

Holistic Personas for Designers of a Context-Aware Accounting Information Systems e-Learning Application

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Abstract

E-learning systems have been increasingly used to train and empower employees to take a more active role in the creation and dissemination of system knowledge, when, either new systems are installed, or existing systems are changed due to organizational changes. In recent years, there is a greater demand for information from Accounting Information Systems (AIS). Despite a growing demand for e-learning systems, there is a lack of research on eliciting requirements for design of a Context-Aware Accounting Information Systems e-Learning Application (CAAISeLA). This paper describes how Holistic Personas, archetypical learners and users of AIS, can assist designers to elicit requirements for design of a context-aware AIS e-learning application for employees. We designed AIS e-learning resources using Holistic Personas and empirically tested them. The use of Holistic Personas demonstrates that users' needs were addressed which otherwise would not have been detected. We present empirical results of 20 employees at an Australian university who participated in evaluating the effectiveness of various e-learning resources. The results demonstrate that learners' characteristics and educators' teaching methods influence learners' choice of e-learning resources and Holistic Personas can be used for design of a CAAISeLA. The novel contribution of this paper is the application of the Holistic Personas to the design of AIS e-learning resources and the empirical findings that extend the multiple-perspectives of the Adult Learning theory, the Self-Determination theory and the Constructivist Learning theory to the design of CAAISeLA.

Keywords: Context-aware e-learning resources, Holistic Personas, Accounting Information System, Self-Determination theory, Constructivist Learning theory.

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1. Introduction

In recent years, there is a greater demand for information from Accounting Information Systems (AIS) [8]. Based on a decade of teaching staff on how to use AIS, as well as managing AIS, the lead author has observed the following: (1) in the university environment, AIS users consist of a diverse range of roles and responsibilities that include both professionals and academics; (2) the university is a dynamic organization and hence users of AIS frequently change; (3) during the past five years

there has been an increase in the number of users as their vigilance over budget has increased; (4) the traditional face-to-face AIS training workshops do not adequately address the needs of all users as the interaction time is limited, teaching resources are scarce and the waiting time for scheduled face-to-face training workshops is long; (5) senior professionals and academics cannot devote a set period of time to participate in face-to-face training workshops; (6) in recent years the accessibility and mobility of the computing equipment has changed the time and place the users work and learn, with the resultant increase in demand for e-learning applications. Hence to

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empower employees to take active roles in the training and use of the AIS is a complex process due to diversity of users involved.

The User-Centered Design (UCD) methodology considers the goals of the users as a primary requirement of software applications. Designers of e-learning applications can deliver better usability if they take into account each learner's characteristics and expertise [16]. In order to gather information about users' requirements at the business process level, each group of users should contribute their requirements. However, it is often not possible for designers to meet with all users of diverse groups. Persona, an archetypical user of an application, is widely used by software engineers to design applications that are focused on the needs of users. For example, Madsen et al. [32] used personas, which they created, to assist with designing a personalized professional development website. Dantin [14] used personas to evaluate user interfaces of two small educational applications. Kozar and Miaskiewicz [29] used personas to design a student-centered approach introductory Information Systems course. Salomão et al. [40] defined personas of university students for the development of a digital educational game to learn foreign language. Personas developed with photos of real people and scenarios with a storyboard can be more effective artifacts [31] in software design. Based on the literature and drawing on years of experience in Information Systems industry, Anvari and Tran [6] proposed a framework to develop Holistic Personas which are structured and better represent the end users. A Holistic Persona consists of five dimensions: factual, personality, intelligence, knowledge and cognitive process. Factual dimension covers details such as demographics, interests, etc. which are not covered in other dimensions. Holistic Personas have been used in the design of teaching material in computing [5].

Context-aware applications have been deployed extensively [47]. The goal of context-aware applications is to make interaction with computers easier [21]. In the context of online learning, applications need to present relevant learning materials to the learners. Most context-aware applications address learners' context such as location, time, surrounding resources and learners' learning styles. Our extensive literature search was unable to identify any study that reports how users of AIS use e-learning resources to learn in the context of workplace environments and how designers consider the multiple perspectives and multiple characteristics of diverse users towards learning AIS.

This paper describes how Holistic Personas can assist designers to elicit requirements for designing context-aware AIS e-learning applications for employees. The findings of our empirical study will be valuable for educators and designers who are interested in designing context-aware e-learning applications for employees.

The rest of the paper is organized as follows: (2) background and related work; (3) methodology: the Five-Dimensional Requirements Elicitation Framework

(5DREF) [44]; the design of e-learning resources using Holistic Personas and procedure; (4) results; (5) discussion; (6) contributions and limitations; (7) conclusion.

2. Background and Related Work

There are many definitions of context-awareness. For example Li et al. [30] defined five context dimensions as who (user), what (object), how (activities), where (location), and when (time). Verbert, Manouselis, Ochoa, Wolpers, Drachsler, Bosnic and Duval [47] presented the components of various context definitions: location, time, physical conditions, computing resource, user and their activities, and social situations. Abowd and Mynatt [1] identified the five W's (Who, When, What, Why, Where) as the minimum necessary information to understand context. Dey, Abowd and Salber [21, p. 106] stated that context-aware applications consider "*any information that can be used to characterize the situation of an entity. An entity is a person, place, or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves*". Synthesizing context-awareness definitions from the literature [1,21,30,47] and reflecting on our experiences in designing AIS teaching materials, we have identified that in addition to *why, who, when, what and how, evaluation* is needed to characterize the interaction between a user and a CAAISeLA.

Why: The 'Why' addresses context-aware features such as learning styles, teaching methods and strategies. Tynjälä and Häkkinen [46] note that for successful e-learning solutions for workplace environment, knowledge from various sources should be integrated. Educators employ different learning theories to teach. Hence CAAISeLA needs to provide different sets of tools to support educators to develop e-learning resources. For example in a direct instructional approach, educators break a new body of knowledge into small steps with clear objectives to provide learners with the opportunity to practice with feedback on each step learnt [33]. According to Constructivist Learning theory [39] learning is an active process of creating meaning from experiences based on the learner's current or past knowledge [20] and constructivist learning occurs when the '*learner actively builds a mental model of the system she is to learn*' [12, p. 74]. '*E-Learning, or better computer supported learning, focuses on the individual's acquisition (or rather construction) of new knowledge and the technological means to support this construction process*' [41, p. 204]. Socio-constructivist theory states that interaction between learners and their peers is a necessary part of the learning process [48]. Hence educators of Socio-constructivist theory provide forums to promote social interaction and learning. Educators of scaffolding instruction teach students concepts that are just above their knowledge level by encouraging them to do an activity to improve beyond their current skills level [26, p. 138]. Hence some

educators include quizzes to provide scaffolding instructions or provide e-learning materials that are less guided such as scenario writings to encourage learners ‘to produce some outputs that are not contained in or presented in the learning materials’ [12, p. 79].

Who: In the context of AIS e-learning, the ‘Who’ is diverse and each group of users has specified learning objectives [43]. When users are not available to elicit requirements, personas can be used in designing e-learning applications [32,34,38]. For example, Maier and Thalmann [34] created three personas, that represented three distinctive informal learner types that resulted in three service areas: ‘*individuation, interaction and information*’ [34p. 59]. Panke, Gaiser and Werner [38] incorporated personas that offer information on how to integrate digital media into teaching. Anvari and Tran [6] and Anvari et al. [4] used Holistic Personas for design of learning applications.

When: Users of AIS are adults. Adults are motivated to learn by internal factors [28]. Therefore to design AIS context-aware applications, designers should consider when learners are motivated to learn. Yoo et al. [52] found that ‘intrinsic motivators (effort expectancy, attitudes and anxiety) affected employees’ intention to use e-learning in the workplace more strongly than did the extrinsic motivators (performance expectancy, social influence and facilitating conditions)’ (p.942). Deci and Ryan [17]’s Self-determination theory states that a person’s motivation depends on the fulfilment of the needs for competence, relatedness and autonomy.

What: In a work environment, learning materials need to promote learners’ new knowledge that ‘*can be transferred back to job and utilization of new skills to enhance organizational performance*’ [49, p. 194]. Bloom’s Revised Taxonomy incorporates the Knowledge Dimension and the Cognitive Process Dimension. The Knowledge Dimension considers what learners need to learn. The ‘What’ to learn for a CAAISeLA contains *Factual, Conceptual, Procedural* and *Meta-cognitive knowledge* [3] of AIS.

How: The ‘How’ considers learners’ view of the Cognitive Process because the Cognitive Process explains how participants construct new knowledge from the e-learning resources provided. According to Bloom’s taxonomy there are six levels: *Remember, Understand, Apply, Analyze, Evaluate* and *Create*; with *Remember* being the least complex and *Create* being the highest rung of the Cognitive Process [3]. Different levels of cognitive processes require different functional tools for educators to design e-learning resources for diverse learners [44]. Hence depending on capabilities of the users and how they learn, CAAISeLA needs to provide a varied format and order of presentation for the e-learning materials.

Evaluation: Learners, domain experts, educators and other stakeholders evaluate the e-learning application from their own perspective. An e-learning application should have tools to provide timely feedback to learners so that they can self-evaluate their performances and for

educators to monitor learners’ activities and progresses [44].

3. Methodology

This section discusses the application of the 5DREF and Holistic Personas for the design of context-aware AIS e-learning resources and the procedure for the study.

3.1. The Five-Dimensional Requirements Elicitation Framework

Synthesizing the literature and reflecting on many years of experiences in designing learning materials, and in teaching adults AIS in workplace environments, we presented the 5DREF that consists of five dimensions to guide the design of questionnaires for requirements elicitation and usability evaluation of a system [44].

The 5DREF consists of five dimensions: Change Management, User Characteristics, Knowledge, Cognitive-process and Evaluation. The 5DREF provides the designer a structure to elicit requirements from stakeholders and users of the applications. The questions asked are: why to change, who is involved in the change, what and how to change, and reflection on the change.

Each dimension is discussed in the following five subsections. In a context of AIS e-learning applications, the 5DREF provides a framework for designers to focus on (1) why (need) educators teach in certain ways, (2) who (users) are involved in the learning process, (3) what (resources) and (4) how (activity, social) learners learn, and (5) evaluate the teaching and learning process.

Each dimension is discussed below.

(1) Change Management (Curriculum Development) Dimension:

The Change Management dimension, the ‘why’ to change, consists of nine interrelated factors: Capacity building, Champions of change, Collaboration, Communication, Coherence-making, Communities, Culture for learning and evaluation, Curriculum development and Continuous improvement [44].

In designing a CAAISeLA, the focus of change management was on the curriculum development factor only. To address the ‘Why’, we investigate the way learning resources are used by educators. In this paper, we examine the *Curriculum Development* factor of the *Change Management* dimension [44].

E-learning resource requirements are often elicited from educators. For example, the educator in our study applied Piaget [39]’s Constructivist Learning Theory and Deci and Ryan [17]’s Self-Determination Theory to her teaching.

(2) User (or Learner) Characteristics Dimension: In the light of CAAISeLA, this dimension is referred as the *learner* dimension, the ‘who’. It addresses, the *User Characteristics*.

At the university where this research was conducted, the majority of the users of AIS (about 72%) were female and a greater number of professionals use AIS compared with academics. Hugo [25] in analysis of 2001 demographics data in Australian universities found that 55% the professionals who were 40 years old or younger were female. The study confirms the gender of the sample population in our study. For our study we selected a female professional as one of the representative AIS users. Further in the university environment a senior academic is a highly regarded position. Hence to avoid gender inequality misinterpretations, the second Holistic Persona representing an academic was also a female.

Hence for our study to assist the designer (the lead author), we authored two female Holistic Personas, Megan and Kim, to represent AIS users. Megan and Kim had the following attributes: demographics, personalities, intelligence, knowledge and cognitive process that were proposed by Anvari and Tran [6].

The description of Holistic Personas Megan and Kim are listed in the Appendix A.

(3) Knowledge Dimension: In the light of CAAISeLA, the Knowledge dimension addresses ‘what’ to teach.

To be context-aware, online AIS needs to take into account learners’ existing knowledge and experiences and allow learners to choose their own target levels of knowledge to be gained at the conclusion of sessions and select contents that are relevant to them.

The Holistic Personas’ prior knowledge of AIS was taken into account for the design of e-learning materials. In our study, the prior knowledge of AIS of the Holistic Personas’, Megan and Kim, were taken into account during the design of the e-learning resources. For example we designed e-learning materials that included factual and conceptual knowledge for Holistic Persona Megan who had no prior knowledge of the subject matter. We also designed procedural knowledge materials, advanced queries and resources to include in the e-learning materials for Holistic Persona Kim to reflect and to construct meta-cognitive knowledge.

(4) Cognitive Process Dimension: In the light of CAAISeLA, the Cognitive Process dimension considers how learners learn. Cognitive Process dimension has six levels: *Remember, Understand, Apply, Analyze, Evaluate and Create* [3].

The *Cognitive Process* dimensions assist the design of e-learning resources that are context-aware for diverse learner groups who engage with the learning materials using different levels of the cognitive processes. For example to encourage learners to learn at the higher rung of the cognitive process dimension, real-life worked-example scenarios [19] were provided.

Holistic Personas Megan and Kim presented different levels of Knowledge and Cognitive Process dimensions which were taken into account in the design of a CAAISeLA. Each Holistic Persona represented the needs of different learner groups who had specified goals at different levels of knowledge and cognitive processes.

(5) Evaluation Dimension: The Evaluation dimension helps researchers and educators to monitor the effectiveness of the teaching and learning processes. This study discusses educators’ as well as learners’ reflective evaluation of the e-learning resources.

The researcher and the educator “may reflect on the feeling for a situation which has led him to adopt a particular course of action” [42, p. 62]. Most influential adult learning theories place a high emphasis on personal reflection on the learner’s experiences [46]. Reflection is a strategy to unearth tacit knowledge, to examine from multiple perspectives, to self-challenge and open practitioners and learners to new insights and meta-cognitive self-review [13]. Reflection turns experience into knowledge [13,42]. Reflective practitioners improve their professional skills based on their on-going reflection with respect to their performance during and after the accomplishment of a process of creation [42].

This paper reports on our evaluation and participants’ evaluation of the e-learning resources for our online AIS course.

3.2. The Design of Online AIS learning resources using Holistic Personas

We developed e-learning resources for an online AIS course, which allows the educator to enroll participants, follow their learning progress through log files, and interact with them. This section presents the design of context-aware e-learning resources that teaches Chart of Accounts (COA). The study was conducted between November 2015 and January 2016 and between May 2016 and July 2016. In this study we targeted the needs of AIS users who would attend the study: administrative staff at middle rank and academic staff at researcher and lecturer levels.

The AIS e-learning resources: In this study the effectiveness of the e-learning resources designed based on the guided-construction method (Detailed Documentation method) and non-guided construction method (the Holistic Persona and Scenario method) were studied. The knowledge, cognitive-process and curriculum development dimensions of the 5DREF provided guidelines for the design of e-learning resources.

Considering Self-Determination Theory as a teaching and learning strategy, we included various types of e-learning resources e.g. textual documents, visual posters, videos, quizzes, reflective exercises and forums for learners of various learning styles to self-direct learning in the non-guided construction method. The Detailed Documentation method was designed using the direct instruction and scaffolding strategy.

The study flowchart is illustrated in figure 1.

The guided-construction method consisted of the following five e-learning resources (figure 1).

1. Textual Webpage: The key concepts were documented on a simple webpage that aimed at

scaffolding participants to learn at factual and conceptual knowledge.

2. Word COA Document (Appendix B.1): A Word document on COA, which aimed to facilitate learning of conceptual and procedural knowledge, was designed to scaffold participants like Megan who were new to AIS and participants like Kim to refresh their knowledge of AIS.

3. Word COA SelCode Document (Appendix B.2): A Word document on COA aimed to facilitate learning of procedural knowledge at an advanced level.

4. Forum Reflection: A forum encouraged reflective activities which aimed at facilitating learning of meta-cognitive knowledge.

5. Quiz Key Concepts (Appendix C): This quiz consisted of 10 questions. It was also referred as the core quiz. Learners needed to participate in this quiz before they could access the e-learning resources from the other method.

The guided-construction method was designed using scaffolding instruction as a teaching strategy. The first three e-learning resources (items 1-3) were primarily textual with some visual images. The e-learning resource documents were written in sequential order in an increasing level of complexity from easy to medium. The initial materials that were the least complex were to assist participants with entry level of AIS knowledge. Kim with her moderate level of knowledge would need only to glance through the first and second documents. It was expected that Kim would go directly to the third document. However Megan would need to study only the first two documents. The 4th e-learning resource (item 4) was a forum. To encourage active learning, participants were required to initially post their reflection then they were able to read other participants' postings. The forum was provided for learners to post their work at the cognitive process level 'Analyze, Evaluate and Create' [3] as well as to read and to raise questions. The 5th e-learning resource (item 5) was the quiz to test participants COA key concepts. The quizzes scaffolded learners at the cognitive process levels of 'Understand' and 'Apply'. In short, the guided-construction method provided e-learning resources with step-by-step instructions and detailed documents.

The non-guided construction method was designed using Constructivist Learning with scaffolding strategy and Self-determination theory as a teaching strategy. Participants could construct their knowledge through their understanding of the posters, actively learn by participating in the quizzes and reflect on questions that were raised in the forums. They could also interact with peers and the facilitator via forum postings or by emails.

The non-guided-construction method consisted of the following 11 e-learning resources. (Figure 1)

1. Poster COA (Appendix D.1): The contents of the poster were similar to the textual webpage but the contents were presented visually using limited textual descriptions. This poster was designed for participants like Megan who 'likes to have a mental model of how it

works' (Appendix A) to construct her conceptual knowledge of AIS.

2. Forum One Page Poster: This forum was designed to encourage participants like Kim to share her conceptual and procedural knowledge of AIS with participants like Megan who are new to AIS. It was expected that Megan would gain enough knowledge to ask relevant questions.

3. Quiz One Page Poster: This quiz had ten questions, shown in the Poster COA. It was designed to scaffold participants like Megan who prefer visual learning and are new to AIS, to learn to construct knowledge from a visual document with scaffolding strategy.

4. Word COA_OPS (Appendix B.1): This was an equivalent of Word COA Document (item 2 in the Guided Construction method).

5. Poster COA_PRJ: This was an equivalent of Word COA SelCode Document (item 3 in the guided-construction method). However it was visually presented rather than having textual contents to encourage constructivist learning activities. It was designed to solicit participants' preferences between visual and textual documents.

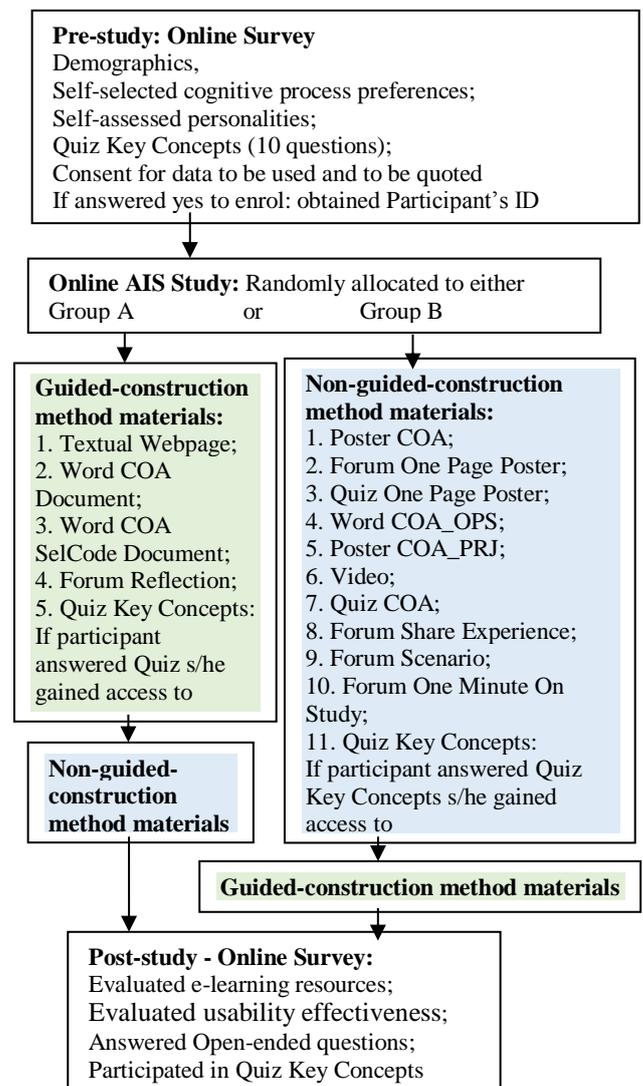


Figure 1: Study flowchart

6. Video: This is an equivalent of Word COA SelCode Document (item 3 in the guided-construction method) that aimed at facilitating learning at procedural knowledge. The video presented was designed to meet Megan's learning preferences.

7. Quiz COA: This quiz had 10 questions that required more advanced knowledge than the other quizzes. It was designed for participants who wished to learn more than the key concepts.

8. Forum Share Experience: This forum provided for peers sharing their learning and interacting with peers. It was designed in accordance with the Constructivist Learning theory.

9. Forum Scenario (Appendix D.2): This forum encouraged peer learning and learning at a high rung of cognitive processes. It aimed at facilitating learning at meta-cognitive knowledge.

10. Forum One Minute On Study (Appendix D.2): This forum encouraged reflective activities. It aimed at facilitating learning at meta-cognitive knowledge.

11. Quiz Key Concepts (Appendix C): This was the core quiz consisting of the same 10 questions as item 5 in the guided-construction method. Learners must participate in this quiz before they could have access to e-learning materials from the guided-construction method.

In sum, the non-guided-construction method had two additional quizzes that were designed to test both Megan and Kim as the quizzes contained questions that aimed at the cognitive process level 'Understand', as well as questions at the cognitive process levels 'Apply, Analyze and Evaluate'.

We analyzed Holistic Personas Megan's and Kim's multiple perspectives towards AIS learning. For example based on the description of Holistic Persona 'Megan is a deep thinker. She often researches knowledge in areas other than her expertise and considers how it can be transferred to her own field,' we designed posters for learners like Megan (e.g. Poster COA - Appendix D.1); because 'Megan likes to watch a short video to get an overview of the whole scenario. She learns by doing exercises and tests her knowledge by doing quizzes and tutorials' (Appendix A), a video and quizzes were included in our e-learning resources for learners like Megan; considering the characteristics of Megan who 'signs into a forum using a pseudonym only if she has to; otherwise she reads materials anonymously' (Appendix A) participants were allowed to post anonymously. However due to the limitations of the application, participants with pseudonym names were known to the educator.

Considering the description of Kim who 'is constantly looking at the ways university conduct business and seeks to improve it by questioning the reason for activities and how similar activities are carried out in other institutions' (Appendix A) we designed a number of forums for discussion; considering the characteristic of Kim who 'reads extensively all the information that she can find including blogs, wikis and forum postings' (Appendix A), there was a need to present text-based learning materials

and variety of e-learning resources for learners like Kim to construct meta-cognitive knowledge.

Reflecting on both Megan's and Kim's needs, we designed e-learning resources with the objective of providing relevant financial knowledge for professionals and academics and for relevant professional staff to improve business processes. For example, it includes the One-page poster on Project Chart of Accounts for Megan who 'has won a number of grants'; an exercise for Kim to describe to Megan how the Chart of Accounts works (Appendix D.3); Questions posed in Quizzes and Forums cover both Megan's and Kim's perspectives.

3.3. Procedure

In September 2015, we applied for ethics approval for the study which was granted by Macquarie University's Human Research Ethics Committee, effective 13/10/2015 (ethics reference number 5201500782). Between November 2015 and July 2016, university staff members who had attended or had expressed interest in attending the face-to-face training workshops over the previous years, were invited by the lead author via email to take part in the study. Participation was voluntarily and required completion of a consent form. The participants, those who gave consent to participate in the study, were given the option to allow materials from their input be quoted.

The participants answered a pre-study questionnaire with 19 questions about their demographics, cognitive process preferences for learning and personalities.

The Big-Five Factors of personality [23] Extraversion, Agreeableness, Conscientiousness, Emotional Stability and Imagination, is widely used in research to measure personality [7,9]. The questionnaires provided by Gosling et al. [24] were adopted to assess the participants' personalities. The bi-polar answers on a 7-point Likert scale were added together after reverse scoring the negative questions and recoded to provide results in the range of 0-12.

Ten questions in the pre-study (Quiz Key Concepts) were designed to assess participants' prior knowledge of the university's AIS. At the end of the pre-study survey, the participant was asked to provide her/his university ID if she/he wished to enroll in the Online AIS.

Those who chose to enroll were randomly assigned into Group A or Group B in such a way that the participants in both groups were evenly distributed. Participants could sign into the Online AIS any time. In the first session the participants received a brief introduction of the purpose of the study (see Appendix E) and the course contents. They were advised that the e-learning resources would be presented in two teaching methods.

At the conclusion of each method, the participant was required to complete a quiz consisting of 10 questions, which was the same as the pre-study 10-questionnaire test, to gain access to the other method. This quiz was called

Quiz Key Concepts. The questions in the quiz increased in level of difficulty from easy to medium level.

Upon completion of the study, the participants were asked to answer a post-study survey to provide feedback on their overall experience of using the Online AIS and to answer the same 10-questionnaire test again. The purpose of conducting same test multiple times was to measure participants' increasing understanding of the key concepts as they progressed through the Online AIS study. The results of the participants' performance in the quiz tests will be reported in another paper as they are beyond the scope of this paper.

Data was collected from the pre and post-study surveys and, from the application's log files that tracked participants' activities such as sign in time and duration of time the participants accessed the learning materials.

Data, from log files and the post-study survey was collected to access the effectiveness of the learning resources and the usability of the Online AIS for self-directed learning as empirical studies have found that usability is one of the top three most important quality requirements [2,15].

4. Results

The objective of this paper is to report on how we have used Holistic Personas to develop various e-learning resources; how educators consider the multiple perspectives and multiple characteristics of users towards learning AIS and how learners rate the effectiveness of the various e-learning resources. Hence we will present the results of demographics, participants' personalities, e-learning resources that were accessed by participants and participants' evaluation of the e-learning resources of our Online AIS.

4.1. Participants' demographics:

Twenty-eight people, from faculties and offices throughout the university, participated in the pre-study survey. Twenty-five people enrolled in the Online AIS study. Five people never signed into the Online AIS hence they were excluded from the analysis.

The sample population for group A is 10 participants, for Group B is 10 participants and for the whole study is 20 participants (the sample population). They were from Faculty of Science and Engineering, Faculty of Human Sciences, Faculty of Medicine and Health Sciences, Deputy Vice Chancellor Academic Office, Learning and Teaching Centre, Campus Wellbeing, Widening Participation Unit and Office of Financial Services. There were 10 Admin Officers, 2 Finance Officers, 3 Head Department Professionals, 1 Business Manager, 2 IT Officers, 1 Accountant and 1 Postgraduate Student. Three participants never attended any training about the University's financial systems prior to this online study.

4.2. Participants' personalities:

The resultant data of the self-assessment of personality factors provided by the sample population is treated as interval-level data, converted to percentages. The mean values, in percentages, of the rating given to each personality factor by the sample population are presented in figure 2 and table 1.

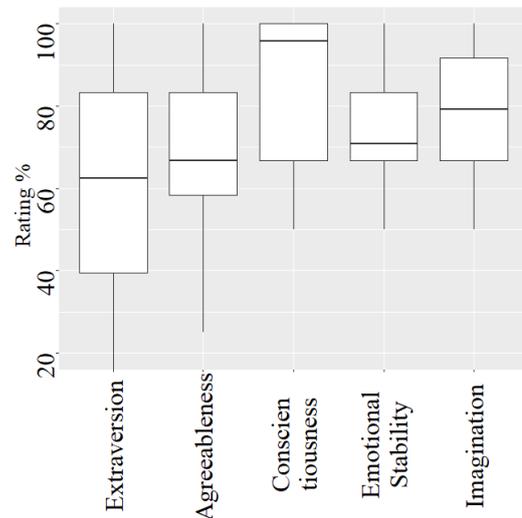


Figure 2: Participants' personality

Table 1. Personality of the participants

Personality	Mean(%)	SE (%)
Extraversion	59.2	5.7
Agreeableness	68.3	4.0
Conscientiousness	85.0	4.1
Emotional Stability	72.9	3.4
Imagination	80.0	3.2

4.3. Participants' access to each of the learning resources:

Each participant accessed at least one e-learning resource. Figure 3 provides the percentage of the sample population who accessed the e-learning resources.

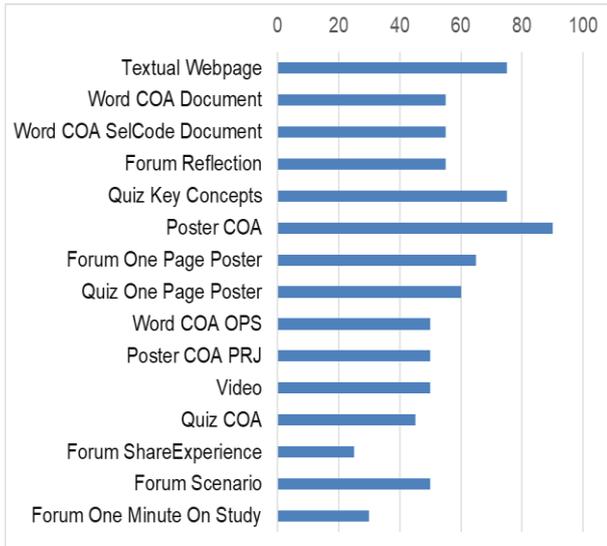


Figure 3: Percentage of Participants accessed e-learning resources

4.4. Participants' evaluation:

Fourteen participants (70% of the sample population) completed the post-study survey. To measure the usability of the items provided the following question was asked: 'I found the following online tools and resources effective for my self-directed learning'. The participants rated each of the ten items listed in the column Question of table 2 on a Likert scale (1-disagree strongly, 7-agree strongly). The resultant data is converted to percentages and analyzed (Anvari et al. 2015, Norman 2010). Figure 4 shows the information presented in table 2 graphically.

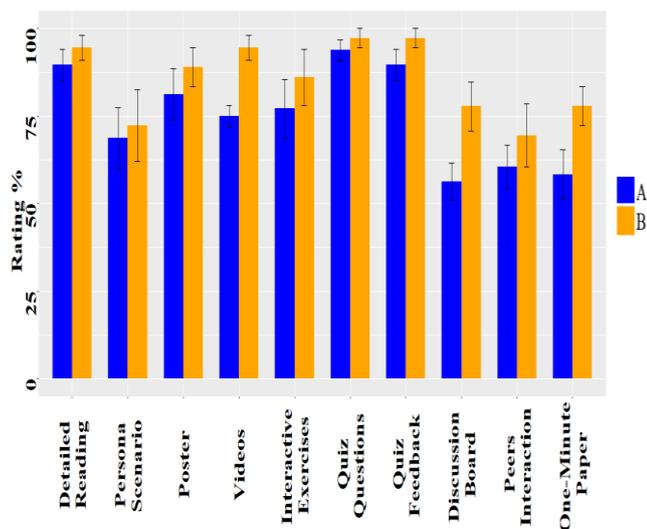


Figure 4. Effectiveness of the e-Learning Resources

Table 2: Post-Study Survey Questionnaire - Effectiveness

Question	Short phrase (used in figure 4)	Group	Mean %	SE %
1 Detailed Reading materials	Detailed Reading	A	89.6	4.4
		B	94.4	3.5
2 Holistic Persona and Scenario	Persona Scenario	A	68.8	8.6
		B	72.2	10.2
3 One-page poster	Poster	A	81.3	7.3
		B	88.9	5.6
4 Videos	Videos	A	75.0	3.1
		B	94.4	3.5
5 Interactive Exercises	Interactive Exercises	A	77.1	8.3
		B	86.1	8.0
6 Quiz question	Quiz Questions	A	93.8	3.0
		B	97.2	2.8
7 Quiz feedback	Quiz Feedback	A	89.6	4.4
		B	97.2	2.8
8 Discussion Board	Discussion Board	A	56.3	5.4
		B	77.8	7.0
9 Peers Interaction	Peer Interaction	A	60.4	6.3
		B	69.4	9.0
10 One-Minute Paper	One-Minute Paper	A	58.3	7.0
		B	77.8	5.6

The participants were asked to provide feedback on the usability of the Online AIS for self-directed learning. They rated nine items on the usability effectiveness as listed in the column Question of table 3. The participant responses were measured on a Likert scale (1-disagree strongly, 7-agree strongly). The questions are listed in table 3 with mean and standard error (se) in percentages.

Figure 5 shows the information presented in table 3 graphically.

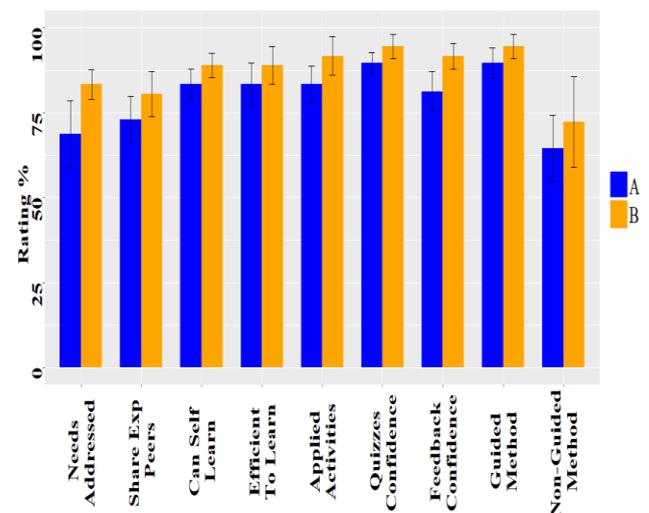


Figure 5. Rating of the Usability of the Online AIS

Table 3: Post-Study Survey Questionnaire - Usability

Question	Short phrase (used in figure 5)	Group	Mean %	SE %
1 My needs, mentioned in my pre-study survey form, have been addressed effectively	Need Addressed	A	68.8	9.7
		B	83.3	4.3
2 Online AIS has utilities that effectively assist me to share my experiences with my peers	Share Exp Peers	A	72.9	7.0
		B	80.6	6.7
3 Online AIS provides me with feedback that I can use to self-manage my learning	Can Self Learn	A	83.3	4.5
		B	88.9	3.5
4 I have found Online AIS is an efficient way to learn	Efficient To Learn	A	83.3	6.3
		B	88.9	5.6
5 Online AIS provides worked-examples and activities that I can effectively apply	Applied Activities	A	83.3	5.5
		B	91.7	5.7
6 Online AIS has utilities (quizzes & examples) that builds my confidence in Finance One	Quizzes Confidence	A	89.6	3.0
		B	94.4	3.5
7 Online AIS provides me with feedback that build my confidence in Finance One	Feedback Confidence	A	81.2	5.8
		B	91.7	3.7
8 I find the Detailed Documentations method effective.	Guided Method	A	89.6	4.4
		B	94.4	3.5
9 I find the Holistic Persona and Scenario method effective.	Non-Guided Method	A	64.6	9.7
		B	72.2	13.4

4.5. Participants' post-study survey - time spent and preferred method:

Fourteen participants completed the post-study survey. As part of the survey they answered questions on time spent and preferred study method. Majority of participants (93%) rated the guided-construction method adequate or good or excellence while only 79% participants rated the non-guided construction method for a similar scale. Table 4 and 5 presents the results.

Table 4: Participants' answers to the time they spent on learning

Participant reported time spent on	Mean (minutes)	SE(%)
Guided construction	30	3.7
Non-guided construction	34	5.3
Both methods	64	

Table 5: Participants' answers to their preferences of the teaching methods

Participant For Online AIS study prefer to use	%
Only Guided construction method	50
both methods	50

5. Discussion

The design of CAAISeLA for this study was guided by the five dimensions of the 5DREF [44]: who (the learners), why (the learning theories), what (the knowledge), how (the cognitive process) and finally an evaluation of the study. In this section we reflect on the study, its design and the results obtained.

5.1. The Learners:

The participants were staff at an Australian university. Participants received no financial gain. As participation was voluntary and the learners had to spend about an hour of their work time in doing the study, without receiving any compensation or financial gain, the e-learning resources were designed to maximize the participants' intrinsic motivation to learn AIS [52]

- **Effort expectancy:** Learning materials in this study were designed to meet learners' expectation of effort. Participants could spend as little as 15 minutes of their time but the majority of the participants spent about one hour. It can be deduced that the contents were relevant to their duties. Considering the users' needs as represented by Holistic Personas, Kim and Megan, the e-learning materials had useful contents and were sufficiently long for all learners.

- **Attitudes:** Participants' attitude toward online learning and toward AIS learning could affect their abilities to learn. In this study participation was voluntary. Some participants spent time in excess of the required amount as they were learning new concepts.

- **Anxiety:** In the context of this study, there were two distinct groups of learners: professionals and academics. The professionals had less anxiety in learning AIS as most had used accounting/financial applications as part of their roles. 85% of the sample population did not have prior access to the university's online learning

system before the study. It was not expected that they had previous exposure to online learning tools. On the other hand, the academics had less anxiety in using online learning tools as they would have been expected to have used online teaching and learning tools as part of their teaching, however it was not expected that they would have exposure to AIS. In this study the facilitator was available to provide assistance with the use of the tools to anyone who requested it and this was envisioned to ease participants' anxieties about use of the e-learning resources. However no one contacted the facilitator for assistance as they self-directed themselves and they did not express any anxiety in using the e-learning resources in any of their notes or emails. Regarding those who enrolled but never took part, evidence suggests that there were other reasons which were unrelated to anxiety, such as work load, as it was the busy period preparing material for end of the year documents and their colleagues being away, or the would be participants had were away on holidays.

Participants' selections of e-learning resources indicate that CAAISeLA needs to provide different e-learning resources for different methods of teaching (figure 4). For example Group A rated 56.3% and Group B rated 77.8% for the effectiveness of forums (Discussion Board – Table 2 – Item 8).

In the sample population 10% posted in the forums and 30% expressed about their experiences. Others only viewed the forums but did not post. The result indicates that the sample population under our study did not form a community of practice which scholars deem essential for adult learning [11].

Our participants' personality traits, as plotted in figure 2, indicate that the participants' conscientiousness were the highest factor among their five personality factors (mean 85.00%) and their extraversion was the lowest (mean 59.17%).

These findings advance our knowledge of the learners of AIS and will assist designers, educators and researchers in authoring Holistic Personas to represent the users of AIS application and learners of online AIS courses in future projects [5,18].

5.2. Learning theories (Curriculum development):

The results indicate that most participants in Group A (90%) quickly participated in the core quiz activity that gave them access to the non-guided construction method (Group B materials). Hence the participants in Group A who received '*guided-construction*' [12, p. 82] in the form of detailed documents that included step-by-step scaffolding instruction, '*to prompt students to attain the additional skills needed to reach this zone, teachers encourage them to learn by doing an activity*' [26, p. 138], were ready to test their knowledge quicker than Group B who initially received a description of Holistic

Persona Megan, a poster and five different learning materials without any direct instruction.

Participants in Group B were slower in completing the course content and many Group B participants did not participate in the core quiz and hence did not get access to the guided-construction method (Group A materials) which they would have had access if they finished the core quiz regardless of their performance in the quiz.

The results show (figure 4) that Group B rated the effectiveness of videos much more than Group A (94.4% for Group B and 75% for Group A – Table 2: Item 4). This finding indicates that users' choice of e-learning resources and activities depend on the methodologies used by educators to design course contents. Hence CAAISeLA must have tools that are suitable for various educators so that they can design relevant and context-aware e-learning resources for learners. For example, forum writing would be more suitable to those who are highly self-directed in their learning and have grasp of the fundamentals of the subject because '*learners interpret concepts and principles in terms of the 'schemata' that they have already developed*' [10, p. 22].

It is of interest to note that during the study period, participants were reminded to complete the study. Many Group B participants asked for more time to do the studies and they were active during the study period, but the majority of them did not make any postings.

These results indicate that CAAISeLA should have tools to support the design of e-learning materials that incorporate the multiple-perspectives of learning theories so that educators can design context-awareness e-learning resources to meet the needs of the learners.

5.3. Knowledge:

A high number of participants (70% of the sample population) completed the post-study survey. The results indicate that participants found e-learning materials relevant and thus completed the study and gained more knowledge of the university's AIS.

Designers of e-learning applications that are aware of users' knowledge and their positions in an organization should incorporate tools for input parameters from the learners and tools for educators to develop e-learning resources that have context-awareness about human intellectual factors such as users' knowledge. For example, a CASISeLA presents only certain e-learning resources when the learner passes a certain level of the quiz test or holds a certain position in the organisation e.g. Accountant or IT Officer.

Our study's results demonstrate that e-learning resources should be made context-aware according to learners' knowledge.

5.4. Cognitive Process:

The Cognitive Process explains how participants construct new knowledge from the e-learning resources

provided. Quizzes promoted conceptual understanding [51], applying and analyzing [35]. Fourteen participants (70% of the sample population) displayed their participation at the Cognitive Process level “analyze” as they actively participated in the quizzes other than the core quiz and/or posted on the forum. Two participants (10%), one from each group, “evaluated” and “created”. The results indicate that a CASISeLA can be implemented effectively to target the mid-level of the Cognitive Process, ‘Apply’.

Educators need to have strategies to scaffold learners so that the e-learning technology can ‘support individual choices about access to materials and expertise, amount and type of educational content’ [27, p. 19], to get learners to the higher rung of the Cognitive Process, *Analyze, Evaluate and Create* [3].

The results from this study reveal that most participants only viewed the forums and did not post their reflection. This finding is consistent with Nielson’s 90–9–1 rule [36]: 90% of users read or observe; 9% of users contribute from time to time and 1% of users account for most contributions.

A noticeable feedback from the participants who completed post-study surveys was that they found quizzes built their confidence in AIS: 89.6% for Group A and 94.4% for Group B (Table 3 – Item 6:– ‘Online AIS has utilities (quizzes & examples) that builds my confidence in Finance One’).

Hence, e-learning resources should be made context-aware according to learners’ cognitive processes. For example in our study, the application of the knowledge and cognitive process dimensions, summarized in tables 6 and 7 in Appendix F, presents the Learning Outcomes of the Online AIS, at various levels of Bloom’s Revised Taxonomy and the e-learning resources. The knowledge dimension is presented in the columns; the cognitive process dimension is presented in the rows along with the e-learning resources derived from the two teaching methods.

5.5. Evaluation:

The post-survey results show that most participants preferred the guided-construction method.

Participants rated the effectiveness of the One-Minute Paper at 77.8% for Group B and 58.3% for Group A (Table 2 – Item 10). Only 30% of the sample population posted reflection on the forums which indicates that their choice of learning strategy is guided-construction. These results indicate that participants might have found the concept of reflection difficult to comprehend. ‘*The difficulty with reflection, though, is that humans tend to be attracted to the experiential mode, which is relatively easy and sometimes entertaining, but discouraged from the reflective mode, which is difficult and laborious, but vitally necessary in modern life.*’ [50, p. 249].

In future research we plan for a strategy for the facilitator to scaffold participants to reflect as ‘*the*

reflective component of professional learning requires special support, including time and the help of other persons’ [50, p. 249].

Even though most participants indicate that they preferred the guided-construction method, figures 4 and 5 show that Group B consistently rated higher than Group A the effectiveness and usability of the e-learning resources of the Online AIS. For example Group B rated the effectiveness of videos at 94.4% while Group A rated it at 75.0%; Group B rated the effectiveness of discussion board at 77.8% while Group A rated it at 56.3%; Group B rated the effectiveness of the One-Minute Paper at 77.8% while Group A rated at 58.3%. These results clearly indicate that when non-guided construction method is employed, learners appreciate videos and discussion boards more than when guided-construction method is employed. In a non-guided construction method, the participants consume all the materials they are given. Observing the rating provided for effectiveness and usability of the e-learning resources, we can deduce that Group B valued the variety and the amount of the resources available to them. Hence the CAAISeLA should have tools for educators to display e-learning resources to users according to their methods of teaching.

These findings can assist designers to design context-aware e-learning applications that provide tools for educators to develop e-learning resources for AIS users. This study has demonstrated that Holistic Personas provided context-aware design guidelines and helped to predict behaviors of the participants.

6. Implications and Limitations of our findings

6.1. Implications of our study:

Following are the recommendations derived from this study:

- (i) CAAISeLA needs to provide context-aware e-learning resources to facilitate self-directed learning for various learner groups.
- (ii) CAAISeLA needs to allow learners to select contents that are relevant to them.
- (iii) Consideration of diverse perspectives of users’ activities balanced with multiple theories of learning in a workplace environment leads to more effective e-learning applications.
- (iv) Designers of a CAAISeLA can apply UCD methodologies that take into account each learner’s choice of learning strategy while designing context-aware AIS e-learning applications.
- (v) When access to users of AIS is not available, Holistic Personas can assist designers to focus on users’ needs in the design processes [5].

- (vi) The 5DREF can assist designers in providing context-aware e-learning resources to learners and educators [44].
- (vii) The context-aware information provided by CAAISeLA can provide e-learning resources that are relevant to educators' teaching methods. For example when non-guided construction teaching method is employed, videos and discussion boards should be made available to learners so that they can self-guided-construct their own learnings.
- (viii) Holistic Personas can assist designers and educators to design e-learning resources that are context-awareness [45].
- (ix) Although Socio-constructivist theory states that interaction between learners and their peers is a necessary part of the learning process [48], the results of this study indicate that learners of AIS wanted to be active but were not ready to interact with others. Hence forums are for educators and facilitators to communicate, to provide model questions and answers and, to guide learners.

6.2. Limitation of our study:

Our sample is small and the participants were from one university in Australia. The participants in the study were mainly from professional group (expected to resemble Holistic Persona Kim). Only one academic took part in this study. The academic group is also users of AIS and researchers are expected to resemble Holistic Persona Megan. Hence care should be taken when applying the results to other scenarios. Further research is needed with larger sample sizes and diverse participants.

In our further research we plan to analyze the effects of various personalities on their choice of e-learning resources and methods. For example, according to a study by Orvis et al. [37], extraverts and people who are imaginative would learn better in a less controlled e-learning environment. The personalities of the sample population of our study are highly conscientiousness and are introverts.

This study did not examine the effects of various intelligences [22] on online AIS learning. For example, would AIS users who have high spatial ability behave differently to those with lower spatial ability in their choice of e-learning resources.

7. Conclusion and future research

We have demonstrated how Holistic Personas [6] can assist designers to design context-aware online AIS learning resources for employees. We have provided examples of how Holistic Personas can assist designers to design context-aware AIS e-learning resources. We have also demonstrated that the multiple-perspectives provided by incorporating multiple learning theories guided by the

5DREF [44] are necessary in designing context-aware online AIS learning resources for diverse users.

The novel contribution of this paper is the application of the Holistic Personas to the design of AIS e-learning resources and the empirical findings that extend the multiple-perspectives of the Adult Learning theory, the Self-Determination theory and the Constructivist Learning theory.

The empirical findings are in line with the theory of andragogy [28]: adults are self-directed learners and would actively learn online if e-learning resources are relevant and intrinsically motivate them. Context aware AIS e-learning resources need to include quizzes, videos, visual posters, textual documents and guided-constructivist learning activities that are presented according to learners' demonstrated knowledge and preferences. In the context of AIS, reflective learning and scenario writings were too advanced for most professionals and as expected (Appendix A) they visited forums only to read [36]. This study has provided empirical support for direct instructions [33] and guided construction.

For a future study we plan to include strategies to encourage participants to learn at the higher rung of the cognitive process dimension. We plan to study the effects of personality traits and multiple intelligences on learners' choice of e-learning resources in future. We also plan to introduce Holistic Personas to educators and designers of a context-aware language e-learning application.

In sum, this paper extends the literature in the application of personas in general and Holistic Personas in particular, and using the 5DREF to guide the multiple perspectives of e-learning theories and UCD in the design of context-aware e-learning resources for diversified groups of AIS users in working environments.

Appendix A. Holistic Personas

A.1 Holistic Persona Megan



Megan is a senior academic at the University. She has passion for logical/numerical knowledge. She has developed good linguistic ability and is able to express her ideas efficiently. Megan has won a number of grants. Her days are full as she conducts research, lectures, supervises PhD students and directs personnel in her projects. She has little time to do anything else. She seldom makes effort to meet new people.

Megan is a deep thinker. She often researches knowledge in areas other than her expertise and considers how it can be transferred to her own field. When she chooses a new field for learning, she makes effort to learn deeply and pays attention to how the knowledge is created. She likes to watch a short video to get an overview of the whole scenario. She learns by doing exercises and tests her knowledge by doing quizzes and tutorials. She mixes theoretical learning with practice.

Megan does not attend face to face training. She likes to know experts in the field to ask quick questions if she is stuck. Megan researches various topics of the field assiduously. She reads all literature critically: wikis, blogs and forums. She does not take part in discussions. She reads novices' questions and experts' answers. She signs into a forum using a pseudonym only if she has to; otherwise she reads materials anonymously.

Megan does not like software that is not intuitive and fit for purpose. She likes to have a mental model of how it works. She is happy to read the instruction manual or online help, if it exists, but often she finds the available support inadequate or not well structured. She relies mainly on textual information for instruction but watches videos that show screen captures with step by step instruction on how to achieve a goal using the software.

Megan relies on professional staff to help her with financial matters. She finds that the university financial systems are complex. She is apprehensive of the consequences for any interactions she might have with the applications. She often finds that reports produced from the university financial systems are unreliable, erroneous

and inconsistent. Often professional staff have to use a calculator to manually adjust the data in the reports. She feels that finance consists of basic arithmetic. Financial systems should be trustworthy, precise and reliable.

A.2 Holistic Persona Kim



Kim is a senior professional at the University working on policies and procedures.

Kim likes her role as she finds it fulfils a lot of her hidden talents and aspirations. She likes dealing with people and solving problems. She also enjoys improving processes and procedures. She is constantly looking at the ways university conduct business and seeks to improve it by questioning the reason for activities and how similar activities are carried out in other institutions. She often devises new methodologies to gather information for answering difficult questions which has legal or business implications.

In the past Kim has changed position often as she likes challenge and wants to acquire new skills. She welcomes change and likes on the job training. Her attitude to a challenge is outright engagement. When she faces issues she finds out what training she needs or what information she has to gather and makes plans to acquire them.

She reads extensively all the information that she can find including blogs, wikis and forum postings. She does not participate in forums discussion however if she participates, she uses her name. In the past she has engaged in on line training for her studies and participated in forums but she is not keen on the idea of online workplace training. She is a competent user of a number of systems and packages: human resources, finance and management.

Kim is outgoing and enjoys a number of activities outside work such as gardening, singing, bike riding and bush walking. She studies different languages and makes friends with people of different cultures.

Appendix B. Guided-construction e-Learning Resources

B.1 A Chart of Account Document (Word COA_OPS)

Chart of Account Enquiry

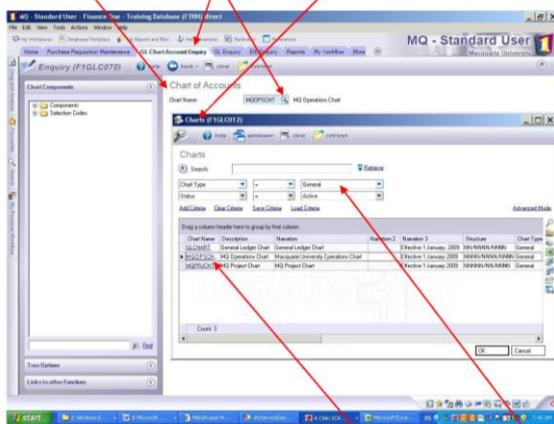
This topic discusses and demonstrates by examples the following:

- Active General Charts: General Ledger, MQ Operations and MQ Project Charts
- MQ Operations Charts' Components
- Procedure to extract details of Chart Components into a Word document

1. Active General Charts

Sign into Finance One. Click on the 'GL Chart Account Enquiry' Tab, the window called 'Chart of Accounts' will appear. Click on the Pick List of 'Chart Name' a window, called 'Charts', will appear as illustrated in the following figure.

Figure 1: Chart of Accounts with Chart Type = General and Status = Active



As illustrated from the above figure, effective 1 January 2009, there are three active General Type Charts; they are:

- General Ledger Chart GLCHART,
- MQ Operations Chart MQOPSCHT and
- MQ Project Chart MQPRCHT.

In the following example we will examine the MQOPSCHT, select MQOPSCHT from the list, the Chart of Accounts for MQOPSCHT will appear as illustrated in the following figure.

Online-FIMS-B-Book-COA-Enquiry-V1-20150101.docx – Author: Hien Minh The Tran – 01 Jan 2015

B.2. A Word COA SelCode Document on COA

Word COA SelCode: A Word document on COA at an advanced level aimed to facilitate learning of procedural knowledge.

Chart Account Enquiry: Selection Types & User Fields

Selection Types and User Fields are used to group accounts for enquiry and reporting. These are attached to Major Account and Natural Account. Each Selection Type has many items, called Selection Codes.

This paper explains with examples how to query the following data from Finance One:

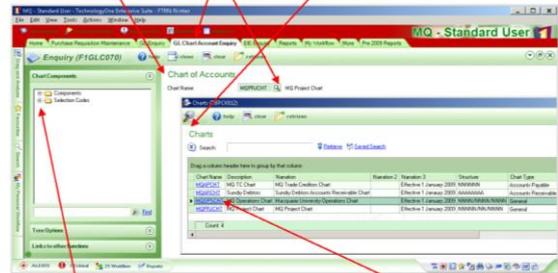
1. Operations Chart Selection Types and Codes
2. An Operations account's Selection Codes and User Fields
3. Project Chart Selection Types and a Project account's Selection Codes and User Fields

1. Operation Chart Selection Types and Codes

Sign into Finance One. Click on the 'GL Chart Account Enquiry' Tab, the window called 'Chart of Accounts' will appear.

Click on the Pick List of 'Chart Name' a window, called 'Charts', will appear as illustrated in the following figure.

Figure 1: Chart of Accounts – select a chart from the Charts window



In the following example we will examine the MQOPSCHT, select MQOPSCHT from the list, the Chart of Accounts for MQOPSCHT will appear.

Click on the + beside the 'Selection Codes' the MQOPSCHT's Selection Types will appear as illustrated in the following figure.

Online-FIMS-COA-Enquiry-SelCodeUserField-V1-20150115.docx – Author: Hien Minh The Tran – 15 Jan 2015

Appendix C. Screenshot of the Core Quiz Questionnaire

Sample questions of the Core Quiz Questionnaire.

Question 9

Partially correct
Mark 0.67 out of 1.00

Flag question

Q9. The Natural Account is

Select one or more:

- a. the last four-digit number of a Primary Ledger's account number ✓
Well Done!
- b. the last four-digit number of an Operations Ledger's account number ✓
Well Done!
- c. the last four-digit number of a Projects Ledger's account number

Check

Your answer is partially correct.

You have correctly selected 2.

The correct answer is: the last four-digit number of a Primary Ledger's account number, the last four-digit number of an Operations Ledger's account number, the last four-digit number of a Projects Ledger's account number

Question 10

Correct
Mark 1.00 out of 1.00

Flag question

The Natural Account starts with 2 is

Select one:

- a. an income account.
- b. an employment-cost account.
- c. a general-cost account.

Check

Appendix D. Non-guided Construction e-Learning Resources

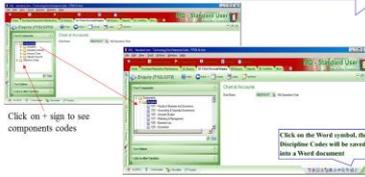
D.1. A Sample of a COA Poster

Accounting Information System

Essential terms and definitions
 Data is recorded in the Accounting Information System (AIS) within Ledgers.
 There are Operations and Project Ledgers.
 There are Actual, Commitment, Budget, Forecast & Mid-Year Budget for each ledger, each year.
 There is one Primary Ledger (Ledger Code GL) and a number of Subsidiary Ledgers. At Macquarie University, the Subsidiary Ledgers are Operations (Ledger Code MO) and Project (Ledger Code MP).
 A Chart of Accounts, COA, is a classified list of all accounts in the ledger.
 COA holds the descriptive information for an account while Ledgers contain the transactional information for a nominated account.

Operations COA (MQOPSCHT)

MQOPSCHT has four components:
 1- Discipline 2- Discipline/Activity
 3- Account Type 4- Natural Account



An example of an Operation Account is 201100024353.
 The names of each four components are illustrated in the following four pictures



Primary Ledger (GLCHART)

GLCHART has 5 components:
 1-Entity,
 2-Discipline/Org Unit,
 3-Entity/Org Unit,
 4-Account Type and
 5-Natural Account



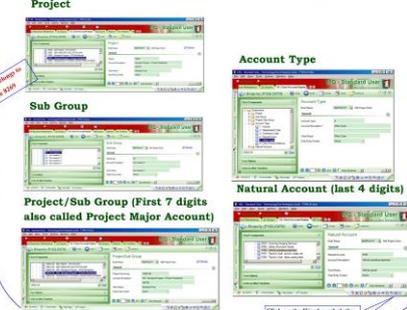
Key Concepts

The central theme of this poster is Chart of Accounts.
 Chart of Accounts contains a list of accounts.
 All Operation accounts start with a Discipline Code.
 A Discipline can have many activities.
 All Project accounts start with a Project number.
 A Project can have many Sub Groups.
 A Project belongs to a Discipline.
 There is hierarchy within a Discipline Code.
 Ledgers contain financial transaction data.
 Operation financial transaction data are recorded in Operations Ledgers.
 Project financial transaction data are recorded in Project Ledgers.
 Transaction data that are posted in the Operation and Project Ledgers are automatically posted in the Primary Ledger via Discipline Code and Natural Account.

Project COA (MQPRJCHT)

MQPRJCHT has five components:
 1- Project
 2- Sub Group
 3- Project/Sub Group
 4- Account Type
 5- Natural Account
 Each Project belongs to a Discipline.

For example 10653305100 is a Project Account.
 Project 10653 belongs to Discipline 8269.
 The names of the components are illustrated in the following pictures



Hierarchy within a Discipline code

A Faculty can have many Departments and a Department can have many Disciplines.
 - the last three digits of a Faculty code are all zeros e.g. 4000 is a Faculty code.
 - the last digit of a Department code is a zero e.g. 4030 is a Department code.
 - the last digit of a Discipline code is not a zero e.g. Discipline codes 4031, 4032.

Online AIS: COA
 Author: Hien Minh Thi Tran — 08 October 2015

D.2. Screenshots of various e-Learning Resources

1.4 Learning Materials

Below is the list of five learning activities. Depending on your style of learning, select one or more items from the list and study the materials at your own pace.

- [Click here to download a Word document \(in PDF\) about Steps to enquiry on Operations Chart of Accounts](http://ilearn.mq.edu.au/mod/resource/view.php?id=3234041) (http://ilearn.mq.edu.au/mod/resource/view.php?id=3234041) 778.2KB PDF document
- [Click here to download an One-Page Poster \(in PDF\) that documents Steps to enquiry on Projects Chart of Accounts](http://ilearn.mq.edu.au/mod/resource/view.php?id=3234042) (http://ilearn.mq.edu.au/mod/resource/view.php?id=3234042) 2.4MB PDF document
- [Click here to download a Video clip that demos steps to enquiry on Project Chart of Accounts](http://ilearn.mq.edu.au/mod/resource/view.php?id=3234043) (http://ilearn.mq.edu.au/mod/resource/view.php?id=3234043) 36.8MB video/mp4
- [Quiz to practice Chart of Accounts knowledge](http://ilearn.mq.edu.au/mod/quiz/view.php?id=3234044) (http://ilearn.mq.edu.au/mod/quiz/view.php?id=3234044)
- [Forum to share learning experiences with peers](http://ilearn.mq.edu.au/mod/forum/view.php?id=3234045) (http://ilearn.mq.edu.au/mod/forum/view.php?id=3234045)

1.6 Scenario writings

Based on the information and activities from the learning materials, **write a scenario to describe how Kim can motivate Megan to participate in the Online AIS study or/and write a scenario to describe how Kim might use Finance One.**

If you wish, you can post your scenario writings on the forum below and read others.

Scenario Writings (<http://ilearn.mq.edu.au/mod/forum/view.php?id=3234048>)

1.7 One-Minute Paper

Please reflect about one-minute on the following question:

What questions remain on your mind?

If you wish, you can post your reflection of the question on the forum and read others.

One-Minute Paper Forum on the study
(<http://ilearn.mq.edu.au/mod/forum/view.php?id=3234050>)

1.8 Financial Key Concepts Quiz

Up-to-now the learning materials presented using the *Holistic Persona and Scenario*.

Learning materials using the Detailed Documentation Method will be available after you complete the following quiz.

Financial Key Concepts Quiz
(<http://ilearn.mq.edu.au/mod/quiz/view.php?id=3234034>)

<http://ilearn.mq.edu.au/course/view.php?id=22550>

D.3. A scenario writing to scaffold participants using a forum

Chart of Accounts (COA) is a set of numbers with descriptions. The Project and Project/Sub Group(s) are created at the beginning of the project for which Megan

receives a grant. Once they are created, transactions of the grant income and expenditure are recorded

[Please explain to Megan how COA is used]

Appendix E. Introduction to the Online AIS

(<http://ilearn.mq.edu.au>)

(<http://ilearn.mq.edu.au>)

Online AIS Group B

Myhome(<http://ilearn.mq.edu.au/my/>)
/ PCSOAGB(<http://ilearn.mq.edu.au/course/view.php?id=22550>)

Welcome to Accounting Information System

My name is Hien Tran. I am the Systems Accountant at Macquarie University. I will be your facilitator for the Online Accounting Information System (AIS) study.

This study will introduce you to the University Financial System, called Finance One.

The learning materials will be presented in two methods.

The *Holistic Persona and Scenario* Method employs a holistic approach of presenting course materials that includes scenarios, activities the Holistic Persona performs to achieve an outcome, pictures and narrative. This method presents the learning materials in various formats and a number of activities. Depending on your interest and learning style, please select one or more items from the list and study the materials at your own pace.

The *Detailed Documentation* Method employs a traditional approach of presenting course materials that contains reading materials using text and logical explanations and two activities: a One-Minute paper forum and a Quiz.

For both methods, if you have access to Finance One, please sign in to Finance One and practice the steps that are documented in the learning materials to gain hands-on experience.

At the completion of this study, you should be able to

- describe terms and key concepts that are used within the Macquarie University AIS;
- compare and contrast the Chart of Accounts' components;
- explain the differences between Operations and Project Charts;
- perform Chart of Account enquiry;
- extract Chart of Accounts' components.

Please note the time which you spend on learning as you will be asked at the end of the study the time taken for each method.

I hope you enjoy the study.

<http://ilearn.mq.edu.au/course/view.php?id=22550>

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Appendix F. Knowledge Dimension and Cognitive Process Dimension

Table 6. Factual and Conceptual Knowledge

COGNITIVE PROCESS	KNOWLEDGE	
	FACTUAL KNOWLEDGE	CONCEPTUAL KNOWLEDGE
Remember	Describe essential terms and definitions that are used within the University's financial system. Learning resources are: Textual Webpage; Poster COA; Word COA Document	

COGNITIVE PROCESS	KNOWLEDGE	
	FACTUAL KNOWLEDGE	CONCEPTUAL KNOWLEDGE
Understand	Explain the differences between Operations and Project Charts of Accounts and Ledgers. Learning resources are: Textual Webpage; Poster COA; Word COA Document	Recognise the differences between various chart of accounts and ledgers. Learning resources are: Textual Webpage; Poster COA; Word COA Document
Apply		Compare and contrast the various charts of accounts' components. Learning resources are: Quiz Key Concepts; Quiz One Page Poster
Analyse		Differentiate selection types/codes and user fields. Learning resources are: Video; Word COA SelCode Document.

Table 7. Procedural and Meta-Cognitive Knowledge

COGNITIVE PROCESS	KNOWLEDGE	
	PROCEDURAL KNOWLEDGE	META-COGNITIVE KNOWLEDGE
Understand	Distinguish Chart of Accounts' Components. Learning resources are: Textual Webpage; Poster COA; Word COA Document; Quiz Key Concepts	Summarise the applications of Charts Components. Learning resources are: Forum One Page Poster
Apply	Perform Chart Account enquiry on components. Learning resources are: Poster COA; Word COA_OPS; Video; Quiz COA	Produce a scenario writing that describes how Kim can motivate Megan to learn AIS. Learning resources are: Forum Scenario
Analyse	Analyse Charts Components, Selection Types/Codes and User Fields. Learning resources are: Poster COA; Video; Forum One Page Poster	Survey: Participate in post-study Survey about learning materials. Learning resources are: Post-Survey Questions to evaluate the effectiveness of the teaching methods and learning resources.
Evaluate	Evaluate the various usages of Selection Types/Codes and User fields. Learning resources are: Poster COA_PRJ; Forum Scenario; Forum Reflection	Recommend the usages of Selection Codes and User Fields for Advanced Queries Learning resources are: Forum Share Experience
Create	Write a scenario that describes how Kim might use Finance One. Learning resources are: Forum Reflection; Forum Scenario.	Create: encouraging reflection through one-minute papers and posting on forums. Learning resources are: Forum to post participants' reflection on the study; Forum Scenario; Forum One Minute On Study.

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