Digital andragogy: A richer blend of initial teacher education in the 21st century

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This paper revisits the term 'andragogy' (adult education) and develops a new concept based upon an analysis of the skills and dispositions of 21st century learners in initial teacher education through the lens of adult education: 'digital andragogy'. In order to engage and retain students and revitalise education courses by optimising digital affordances, lecturers must examine the profiles of their learners and seek to create learning spaces that best suit their needs and wants. We posit that learners in initial teacher education programs should be encouraged and supported to transition from pedagogical practices experienced in their school years to higher education contexts for learning that are based upon digital andragogy.

Introduction

'Andragogy' (the art and science of teaching/leading adults) is a term that can be traced back to 1833, when Alexander Knapp described Plato's instructional practices with young adults (Knapp, 1833, as cited in Taylor & Kroth, 2009). The term all but disappeared from use until the 1920s when it was resurrected during an increase in the number of adults returning to academia or needing to upgrade skills or qualifications. In 1968 Malcolm Knowles popularised the term within the education community, particularly in the US, and continued to develop and refine the concept until 2000.

Whilst is has been argued that andragogy is not an 'educational theory' (Merriam, 2001) or that it describes principles of effective practice in adult education (Hartree, 1984), the point of agreement is that adults learn differently to children, and so they should be taught differently. Conner (2004) referred to andragogy as learner-focused education and pedagogy as teacher-focused; others contend that pedagogy focuses upon transmission of content subject matter, whilst andragogy has a focus on the acquisition of and critical thinking about the content and its application (Batson, 2008; Pew, 2007).

Knowles (1984) described five characteristics of adult learners that shaped early andragogical approaches to the adult education movement:

1. Self-concept: as a person matures self-concept moves from one of being a dependent personality toward one of being self-directed;
2. Experience: as a person matures they accumulate a growing reservoir of experience that becomes an increasing resource for learning;
3. Readiness to learn: as a person matures their readiness to learn becomes oriented increasingly to the developmental tasks of their social roles;
4. Orientation to learning: as a person matures their time perspective changes from one of postponed application of knowledge to immediacy of application, and accordingly

their orientation towards learning shifts from one of subject-centredness to one of problem centredness;
5. Motivation to learn: as a person matures the motivation to learn is internal.

It is interesting to note the semantics used by Knowles "as a person matures": he is not stating that adults are self-directed, have a reservoir of experiences upon which they can draw, have a problem-centred orientation, and are internally motivated. Is this noteworthy? We believe so; for various reasons it appears that the majority of teacher education undergraduate students, whilst chronologically classed as 'adults', do not or do not consistently exhibit these characteristics. Are they then not 'mature' or is it that 21st century adult learners share a different set of characteristics, perhaps resulting from their upbringing, schooling, and ubiquitous digital distractions? Perhaps these learners find themselves in a state of 'luminality' that Cousin (2006) described as the transitional and at times unstable oscillation between child and adult. With the rhetoric of "21st century learning skills" flooding educational discourse, perhaps the time is ripe to revisit andragogy through the lens of 21st century learning skills and the profiles of our learners. The digital technologies now accessible by students have enabled a reimaging of blended learning.

Issues pertaining to learning in initial teacher education programs

An ever-increasing concern for educators in higher education is the lack of student engagement with the course content (Biggs & Tang, 2007; Massingham & Herrington, 2006). Many students approach their studies in a minimalistic, surface approach: enter the learning management system at the beginning of the semester, and then return to submit the assessments at the required due dates throughout the semester. They are concerned about their progression through the course and final certification referred to as surface learning (Biggs & Tang, 2007), rather than their personal learning and the development of their professional identity (deep learning). Deep learning requires higher-order thinking, collaboration and conversation with peers, and reflection and feedback. In order for this to occur, learners need to prepare, read widely, reflect, and communicate.

Most of the current learners in tertiary institutions were exposed to pedagogical educational experiences throughout their primary and secondary years of schooling (McGrath, 2009), and as a result may expect the same practices to be enacted by their lecturers in the tertiary context. When mature adult learners are confronted with pedagogical approaches in their tertiary studies, existing predispositions to surface learning may emerge. Whilst surface learning and pedagogical practices may require less energy than deep learning and andragogical practices on the part of both the student and teacher, we believe that neither is conducive to developing 21st century skills or profession-readiness, particularly in the sphere of teaching.

Another issue is the time it takes for the transition from childhood to adulthood, and the preparedness and willingness of a new adult in becoming a responsible, self-directed learner. Students who have made a recent transition from childhood to adulthood,

because of the change in their age (17 to 18) or societal role, may still lack the educational experience necessary to function as independent, self-directed adult learners (Miflin, 2004). This may well be the case for first year university students who have just graduated from secondary school.

Profile development

As initially stated, a profile of 21st century learners is foundational to the transition of teaching and learning from a pedagogical approach to a digital andragogical approach. This paper examines the learning needs and concerns of two groups of tertiary students from the Bachelor of Primary and the Bachelor of Early Childhood Education degrees at Curtin University through anonymous online surveys (*Qualtrics*). The nature and intent of the survey were explained both orally and with an information letter posted on the learning management system (*Blackboard*), and the participants gave their consent by undertaking the survey.

The student participants were drawn from two cohorts: a first year group and a second year group. The first year group of students undertook one of four iterations of a common, core unit – *Inquiry about the World*. This unit was taught in three different modes: on campus (face to face), regional (online), and through Open Universities Australia (OUA).The second, smaller cohort were students undertaking the second year *Professional Studies* unit (again delivered in the three modes) in the Bachelor of Primary Education course.

The data from the first year cohort was collected in 2013 and 2014, and pertained to the students' frequency of use and confidence in using different forms of digital technology (such as *Facebook*, email, and *Twitter*), and their ability to successfully manipulate data (e.g., uploading various file types, and zipping and unzipping large files). In all 1159 students over the two years completed the survey. The data from the second year cohort was collected in 2015 from 79 students and focused on their frequency of use and confidence using digital technologies, and in addition, how they enacted their studies and juggled other commitments in their life.

First year profile

A new first year unit was implemented in Semester 2, 2013, and embedded into the core structure of the unit was a pre- and post-survey. Table 1 shows the numbers of students who completed the surveys, separated into the modes of study: via Open University Australia (OUA) offered in Study Period (SP) 2 and 4, and on campus (Internal) in Semester 2 of 2013 and 2014.

The gender profile for the internal and OUA iterations of the unit were reasonably consistent, with between 85-91% of the enrolling students being female, as indicated in Table 2.

Table 1: Distribution of student numbers across the cohort

Iteration	Number of students
2013 Internal cohort	219
2014 Internal cohort	236
OUA SP2 2014	411
OUA SP4 2014	293
Total	1159

Table 2: Gender distribution across the cohorts

	Internal 2013 %	Internal 2014 %	OUA SP2 2014 %	OUA SP4 2014 %
Female	88	91	91	85
Male	11	9	9	15

The age profile of students was very different across the modes: the number of students who were under 24 years old varied from 76% in the 2013 internal cohort to only 18 % of the 2014 OUA SP4 cohort. The students were significantly older in the OUA classes with 76% of students in SP4 and 68 % of students SP2 being between the ages of 25 to 44, as shown in Table 3.

Table 3: Age distribution across the cohorts

Age	Internal 2013 %	Internal 2014 %	OUA SP2 2014 %	OUA SP4 2014 %
18 to 24	76.5	58.5	25	18
25 to 34	14	25	44	45
35 to 44	8	13	24	31
45 to 54	1	2	6	6
55 to 64	0.5	1	1	0
65 to 74	0	0.5	0	0

To confirm this data, the students were also asked how long it had been since they had left school. The OUA cohort indicated that between 83-90% of them had been out of school for longer than 5 years, as shown in Table 4.

Table 4: Comparison of time since leaving school

	Internal 2013		Internal 2014		OUA SP2 2014		OUA SP4 2014	
	%	Numbers	%	Numbers	%	Numbers	%	Numbers
Left last year	29	64	31.5	74	4	15	1.5	4
Left 2 years ago	17	37	7.5	18	2.5	10	2	6
Left 2 to 5 years ago	21.5	47	13	30	11	44	6.5	19
Left more than 5 years	32.5	71	48	114	83	339	90	263

All student cohorts were asked about their use and confidence in using a range of technology tools, and the results show that there is a wide range of usage and confidence in regards to the tools selected in the surveys. Students in both cohorts indicated that they use "primary personal digital technologies" on a daily basis: these are Internet, email, and social media. Table 5 shows the self-reported use of these technologies for the internal students, with the primary personal digital technologies shaded.

Table 5: Percentage distribution of internal students' use of technology tools

	Daily		Once*		Sometimes		Occasionally		Hardly ever		Never	
	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
Internet	96	99	2	1	0	0	1	0	0	0	0	0
Email	76	84	21	15	1	1	1	0	0	0	0	0
Social media	86	85	6	6	1	2	1	1	3	2	3	3
Word	16	37	55	43	17	11	9	8	2	1	0	0
Spreadsheet	4	6	11	12	11	13	31	28	27	31	14	9
Software**	3	4	5	5	6	6	11	20	22	32	52	32
YouTube	27	25	38	37	15	15	13	16	4	5	1	3
Dropbox	3	6	7	6	22	12	39	20	47	20	78	37
Wiki	0	7	7	15	7	9	45	22	58	25	68	23
Blog	3	4	4	5	21	9	34	18	55	29	83	34
Games	17	7	28	13	32	11	32	15	59	23	44	30
Presentation	1	4	25	11	49	26	90	35	36	17	5	4
Web 2.0	0	1	1	2	4	3	7	14	29	24	68	55

* Once means once or twice per week
** Specialised software including MYOB

In 2013, the internal students indicated that there were a number of tools that the majority of them did not use: these were *Dropbox* (78%), Wiki (68%), Blog (83%) and Web 2.0 tools (68%). Table 6 presents the OUA students' use of technology tools, again the primary personal digital technologies are shaded.

Students in the internal cohort indicted that they played games and watched *YouTube* more frequently than the OUA students, which is not surprising given their age and stage of life. Another point of interest is the usage of Microsoft *Word*: internal students' daily use is reported at 16% and 37% (2013-2014) whilst 45% of OUA students across the two study periods, reported a daily use of *Word*.

The next consideration in the survey was about the students' confidence in using the technology tools. The data is shown in Table 7 for internal students and Table 8 for OUA students.

Table 6: Percentage distribution of OUA students' use of technology tools

	Daily		Once*		Sometimes		Occasionally		Hardly ever		Never	
	SP2	SP4	SP2	SP4	SP2	SP4	SP2	SP4	SP2	SP4	SP2	SP4
Internet	97	97	3	3	0	0	0	0	0	0	0	0
Email	85	89	12	9	2	2	0	0	1	0	0	0
Social media	79	75	9	10	2	3	2	2	2	3	5	6
Word	45	45	38	38	9	10	6	5	2	2	0	1
Spreadsheet	13	10	13	16	21	16	26	33	19	15	8	9
Software**	7	9	6	6	6	7	16	15	21	27	42	35
YouTube	17	19	32	32	19	21	21	18	7	6	3	2
Dropbox	4	6	10	13	11	12	17	18	17	19	41	32
Wiki	2	5	13	13	13	9	19	20	21	23	31	30
Blog	4	3	7	10	6	5	13	15	23	24	46	43
Games	8	12	14	16	11	6	13	16	20	20	35	28
Presentation	5	7	16	16	23	18	33	34	14	15	8	7
Web 2.0 tools	1	2	2	5	4	6	16	14	19	22	56	49

* Once means once or twice per week

** Specialised software including MYOB

Table 7: Percentage distribution of internal students' confidence in the use of technology tools

	Tool not used		Not confident		Somewhat confident		Quite confident		Extremely confident	
	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
Internet	0	0	0	0	3	0	29	21	68	79
Email	0	0	0	0	4	1	27	17	68	83
Social media	3	1	1	1	4	2	22	19	69	75
Word	0	0	0	0	6	5	39	31	52	64
Spreadsheet	3	2	18	13	39	39	26	28	14	17
Specialised software	33	27	32	38	17	16	13	13	4	7
YouTube	1	0	2	1	9	9	31	28	56	69
Dropbox	16	20	23	25	29	18	20	22	11	15
Wiki	14	15	20	16	29	23	24	22	12	24
Blog	19	19	17	18	28	27	20	23	15	15
Games	11	19	10	9	21	17	33	31	22	23
Presentation	2	1	5	5	13	18	43	42	25	25
Web 2.0 tools	40	34	38	33	12	22	6	9	3	3

When comparing confidence levels between internal and OUA students, the following can be noted: 'extreme confidence' reported across the primary personal digital technologies with the addition of *Word* and *YouTube* is consistent – ranging from 50% to 83% (average proportion 67.35%). Another interesting finding was that for *Dropbox*, with the exception of the internal 2013 cohort, approximately twice the number of 'extremely confident' students reported that they 'never use' the tool. On the other hand, the reverse is noticed for presentation software, where across all cohorts the number of students responding 'extremely confident' is approximately four times the reported 'never use'.

Table 8: Percentage distribution of OUA students' confidence in the use of technology tools

	Tool not used		Not confident		Somewhat confident		Quite confident		Extremely confident	
	SP2	SP4	SP2	SP4	SP2	SP4	SP2	SP4	SP2	SP4
Internet	0	0	0	0	2	1	27	22	73	77
Email	0	0	0	0	2	2	24	19	75	79
Social media	4	3	1	2	4	7	25	21	66	66
Word	0	0	0	0	5	5	26	27	59	66
Spreadsheet	2	2	13	14	29	28	30	30	26	25
Specialised software	24	22	33	29	17	22	16	14	10	13
YouTube	3	2	3	4	12	12	34	28	50	53
Dropbox	20	17	27	19	21	22	17	24	25	19
Wiki	17	17	23	19	20	26	23	21	27	17
Blog	23	20	23	19	20	25	21	21	24	14
Games	16	16	12	11	14	16	29	26	29	31
Presentation	25	1	6	7	21	16	20	41	30	33
Web 2.0 tools	28	24	35	32	19	22	12	14	5	8

Students were also asked where they had learnt many of their ICT skills: in the internal cohort, skills with the Internet and email were fairly evenly distributed across learning from school, online, and family/friends (although these may not be mutually exclusive). In regards to the use of social media, this was mainly achieved online or family/friends; not startling, given the policies of many schools in regards to such usage. They reported that school had been responsible for teaching them to use *Word*, spreadsheets (for the most part *Excel),* and also presentation tools (such as *PowerPoint* and *Prezi*). Learning how to use *YouTube* was strongly attributed to online (51% and 61%), whereas university seems to have strengths in the learning of blogs, and some influence with *Dropbox* and wiki, although the numbers of 'never use' are high for both applications.

In the OUA cohort, the students were much more likely to have acquired their Internet skills online, 47% of students in SP2 and 55% in SP4; as well as email skills with 50% of students in SP2 and 54% in SP4 learning on their own. An even higher proportion of students taught themselves to use social media (*Facebook* and *Twitter*) - 59% of SP2 students and 65% of SP4 students. A similar trend to internal students is evident for the school's influence learning to use the Internet, email, *Word*, and spreadsheets, and the lack of influence over social media.

When asked about the search engine use (Table 9), the majority of students across the cohorts reported using only *Google*; a sign that we really are the 'googling' our way to find information with only 3% using a search engine other than *Google*.

Table 9: Percentage of students using different numbers of search engines

	2013 %	2014 %	SP2 %	SP4 %
I only use *Google*	85	80	80	80
I mainly use one, but not *Google*	0	3	3	3
I use two search engines	11	14	14	12
I use thee or more	4	4	3	5

Finally students were asked if they thought that they would be able to use a range of tools in their classrooms and to give examples of how they would use them. Students saw value in many of the tools including gaming and social media. Table 10 summarises this data: of interest is the high scoring of the Internet, *Word,* and *YouTube* amongst both internal and OUA students.

Table 10: Percentage of students who indicated they would be able to use these technology tools in their classrooms

	2013 %	2014 %	SP2 %	SP4 %
Internet	99	97	98	99
Email	74	55	53	64
Social media	52	44	40	52
Word	96	85	84	89
Spreadsheet	75	72	74	85
Specialised	21	69	66	78
YouTube	85	86	80	81
Dropbox	48	36	37	51
Wiki	34	42	45	52
Blog	39	48	52	59
Games	50	57	55	61

Second year profile

In this cohort 83% of the students were female, and 68% of the cohort were 'recent' school leavers having left school five years ago or less. Table 11 summarises two factors dealing with time: firstly the students' work-life balance in regards to how their time is already committed, and secondly the amount of time they were willing to commit to undertake the unit.

Table 11: Factors associated with time

Factor	Range of responses			
Work-life balance	15% study	60% study + part-time work	6% study + fulltime work	13% study + work + young children
Voluntary time commitment to the unit	6% only workshop attendance	62% 2 – 6 hours/week	17% 6 – 8 hours/week	10% more than 10 hours/week

This is in line with other research (e.g., Seely-Brown, 2000) that indicates that 21st century learners have a range of tasks that they juggle and choose to strategically assign value in the form of time.

Students were asked about functionality of a learning management system (LMS) that they valued highly. It was stressed that this was a wish list of features rather than the actual functionality of the LMS (in this case *Blackboard*) that was being used in the delivery of the targeted units. Students rated each one on a scale from zero (*not at all important*) to five (*could not live without*). Table 12 summarises this data.

Table 12: Valued functionality of LMS

Feature	Average	Std. dev
Access units online	4.6	0.65
Use phone to access unit	3.1	1.42
Receive notifications through SMS, *Facebook* or personal emails	3.47	1.3
Unit materials chunked and unit progression visible	4.5	0.7

Students reported that attending tutorials on campus was not overly important (average 3.5, std. dev 1.3), nor was having a choice of tutorial to attend (average 3.3, std. dev 1.7), while having access to the tutorial recordings (via *Echo360*) was only slightly more valued (average 3.8 std. dev, 1.1). Students did not consider peer conversation and collaboration through discussion boards of particular value, with average 2.8 and std. dev 1.2.

Students were also asked about their use of online communication tools. Email had a reported everyday use of 48% of the cohort or several times per day (at 44%), whilst 62% of students reported using *Facebook* several times a day, with 21% using it once a day. This could suggest that to communicate with students immediately, *Facebook* would be the most effective form. *Twitter* seemed to be poorly used by students with 71% saying they use it infrequently or rarely, and only 16% using it weekly. *Instagram* was more widely used, but this was somewhat polarised with 53% using it daily or multiple times per day, and 30% using it infrequently or not at all. It would seem that the popularity of tools such as *Instagram* and *Twitter* waxes and wanes.

Students were also asked to rate their confidence with a number of ICTs choosing from zero (*not familiar with)* then on a scale from one (*not confident*) to five (*very confident*), presented in Table 13.

Table 13: Confidence in using ICTs

ICT	Average	Std. dev.
Facebook	4.5	1.0
Email	4.8	0.5
Avatars	3.3	1.1
Presentation tools (e.g., *PowerPoint*, *Prezi*)	3.3	1.1
Content curation tools (e.g., *scoop.it*, *Pinterest*)	2.7	1.3

The reported frequency of use of *Facebook* and email seems to link to the level of confidence indicated by the participants. This is logical as one would not be a frequent user of technology with which one is not confident.

Profile summary

The students in the Primary and Early Childhood Bachelor of Education degrees across all modes of delivery are predominately female. The students who study internally are on average much younger than the OUA students. From the first year profile it is clear that students have engaged with technology, but it seems that their confidence and use extends only as far as their needs which includes the Internet, email, social media (*Facebook* and *Twitter*) and to a lesser extent *YouTube*. This is supported by Henderson, Selwyn and Aston (2015, p. 10) who concluded that these are not the "creative, collaborative, participatory and hyper-connected practices" touted in the discourses of digital learning. We suspect that the high use of and confidence with email is in response to preferred communication means with the university, rather than a preferred way of contacting friends and family. Students are much less confident with the other nominated tools, and often do not use them.

Generally students have informally developed their competence in using these tools. The majority of OUA students taught themselves to use tools whilst, in the internal cohort, students learned from friends and family as well as learning online (such as instructional video clips). For all the students, university was the least likely way that they learnt how to use these technology tools.

In summary they believe they have competency and confidence to use a suite of basic productivity and communication tools that they use frequently: email, the Internet, social media and, to a lesser extent, *YouTube*. After their time at school, if they want to learn a new tool they do not look to the university or other formalised learning; they look to online tutorials, *YouTube* videos and the experience of others, either unknown online or known including family and friends to help them. They demonstrate a learning aligned with 'what they need right now' learning rather than the 'just in case' learning of the past.

Building on this profile, the second year cohort was asked about their propensity to study and how they wanted to engage with their learning spaces. In summary, they want to have the ability to move in and out of the university landscape quickly and easily, leaving digital bookmarks to know what they have done and what needs to be completed and when. Examining the responses from the second year cohort, it can be confirmed that students are busy and have many facets to their lives. They have a spread of technological competencies and an accompanying range of abilities to manage these aspects of their university lives. The majority do not report valuing collaborative spaces such as Collaborate sessions and discussion boards, which we feel needs to be addressed as they prepare for a career in a strongly defined social domain – schools.

Digital andragogy

Batson (2008) boldly states, "the entire ontology of higher education is misconceived" (para 1). Whilst we are reluctant to go so far, it is clear that the enactment of teaching in this space no longer provides the best fit with learners and their lifestyles, and does not adequately align with how knowledge is accessed and constructed in our Web 2.0 world. This is the optimum time and place to embrace andragogical practices within a digitally expanded educational context: which we coin as 'digital andragogy'.

Our notion of digital andragogy draws on the 21st century learning skills, our profile of 21st century learners in initial teacher education progams, and the affordances of Web 2.0 technologies. Silva (2009, p.630) states that "an emphasis on what students can do with knowledge, rather than what units of knowledge they have, is the essence of 21st century skills". Whilst there appears to be many differing lists and descriptions of '21st century learning skills', there are four components that are consistent: critical thinking, communication, collaboration and creativity. These are clearly not new skills, but perhaps the point is that they have new importance (Silva, 2009).

In Western societies people are "inundated by enormous amounts of data that they must access, integrate, and evaluate" (Dede, 2009, p.2). The ability to think critically is paramount to successfully surviving the digital flood; students need to be explicitly taught to recognise, with some speed and fluency, information that is irrelevant, incomplete, lacking consistency, and perhaps even skewed. Communication and collaboration seem to be inextricably tethered in the context of the 21st century suite of learning skills. Successful collaboration is reliant on an ability to engage in rich dialogue whether in face to face situations or in mediated online spaces. Although collaboration can be viewed as a "perennial capability" (Dede, 2009, p.2), the complexities of synchronous and asynchronous team work made possible by current and emerging technologies make for collaborative skills that are more sophisticated than those of the post-industrial era. Saavedra and Opfer (2012, p.12) contended that "creativity is prized in the economic, civic, and global spheres because it sparks innovations that can create jobs, address challenges, and motivate social and individual progress" (p. 12). If creativity is viewed as an incremental rather than a fixed characteristic, then students can learn to be more creative (Saavedra & Opfer, 2012).

It would be a fallacy to state that all 21st century learners exhibit NetGen characteristics; as can be seen from the data, increasingly initial teacher education students are drawn from career-changers, Gen X and Baby Boomers as they pursue long-held but not-able-to-be-acted-upon dreams. However the affordances of digital technologies and Web 2.0 environments for all students in the 21st century seem to influence their 'student behaviour'. Digital technologies have become a way of life; they are used to acknowledge others and to form personal identities (Seely-Brown, 2000). Students want personalised flexible learning, and instantaneous feedback and communication. They multi-task rather than complete tasks in a linear fashion and so pick up and put down tasks multiple times. There is also a somewhat misguided or naïve belief about the tech-savviness of these

students. We make many assumptions about their ability to trouble shoot, file manage, select browsers, access materials, and effectively navigate around learning management systems.

Our definition of 'digital andragogy', distilled by from our investigation and analysis, is "the practice of educators to equip and encourage adult learners to choose and use the affordances of accessible digital technologies to personalise their learning and facilitate their interactions with peers and tutors". However to achieve this, we contend that particular ways of working need to be made explicit for both the educator and the learner, as the locus of control for learning subtly shifts from teacher to learner (Cochrane & Antonczak, 2015). Table 14 provides details of these ways of working.

Table 14: Ways of working for successful digital andragogy

Educator actions	Learner actions
Navigation through the unit is scaffolded by 'chunking' content and tasks.	Self-directed navigation through the content and tasks is undertaken.
The immediate application of learning is made obvious.	Internal motivation is developed and personal progress monitored.
Tasks and activities are designed to require collaborative team work.	Collaboration with peers occurs in teams with complementary skill sets.
Creative and innovative solutions and practices are modelled.	Past experience and prior learning is drawn upon.
Opportunities for creative development and reflection are provided.	Contextual creativity is developed.
A variety of modes and mediums of communication are engaged with.	A variety of modes and mediums of communication are engaged with.

Enacting digital andragogy

The ultimate goal of a digital andragogical approach to initial teacher education is to "enable students to experience and gain understandings of the ways of thinking and practising that are expected of practitioners within a given community of practice" (Land, Cousin, Meyer & Davies, 2005, p. 57). To achieve this goal, we suggest the following principles be addressed by the unit designer:

- The learners are made very aware of the rationale for the non-pedagogical approach, and are also aware of the ways of working (Table 14).
- The learning modules are chunks of information/skills/strategies that encourage learner collaboration and reflection to make meaning and connections to prior knowledge.
- The assessment tasks serve three purposes, not just determination of grades. The tasks are assessment *of* learning, *for* learning, and *as* learning.
- Task (formative and summative) feedback is prompt, personal, and is provided in different formats (written, video, and sound bite).

When designing digital andragogy-based units, there are several considerations to be made well before the unit content is developed: (1) Is there a particular order in which the modules need to be completed? (2) Are some modules pre-requisites for others? (3) Will students be able to complete modules as quickly or slowly as they wish? (4) How will students' understanding of content be monitored as they progress through the unit? (5) How will collaboration and conversation be facilitated? (6) How will feedback be provided and by whom? (7) How will student use of the online materials and resources be monitored? And is this even necessary? (8) What affordances will the learning management system provide for unit access? (9) What are the services that can be used to receive notifications?

Theory into practice

This paper has essentially been a theorising exercise: to rethink educative practices in initial teacher education in the light of data collected about the nature of our current learners. The authors have completed a one-year proof of concept (POC) project (Semesters 1 and 2, 2015) that piloted a digital andragogical approach in two related and consecutive units in the Bachelor of Education (Primary) at Curtin University.

Methodology

In order to research the impact of the POC, a situated case study was undertaken across the two semesters, and data from Semester 1 were used to evaluate and modify the approach for use in Semester 2. Briefly the characteristics of the digital andragogical approach taken in the POC are:

- 5 mandatory Masterclasses as opposed to the traditional 12 tutorial sessions. Students choose which timetabled Masterclass they attend.
- the remaining 7 timetabled tutorials are for drop-in sessions: students may work in groups or receive individual attention from the tutor who is present for the whole time or choose not to attend and manage their work in a time and space of their choosing.
- unit content has been chunked into manageable portions and learning is demonstrated by the submission of weekly tasks. These are commented on and feedback provided by the tutor within one week, and whilst they do not constitute components of the summative assessment of the unit, they do provide ongoing feedback and formative assessment.
- the LMS being used has functionality that is superior to that of *Blackboard:* students can choose multiple ways in which they are notified of announcements, grades, and feedback: ranging from their university student email to *Facebook* and SMS messages to their phones; they also choose the frequency of the messages (from as soon as sent to once a week), and the LMS also has an app for easy access. The associated calendar is linked to the modules, tasks, and syllabus.
- the tutors have digitised information for students as much as possible using *GoAnimations, Vokis, Kahoots*, and video clips.

Participants

The same pre-service education students (88 in total) were transitioned into digital andragogy over the two consecutive semesters.

Data collection

Initial pre-unit implementation data was collected for Semester 1, 2015 (anonymous online survey), and post-unit data at the end of June, 2015 (anonymous online survey and semi-structured email interviews). A further data set was collected at the end of Semester 2, 2015 using an anonymous online survey and semi-structured email interviews. The learning management system being used (*Canvas* by Instructure) was interrogated to retrieve site analytics that contributed to a picture of the effectiveness of this approach to initial teacher education.

Results

The data from Semester 1 suggest that the approach, whilst confronting in one sense, was well-received by students in another. The confrontation was mainly due to the expectation that weekly readings and activities were completed within the week and submitted by the due date. Positive comments were in regards to the LMS calendar that was linked not only to the syllabus, modules, assignments, and discussion boards, but also contacted the students as and when items were forthcoming and due. The students were able to nominate several methods of calendar notification: student email, personal email, *Facebook* or SMS.

Approximately 17% of students in Semester 1 participated in individual semi-structured interviews designed to garner feedback about both the LMS and the digital andragogical approach taken in the unit. Student 6 said "I found it really effective having both the Masterclasses which were quite intensive but also having the time to sort of consolidate that learning and speak with you[rself]" which was a sentiment reflected by the majority of the interviewees. Student 7 stated "I thought it was good that we had weekly activities because it keeps you thinking about the unit and you don't just forget about it for a few weeks until you come back for the next assignment" which related to the chunking of the unit content.

The post-unit survey for Semester 1 had a 96.6% response rate and Table 15 summarises the responses to Question 4 "How important are the following to you?" which was intended to seek feedback on the key features of our digital andragogical approach.

Upon completion of the unit, students reflecting on whether or not the importance placed upon these functions of the LMS and mode of unit delivery had changed revealed that 51% indicated that it was more important for them to be able to access their unit progression, closely followed by 49% indicating that having access to their tutor was more important. Interestingly, the lowest scoring aspect from this survey item as shown in

Table 15 (contributing to peer conversation) revealed that 62.5% stated that there was no change in their opinion and 8% stated that this aspect was now less important.

Table 15: Post-unit implementation survey data
(Question 4: How important are the following to you?)

Unit delivery aspect	% strongly agree/agree
Having access to my tutor	96
Being able to access my unit online	92
Being able to access my unit progression (know what I have done and what to do next)	89
Being able to attend any workshop in the week I want to	73
Attending workshops on campus	72.5
Accessing recorded materials (lectures)	56
Receiving notifications in multiple ways (SMS, *Facebook*, email)	55
Using my phone to access unit information through the app	47
Contributing to peer conversation (e.g. discussion board)	34

The mandatory weekly tasks (scaffolded chunking of unit content and reflection) were contentiously viewed; approximately two-thirds of the cohort valued them and understood the connection to their learning, whilst the remaining third considered them an imposition. From the survey responses, 87.7% indicated that they strongly agreed or agreed with the statement "The weekly tasks were related to my forthcoming practicum and future professional identity", and the second highest scoring response was 79.5% agreement with the statement "The weekly tasks scaffolded my progress through the unit".

The purpose of the Masterclasses was to provide more flexibility for student engagement in the unit. Table 16 shows the high level of success of this mode.

Table 16: Survey responses reflecting upon the Masterclasses

Statement	% strongly agree/agree
The focus of each Masterclass was clear and relevant	98.6
The Masterclasses were engaging and student-focused	94.5
The Masterclasses allowed me to collaborate with my peers in real time	93
The 5 Masterclasses in combination with drop-in sessions supported my learning and life-style commitments	90.5
The schedule of the Masterclasses allowed me to make choices about my attendance	87.8
The unit delivery worked better for me than the traditional 12 weeks attendance	83.8

The following are two quotes from students who undertook the post-unit Semester 1 interviews:

> The notifications were great and also the ability to upload the weekly tasks and get feedback was good. The Masterclasses were GREAT, quality over quantity!

> This has been a very successful learning experience. Having achievable weekly tasks and readings to complete was something I found extremely useful, along with the accessible syllabus and module resources.

Semester 2 survey data reflected the high agreement levels of Semester 1, with 85% of students indicating that they would like all of their units delivered in the manner. The success of the approach has been further validated by 100% agreement in the Student Unit Evaluations for both semesters for all criteria. In addition, no student failed the theory component of either unit.

Conclusion

Whilst the digital andragogy outlined and reported on in this paper does not align entirely with Knowles' (1984) characteristics of adult learners, it does describe a successful, scaffolded transition process to enable pre-service teachers to develop these characteristics in a digital age. Moving beyond presenting concepts and shaping ideas, we seek to help students to cross the threshold from a teaching student to a student teacher, developing their teacher identity and helping them to feel ready to take their place as members of the teaching profession. This can be achieved by scaffolding students to develop a professional digital portfolio (tool) by undertaking a three Cs process (that is, collect, critique, and curate) to demonstrate evidence towards attaining the Australian Professional Standards for Graduate Teachers. The development of these professional digital portfolios will be incorporated into the next iteration of the units that is targeted for 2016, in the form of technical seminars.

The key components of digital andragogy, as enacted in the POC project, will constitute the foundation of the next iteration. These are: chunking of content and tasks; Masterclasses for key content delivery and collaboration opportunities; additional optional workshops specifically relating to assessment tasks and technical support; and instant, informative, and personalised feedback to students.

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