, Z.J. & Prinsloo, A. (1999). Career counselling skills. In G.B. Stead & M.B. Watson (Eds.), **Career psychology (pp. 105-122)**. Pretoria: Van Schaik.

O'Halloran, T.M., Fahr, A.V. & Keller, J.R. (2002). Career counselling and the information highway: Heeding the road signs. **The Career Development Quarterly**, **50** (4), 371-376.

Oliver, L.W. & Chartrand, J.M. (2000). Strategies for career assessment research on the Internet. **Journal of Career Assessment**, **8** (1), 95-103.

Papanikolaou, K.A., Grigoriadou, M., Magoulas, G.D. & Kornilakis, H. (2002). Towards new forms of knowledge communication: The adaptive dimension of a Web-based learning environment. **Computers & Education**, **39**, 333-360.

Passerini, K. & Granger, M.J. (2000). A developmental model for distance learning using the Internet. **Computers and Education**, **34**, 1-15.

Pear, J.J. & Crone-Todd, D.E. (2002). A social-constructivist approach to computer-mediated instruction. **Computers and Education**, **38**, 221-231.

Pierce, L. & September, R. (2000). Reconceptualizing child maltreatment: Providing better services for children and families in South Africa. **Social Development Issues**, **22** (1), 30-34.

Pretorius, T.B. (1999). Computers and career guidance. In G.B. Stead & M.B. Watson (Eds.), **Career psychology (pp. 142-160)**. Pretoria: Van Schaik.

Prince, J.P. & Chartrand, J.M. (2000). Constructing a quality career assessment site. **Journal of Career Assessment**, **8** (1), 55-67.

Reid, W.J. (1994). Field testing and data gathering on innovative practice interventions in early development. In J. Rothman & E.J. Thomas (Eds.), **Intervention Research (pp. 245-264)**. New York: Haworth.

Ritterband, L.M., Gonder-Frederick, L.A., Cox, D.J., Clifton, A.D., West, R.W. & Borowitz, S. M. (2003). Internet interventions: In review, in use, and into the future. **Professional Psychology: Research and Practice**, **34** (5), 527-534.

Riva, G. & Galimberti, C. (2001). The mind in the Web: Psychology in the Internet age. **Cyberpsychology & Behavior**, **4** (1), 1-5.

Rogers, E.M. (1983). **Diffusion of innovations (3rd ed)**. New York: Free Press.

Rothman, J. (1980). **Social R & D: Research and development in the human services**. New Jersey: Prentice-Hall.

Rothman, J. & Thomas, E.J. (Eds.). (1994). **Intervention research**. New York: Haworth.

Rothman, J., Erlich, J.L. & Teresa, J.G. (1976). **Promoting innovation and change in organisations and communities**. New York: Wiley.

Rothman, J., Erlich, J.L. & Teresa, J.G. (1978). **Fostering participation and promoting innovation: Handbook for human service professionals**. Illinois: Peacock.

Rothman, J. & Tumblin, A. (1994). Pilot testing and early development of a model of case management intervention. In J. Rothman & E.J. Thomas (Eds.), **Intervention Research (pp. 215-243)**. New York: Haworth.

Rothwell, W.J. & Kazanas, H.C. (1998). **Mastering the instructional design process: A systematic approach (2nd Ed.)**. San Francisco: Jossey-Bass.

Rudolph, L.C. (1995). Framework for ethical decision making in philanthropy: A matrix of relationships. In J.E. Tropman, J.L. Erlich & J. Rothman (Eds.), **Tactics and techniques of community intervention (365-386)**. Illinois: Peacock.

Sampson, J.P. (1999). Integrating Internet-based distance guidance with services provided in career centers. **The Career Development Quarterly**, **47** (3), 243-254.

Sampson, J.P. & Lumsden, J.A. (2000). Ethical issues in the design and use of Internet-based career assessment. **Journal of Career Assessment**, **8** (1), 21-35.

Sampson, J.P., Kolodinsky, R.W. & Greeno, B.P. (1997). Counseling on the information highway: Future possibilities and potential problems. **Journal of Counseling and Development**, **75**, 203-213.

Scafati, A.A. (Fall, 1998). A case study for the systems approach for developing curricula: Don't throw out the baby with the bath water. **Acquisition Review Quarterly**, 387-393.

Scheepers, H.F. (1996). **Die ontwikkeling en evaluering van 'n interaktiewe loopbaanwerkboek**. Unpublished doctoral thesis. Rand Afrikaans University.

Schott, F. & Seidl, P. (1997). PLANA: An ID model focusing on instructional task analysis. In R.D. Tennyson, F. Schott, N. Seel & S. Dijkstra (Eds.), **Instructional design: International perspective (pp. 395-412)**. New Jersey: Lawrence Erlbaum.

Seale, J.K. & Cann, A.J. (2000). Reflection on-line or offline: The role of learning technologies in encouraging students to reflect. **Computers and Education**, **34**, 309-320.

Seel, N.M. (1997). Models of instructional design: Introduction and overview. In R.D. Tennyson, F. Schott, N. Seel & S. Dijkstra (Eds.), **Instructional design: International perspective (pp. 355-359)**. New Jersey: Lawrence Erlbaum.

Seel, N.M. & Winn, W.D. (1997). Research on media and learning: Distributed cognition and semiotics. In R.D. Tennyson, F. Schott, N. Seel & S. Dijkstra (Eds.), **Instructional design: International perspective (pp. 293-326)**. New Jersey: Lawrence Erlbaum.

Siegel, L.M., Attkisson, C.C. & Carson, L.G. (1995). Need identification and program planning in the community context. In J.E. Tropman, J.L. Erlich & J. Rothman (Eds.), **Tactics and techniques of community intervention (pp. 296-307)**. Illinois: Peacock.

Simonson, M. (1995). Instructional technology and attitude change. In G.J. Anglin (Ed.), **Instructional technology: Past, present, and future (2nd Ed.) (pp. 365-383)**. Colorado: Libraries Unlimited.

Simms, R. (2003). Interactivity and feedback as determinants of engagement and meaning in e-learning environments. In S. Naidu (Ed.). **Learning and teaching with technology (pp. 261-275)**. London: Kogan Page.

Sinclair, J.T., Sinclair, L.W. & Lansing, J.G. (2002). **Creating Web-based training: A step-by-step guide to designing effective e-learning**. New York: Amacom.

Spence-diehl, E.E. (2002). **The early development and pilot-testing of a case management intervention with victims of stalking: An evaluation study**. Unpublished dissertation. Florida International University.

Squires, D. & Preece, J. (1996). Usability and learning: Evaluating the potential of educational software. **Computers & Education, 27** (1), 15-22.

Sternberg, R.J. (2003). **Cognitive psychology (3rd ed.)**. Australia: Wadsworth.

Sugrue, B. (2000). Cognitive approaches to Web-based instruction. In S.P. Lajoie, **Computers as cognitive tools: No more walls (Vol. 2) (pp. 133-162)**. New Jersey: Lawrence Erlbaum.

Tennyson, R.D. (1997). A system dynamics approach to instructional systems development. In R.D. Tennyson, F. Schott, N. Seel & S. Dijkstra (Eds.), **Instructional design: International perspective (pp. 416-426)**. New Jersey: Lawrence Erlbaum.

Tennyson, R.D. & Breuer, K. (1997). Psychological foundations for instructional design theory. In R.D. Tennyson, F. Schott, N. Seel & S. Dijkstra (Eds.), **Instructional design: International perspective (pp. 113-134)**. New Jersey: Lawrence Erlbaum.

Thomas, E.J. (1978). Generating innovation in social work: The paradigm of developmental research. **Journal of Social Service Research**, 2, 95-115.

Thomas, E.J. (1984). **Designing interventions for the helping professions**. London: Sage.

Thomas, E.J. (1992). The design and development model of practice research. In A.J. Grasso & I. Epstein (Eds.), **Research utilization in the social services: Innovations for practice and administration (pp. 71-92)**. New York: Haworth.

Thomas, E.J. (1994). Evaluation, advanced development, and the unilateral family experiment. In J. Rothman & E.J. Thomas (Eds.), **Intervention Research (pp. 267-295)**. New York: Haworth.

Thomas, E.J. & Rothman, J. (1994). An Integrative perspective on intervention research. In J. Rothman & E.J. Thomas (Eds.), **Intervention research**. New York: Haworth.

Triantafillou, E., Pomportsis, A. & Demetriadis, S. (2003). The design and the formative evaluation of an adaptive educational system based on cognitive styles. **Computers & Education**, 41, 87-103.

Tropman, J.E., Erlich, J.L. & Rothman, J. (1995). **Tactics and techniques of community intervention (3rd ed.)**. Illinois. Peacock.

Van Merriënboer, J.J.G. & Dijkstra, S. (1997). The four-component instructional design model for training complex cognitive skills. In R.D. Tennyson, F. Schott, N. Seel & S. Dijkstra (Eds.), **Instructional design: International perspective (pp. 427-445)**. New Jersey: Lawrence Erlbaum.

Vygotsky, L.S. (1986). **Thought and language**. Kozulin, A. (revised). London: MIT.

Wallace, L., Jagose, A. & Gunn, C. (2003). Virtual learning in cultural studies: Matching subject content and instructional delivery. In S. Naidu (Ed.). **Learning and teaching with technology (pp. 97-112)**. London: Kogan Page.

Walters, S.T., Miller, E. & Chiauuzzi, E. (2005). Wired for wellness: E-interventions for addressing college drinking. **Journal of Substance Abuse Treatment**, **29**, 139-145.

Wang, J. & Etter, J. (2004). Administering an effective health intervention for smoking cessation online: The international users of Stop-Tabac. **Preventive Medicine**, **39**, 962-968.

Waschull, S.B. (2001). The online delivery of psychology courses: Attrition, performance, and evaluation. **Teaching of Psychology**, **28** (2), 143-147.

Washington, R.O. (1995). Alternative frameworks for program evaluation. In J.E. Tropman, J.L. Erlich & J. Rothman (Eds.), **Tactics and techniques of community intervention (pp. 296-307)**. Illinois: Peacock.

Whitlock, Q. (2001). Course design for online learning: What's gone wrong? In J. Stephenson (Ed.), **Teaching and learning online: Pedagogies for new technologies (pp. 182-194)**. London: Kogan Page.

Willingham, D.T. (2004). **Cognition: The thinking animal (2nd ed.)**. New Jersey: Prentice-Hall.

Wilson, B. (1997). Reflections on constructivism and instructional design. In C.R. Dills & A. A. Romiszowski (Eds.), **Instructional Development Paradigms**. Englewood Cliffs NJ: Educational Technology.

Ybarra, M.L. & Eaton, W.W. (2005). Internet-based mental health interventions. **Mental Health Services Research**, **7** (2), 75-87.

Zabinsky, M.F., Wilfley, D.E., Calfas, K.J., Winzelberg, A.J. & Taylor, C.B. (2004). An interactive psychoeducational intervention for women at risk of developing an eating disorder. **Journal of Consulting and Clinical Psychology**, **72** (5), 914-919.

Zunker, V.G. (2002). **Career counselling: Applied concepts of life planning**. Australia: Wadsworth.