Educating Adult Learners: Bridging Learners' Characteristics and the Learning Sciences

Yan Yin Ho and Wei Ying Rebekah Lim

Introduction

Current understandings of adult learning are largely built on the basis of the life-stage characteristics of the learners, i.e., being adults, and therefore by implication, shaping certain teaching approaches such as self-directed learning. The work of Kasworm, Rose, and Ross-Gordon[1] and other leading scholars in the adult learning field have unpacked at length

[1] Carol E. Kasworm, Amy D. Rose, and Jovita M. Ross-Gordon, eds., *Handbook of Adult and Continuing Education* (New York: Sage, 2010).

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Y. Y. Ho (✉) · W. Y. R. Lim
Teaching & Learning Centre, Singapore University of Social Sciences,
Singapore, Singapore
e-mail: yyho@suss.edu.sg

W. Y. R. Lim
e-mail: rebekahlimwy@suss.edu.sg

the characteristics of adult learners and, by association, their ways of learning. While such a perspective and work have been useful, we contend that it is no longer sufficient to fully engage adult learners in different learning situations on a lifelong and lifewide basis. In this chapter, drawing on survey data from a case university, we posit that it is equally important to view adult learning from the learning sciences point of view, so as to develop competent learners who are able to transcend across various contexts of work, learning, and society. We further contend that this broader view of adult learning, considering both the adult learner characteristics and the science of learning, is a more inclusive approach of education where a productive adult education can contribute toward the good of society.

We first begin by articulating our motivation to deepen our current understanding of adult learning. Next, we describe the common conceptions of the characteristics of adult learners and, by extension, their ways of learning and knowing. This is followed by the presentation of the survey results which suggested that the learning preference and the learning behavior of adult learners are not a simplistic reflection of their characteristics as adults; a critique we put forth in the discussion section. Finally, we conclude that the work from the learning sciences can enhance our pedagogical approach to adult learning, adding value from the evidences gleaned from learning research.

Impetus to Deepen Our Understanding of Adult Learning

In recent years, given the increasing globalized and interconnected nature of societies, the work on lifelong learning has been studied in tandem with that of adult learning. Educating adults on a continuous and lifelong basis has been viewed as one important mechanism for sustaining a vibrant, healthy, and adaptable workforce. The import of recognizing adult learning and the contexts in which they navigate has increased over time, encapsulated in the UNESCO conceptualization of "Education for the 21st Century" as learning to do, know, be, live together and change.[2]

Such a view is particularly appreciated in a small city-state such as Singapore with globalized economic ties. With human capital as one of her main resources, it is imperative that her workforce is not only knowing and adapting to changing economies, but doing so where health,

[2] Jacques Delors, *Learning: The Treasure Within* (Paris: UNESCO, 1996).

well-being, and civic and social connectedness are well-considered. In response, the government-sponsored SkillsFuture program is a national movement "to provide citizens with opportunities to develop their fullest potential throughout life."[3] Among many initiatives, there is an increasing emphasis for adult learners to return to formal education to deepen their skills for lateral or horizontal career movements for a global economy.

The impetus to deepen our understanding of adult learning stems from this background. The institutes of higher learning have been seeing more adult learners returning to school. While this is heartening, teaching conversely has become more complex. The range of prior experiences, knowledge, learning preferences, and behavior has become more diverse, and correspondingly, teachers would need to broaden their repertoire of skills in order to achieve learning goals. From literature, we had known that pedagogies such as experiential learning (learning by doing), self-directed learning, and andragogy are common approaches of engaging adults.[4] These approaches are well-documented and have largely proven their efficacy. Moreover, these approaches resonate with characteristics of adult learners, which is a life-stage view of the learner profile.

Defining the Adult Learner

The transition from childhood to adulthood has been celebrated with rituals and milestones. These rituals and milestones that mark adulthood are different between societies and culture groups. Therefore, trying to come to a unifying understanding of what defines a person as an adult is not easy considering the disparity among the different societies and culture groups.

The same difficulty is faced by researchers and educators who try to set boundaries to demarcate adult learners entering institutions of higher learning from conventional fresh school leavers ("traditional age" students). While it is common to use the legal age to define adulthood, it is not as simple to use the same principle to define adult learners. Johnson, Taasoobshirazi, Clark, Howell, and Breen used an example to show why

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[3] "About SkillsFuture." SkillsFuture Singapore Agency. Accessed May 31, 2019, from https://www.skillsfuture.sg/AboutSkillsFuture.

[4] Sharan B. Merriam and Laura L. Bierema, *Adult Learning: Linking Theory and Practice* (San Francisco: Jossey-Bass, 2014).

using age to define adult learners would be problematic.[5] For example, a nineteen-year-old undergraduate could already be a parent, shouldering the responsibilities typical of an adult, while a twenty-four-year-old undergraduate may have never left school or has yet to shoulder any adult responsibilities simply because they have been studying all this time. If age were to be used to define adult learners, it would then exclude the nineteen-year-old even though their life reflects more adult responsibilities.

The age example is just one of several dilemmas involved in the attempt to define adult learners. While there is no formal consensus among educators and researchers about the definition of adult learners, it is generally agreed that adult learners have the following characteristics[6]:

- Adult learners take on many roles in their lives. They may be a parent, a child, a partner, a spouse, an employee, or an employer all at the same time.
- Because of the multiple roles, by extension, adult learners have many responsibilities and commitments.
- Most adult learners enroll in part-time programs rather than full-time programs.

However, it is interesting to observe a sort of reversal in trend in recent years. Conventional fresh school leavers in institutions of higher learning are taking on more responsibilities and commitments as many are either working part-time, volunteering, or undergoing internships while studying at the same time.[7] Hence, these fresh school leavers may be juggling as many roles as adult learners, though some will argue that the responsibilities they face may not be as heavy as those faced by adult learners.

[5] Marcus Lee Johnson, Gita Taasoobshirazi, Lauren Clark, Leah Howell, and Mishele Breen, "Motivations of Traditional and Non-traditional College Students: From Self-Determination and Attributions, to Expectancy and Values," *The Journal of Continuing Higher Education* 64 (2016): 3–15, https://doi.org/10.1080/07377363.2016.1132880.

[6] Ellen E. Fairchild, "Multiple Roles of Adult Learners," *New Directions for Student Services* 102 (2003): 11–16; Jovita M. Ross-Gordon, "Research on Adult Learners: Supporting the Needs of a Student Population that Is No Longer Non-traditional," *Peer Review* 13, no. 1 (2011): 26–29.

[7] Adam G. Panacci, "Adult Students in Higher Education: Classroom Experiences and Needs," *College Quarterly* 18, no. 3 (2015), accessed May 31, 2019, from https://files.eric.ed.gov/fulltext/EJ1087330.pdf.

Nevertheless, it will be interesting and important to monitor this development to see whether there is a need to rethink if the notion of adult learners and its implications to pedagogy continue to hold in the years ahead.

Educating Adult Learners

The education of adults is not a modern undertaking. Our ancient teachers had already undertaken this task—one could visualize the learning taking place with the educational exchanges Plato and Aristotle had with their adult students as they debated wide-ranging issues from ethics, education, philosophy to metaphysics.[8] Today, the education of adults is a studied field, and andragogy is a forerunner in this field in terms of shaping how educators approach adult learning and teaching.

The word "Andragogy" is mostly associated with Malcolm Knowles' work even though Alexander Kapp, a German high school teacher, was the person known to have coined the term in 1833.[9] Andragogy is the art and science of helping adults to learn. How a teacher approaches the teaching of adults is usually based on assumptions Knowles made about adult learners. The assumptions are[10]:

1. Adult learners need to know the rationale of why they are learning something.
2. Unlike children whereby their self-concept is still developing, adult learners enter the classroom with a fully developed self-concept, which usually entails assuming full responsibilities for their own lives.
3. Adult learners are not blank slates and that they come with a wealth of experiences.
4. Adult learners' readiness to learn is often oriented to the roles and responsibilities they have.

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[8] Selahattin Turan, "Plato's Concept of Education in 'Republic' and Aristotle's Concept of Education in 'Politics,'" *Education and Science* 36, no. 162 (2011): 31–38.

[9] John A. Henschke, "Considerations Regarding the Future of Andragogy," *Adult Learning* 22, no. 1 (2011): 34–37, https://doi.org/10.1177/104515951102200109.

[10] Malcolm S. Knowles, Elwood F. Holton III, and Richard A. Swanson, *The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development*, 8th ed (New York: Routledge, 2015).

5. Adult learners are problem-centered and are motivated to learn when the learning is perceived to be helping them perform tasks and solve immediate problems.
6. Adult learners are intrinsically motivated to learn.

According to Knowles, drawing on the life-stage view in characterizing adult learners, adult learners are self-directing because of their developed sense of self, which is being responsible for their own lives and decisions. Hence, they know what they want to learn, which is shaped by their needs and experiences. Because learning needs are propelled by internal pressures, adult learners are intrinsically motivated. In short, Knowles' depiction of adult learners can be seen as those who have developed self-concepts, are experience-rich, and are intrinsically motivated.

Knowles' andragogy is popular and influential because it provides applicable teaching principles for teachers of adult learners.[11] For example, teachers should tap on adult learners' self-directedness in their pedagogical practices to enhance adult learners' experience. Spending some time to explain the underlying reasons for teaching certain concepts may activate the self-directing tendencies and spur them on to learn. Adult learners' rich experience should also be tapped to facilitate their learning through problem-based teaching approach, which is preferred by adult learners who need to see relevance in what they are learning. Essentially, Knowles' andragogy centers upon adult learners' characteristics and the teaching and learning processes are built on these characteristics.

LEARNING BEHAVIORS OF ADULT LEARNERS IN INSTITUTIONS OF HIGHER LEARNING

With more adult learners returning to school, the shift in student population means that some institutions of higher learning are becoming unconventional from the traditional model of university, whereby the student population comprises a mix of fresh school leavers and adult learners. The case university discussed in this chapter is one such example of an unconventional institution of higher learning in the Singapore educational landscape where there is a mix of adult learners and fresh school

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[11] Tracy Carpenter-Aeby and Victor G. Aeby, "Application of Andragogy to Instruction in an MSW Practice Class," *Journal of Instructional Psychology* 40, no. 1–4 (2013): 3–13.

leavers enrolled in the undergraduate programs. Classes for the part-time adult learners are usually arranged in the evenings or on weekends and a blended learning approach is also comprehensively incorporated into the curriculum design to imbue greater flexibility into the learning ecology to help adult learners manage their studies better along with their various commitments.

The work of Malcolm Knowles and other researchers of adult learners' characteristics present the notion that adult learners are unique from children, and even from fresh school leavers in conventional universities. Such characterization suggests that a different teaching approach is needed for adult learners with the rationale being that adult learners may be learning differently.[12] As part of ongoing efforts to deepen understanding of adult learners, further propelled by the SkillsFuture movement where more adult learners are returning to formal learning, the case university spearheaded different initiatives to constantly evaluate the university's provision to ensure the adult learners are well supported. One such initiative is conducting a learning needs survey to collect information on the learning preferences and learning behaviors from the university's adult learners. We discussed the results from the learning needs survey in the following sections.

Survey Process and Survey Content

The learning preference and learning needs survey was based on a similar student learning needs survey developed by Khiat.[13] Items in the current survey were updated where needed. An expert panel comprising faculty members and administrative executives also reviewed the items to ensure clarity and appropriateness of the survey.

The survey was hosted on an online survey platform. Students accessed the survey via a link sent together with the email invitation for survey participation. The entire survey was made up of 196 items and measured

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[12] Beverly Woodson Day, Stella Lovato, Candance Tull, and Jovita Ross-Gordon, "Faculty Perceptions of Adult Learners in College Classrooms," *The Journal of Continuing Higher Education* 59 (2011): 77–84, https://doi.org/10.1080/07377363.2011.568813

[13] Henry Khiat, "Academic Performance and the Practice of Self-Directed Learning: The Adult Student Perspective," *Journal of Further and Higher Education* 41, no. 1 (2017): 44–59, https://doi.org/10.1080/0309877x.2015.1062849.

many different constructs such as expectation for a good instructor, experience of using technology for learning, perceived academic competency, and time management skills. Constructs related to perceived institutional support like availability of academic competency support, display of good teaching practices, display of good instructor qualities, and instructors' usage of technology for students' learning were also included in the survey.

Only results from items related to demographic information, learning preferences (i.e., self versus group study, learning styles, and learning modality), and learning behaviors (i.e., time of study, duration of self-study, duration of assignment preparation, and completeness of exam revision) will be reported here.

Survey Respondents Information

A total of 886 adult learners (male = 45.7%) enrolled in the university's part-time programs responded to the survey invitation. The demographic information of the survey respondents is shown in Table 4.1.

With 78% of the respondents reporting to be holding a full-time job, the adult learners at the case university showed similar characteristics as adult learners described by most researchers—working full-time with multiple roles and responsibilities while studying part-time.

Table 4.1   Demographic information

Age (%)					
Below 25	*25–30*	*31–40*	*41–50*	*51–60*	*61–70*
25.4	40.6	19.1	10.2	3.7	1.2

Marital Status (%)				
Single	*Married*	*Divorced*	*Separated*	*Widowed*
70.5	27.2	1.7	0.1	0.5

Employment status (%)			
Holds full-time job	*Holds part-time job*	*Self-employed*	*Not working*
78.0	7.3	3.7	10.9

Survey Results

While exploratory factor analysis and confirmatory factor analysis were used to establish the properties of the survey and both descriptive and inferential statistics like ANOVA and correlation were used to analyze the survey responses, only frequencies of responses will be reported here for the understanding of the learning preferences and learning behaviors of the adult learners.

Learning Preference & Behavior

The survey asked the adult learners to respond to questions with regard to their learning preferences and learning behaviors. When asked about a preference for studying by themselves or studying in a group (*Survey Question: Which mode of learning do you most prefer? Self-study or group study*), 78.7% of the adult learners preferred self-study compared to 21.3% who preferred to study in a group.

To find out about preferred learning style, the adult learners were asked to give a rating to eight different learning styles comprising of reading, listening, writing, observing, doing, talking, discussing, and asking (*Survey Question: What is your preferred learning style? {1 being your most preferred to 8 being the least preferred}*). The adult learners rated reading, listening, and doing as their top three preferred learning styles. On the other hand, talking, asking, and discussing were their top three least preferred learning styles.

When asked to rate their preferred lesson delivery methods, 61.3% of adult learners rated face-to-face lessons as their most preferred lesson delivery method, while 30.2% and 8.5% rated blended learning and full online learning as their most preferred lesson delivery method, respectively (*Survey Question: Rank the following types of lesson delivery according to your preference. {Face-to-face sessions, Blended format, Online sessions}*) (see Fig. 4.1).

Besides preference, the adult learners were asked to report on their learning behaviors. Adult learners were asked about the time period when they were most likely to find time to study (*Survey Question: At which of the following times do you most frequently self-study or do group study? {Including preparing for tutor-marked assignment} e.g., 12 midnight–2 a.m., 2.01 a.m.–4 a.m.*). Responses collected showed that 65.2% of the adult learners found time to study between 8 p.m. and 12 a.m. while
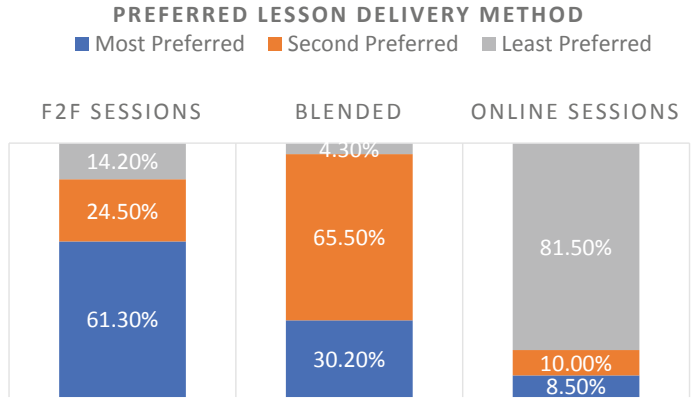
PREFERRED LESSON DELIVERY METHOD

■ Most Preferred   ■ Second Preferred   ■ Least Preferred

F2F SESSIONS	BLENDED	ONLINE SESSIONS

14.20%	4.30%	81.50%
24.50%	65.50%	10.00%
61.30%	30.20%	8.50%

Fig. 4.1 Adult learners' rating of their preferred lesson delivery methods

10.2% found time to study between 6 p.m. and 8 p.m. The rest of the adult learners reported studying between 12 a.m. and before 6 p.m. (less than 6% in any of the two-hour interval period between 12 a.m. and 6 p.m.) (see Fig. 4.2).
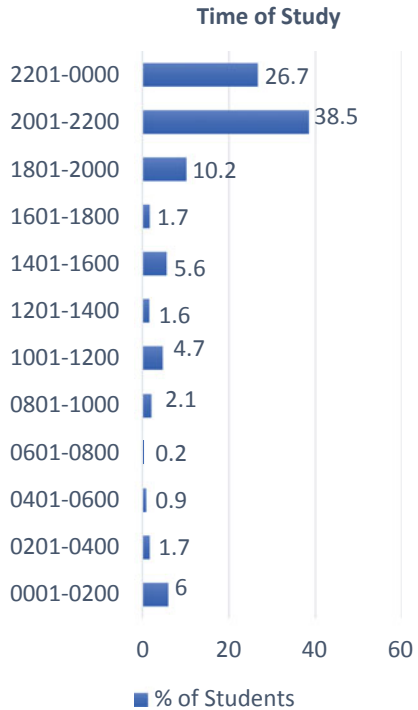
To find out how much time adult learners spent on self-revision, the following survey question was asked—*Average number of hours spent in self-study per week (excluding preparing for tutor-marked assignment).* Responses showed that 55.4% of adult learners reported spending up to five hours per week on self-study. The highest reported number of hours was 2–3 hours of self-study per week (28.2%) (see Fig. 4.3).

Assessment-Related Behavior

To find out the average number of hours adult learners spent to complete an assignment (which may be an essay or a report), the following survey question was asked—*How many hours do you take to finish a tutor-marked assignment?* Responses collected showed that 59.7% of the adult learners reported spending 12 hours and more to complete an assignment. The highest reported number of hours was spending more than 21 hours to complete an assignment (30.1%) (see Fig. 4.4).

As for exam preparation, adult learners were asked to report the average amount of examinable content they were able to complete revising for before the exam (*Survey Question: On average, I complete ____ of the*
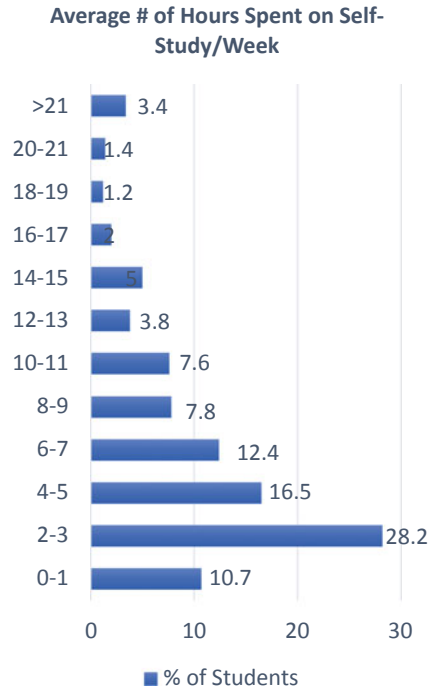
Fig. 4.2 The time periods for when adult learners reported they most likely have time to study

Time of Study

Time period	% of Students
2201-0000	26.7
2001-2200	38.5
1801-2000	10.2
1601-1800	1.7
1401-1600	5.6
1201-1400	1.6
1001-1200	4.7
0801-1000	2.1
0601-0800	0.2
0401-0600	0.9
0201-0400	1.7
0001-0200	6

■ % of Students

examinable content before taking the exam. {0–25%, 26–50%, 51–75%, 76–100%}). 43.8% of the adult learners reported being able to complete exam revision for 76–100% of examinable content. 46.2% reported being able to complete revision for 51–75% of examinable content. 7.8% reported being able to complete revision for 26–50% of the examinable content while 2.3% completed less than 25% of the examinable content before taking an exam.

To summarize the responses collected about the adult learners' learning preferences and learning behaviors, the adult learners seemed to prefer a more solitary form of learning where reading, listening, and doing are the preferred forms of activity. 61.3% preferred the face-to-face lesson format over blended (30.2%) or online (8.5%) lesson modes. 55.4% of adult learners reported spending up to five hours for self-studying, within which 28.2% reported spending 2–3 hours. In terms of assessment-related

Fig. 4.3 Average number of hours (per week) spent by adult learners on self-studying (excluding time spent on assignment preparation)
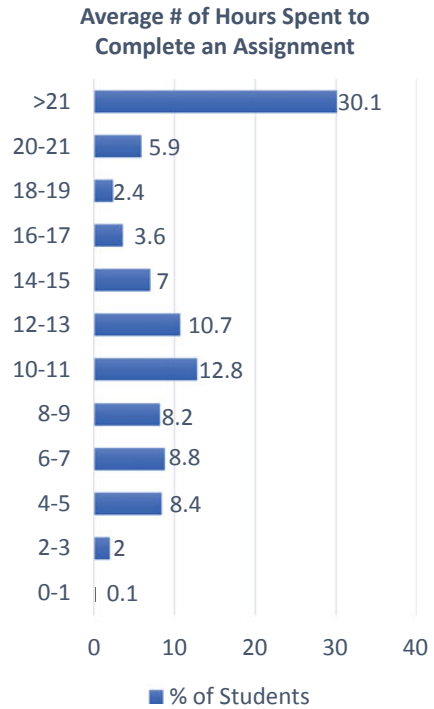
Average # of Hours Spent on Self-Study/Week

Hours	% of Students
>21	3.4
20-21	1.4
18-19	1.2
16-17	2
14-15	5
12-13	3.8
10-11	7.6
8-9	7.8
6-7	12.4
4-5	16.5
2-3	28.2
0-1	10.7

■ % of Students

behavior, 43.8% reported completing at least 75% of exam revision, while 59.7% reported spending more than twelve hours completing their assignments.

DISCUSSION AND RECOMMENDATIONS

Broadly, the learning behavior (e.g., 89.3% of students reported studying at least 2 hours per week) and the assessment-related behavior (e.g., 59.7% reported spending at least 12 hours to complete an assignment) appear consistent with characteristics of adult learners as self-directed learners who would invest time and effort on learning. However, the survey results also raised the question if the amount of time and effort are adequate. For instance, one would wonder how do half of those surveyed who did not complete exam revision cope in the exams (43.8% of

Fig. 4.4 Average number of hours spent by adult learners to complete one assignment

Average # of Hours Spent to Complete an Assignment

Hours	% of Students
>21	30.1
20-21	5.9
18-19	2.4
16-17	3.6
14-15	7
12-13	10.7
10-11	12.8
8-9	8.2
6-7	8.8
4-5	8.4
2-3	2
0-1	0.1

■ % of Students

adult learners reported being able to complete at least 76% of exam revision)? Moreover, only 30.2% of adult learners preferred blended learning, a mode assumed to give adult learners the flexibility they need.

While the survey results will be clarified with a focus group which we will subsequently conduct, the current findings suggest that adult learners' learning preference and behavior are not a simplistic reflection of their life stage as adult learners. We contend that their learning preference and behavior indicate the complex multifaceted adult learners' behavior toward learning. The findings provided a basis to assess if current pedagogies of adult learning require a relook and if new practices are needed. After decades of research in the science of learning, the learning sciences field has developed evidence-based principles informing us how people learn. Combining our understanding of adult learners with strategies derived from the learning sciences could be the way forward for the field as we make good of the time and effort put in by adult learners.

The following section discusses how we draw on the learning sciences to draw implications for adult learning pedagogies. First, the findings indicate adult learners do spend time on their studies (as evidenced by having just 10.7% of the surveyed adult learners report spending less than an hour per week on self-studying). Teachers of adult learners could capitalize on this and help students to optimize their studying efforts. One approach of active learning strategy is to have adult learners make overt their knowledge by organizing and representing them. Ambrose, Bridges, DiPietro, Lovett, and Norman explained that the organizations of knowledge could be different between novice and experts, where experts' organization of knowledge showed denser and more complex connections between constructs as compared to novices' knowledge organization.[14] By encouraging adult learners to make overt their knowledge, they can then assess if there are any misconceptions in learning or lack of depth in learning. One such strategy of making knowledge overt is through visualization study techniques such as mind maps or concept maps. Teachers can further help adult learners by developing course material or resources that allow adult learners to make comparison between their represented knowledge and what they are supposed to achieve.

The strategy of making knowledge overt through organization and representation is also useful in view of adult learners' preferred learning style. The results of the survey showed that the most preferred learning style is reading. Coupled with a strong preference to self-studying (78.7%), it suggests a somewhat passive and traditional learning style. Hence the encouragement for overt representation of knowledge by adult learners, together with good course resources for comparison, becomes more critical. It becomes an opportunity for adult learners to assess their learning progress.

When it comes to the mode of learning, most adult learners (61.3%) preferred the face-to-face class format, rather than blended or online learning. Instead of didactic lectures, face-to-face sessions are to be well used for active learning. Knowles argued for teachers to utilize adult learners' prior knowledge as a teaching and learning resource to motivate and engage adult learners. However, Ambrose et al. cautioned that

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[14] Susan A. Ambrose, Michael W. Bridges, Michele DiPietro, Marsha C. Lovett, and Marie K. Norman, *How Learning Works: Seven Research-Based Principles for Smart Teaching* (San Francisco: Jossey-Bass, 2010).

students' prior knowledge can either help learning or hinder learning.[15] To help learning, students' prior knowledge needs to be activated using good questioning technique. However, prior knowledge needs to be sufficient, appropriate, and accurate to have a positive impact on learning. Prior knowledge becomes a hindrance to learning if it is insufficient, inappropriate, or inaccurate. Ambrose et al. further gave the example of misconceptions as a type of inaccurate prior knowledge that is difficult to change and could have a forward acting impact on future learning, where new learning can be distorted or misinterpreted by misconceptions.

Therefore, in order to tap on adult learners' rich experience, the implication for teachers is to first activate this prior knowledge via posing good questions and good facilitation techniques to encourage discussion. This exercise is to help adult learners see the relevance and connection between new and prior knowledge. Teachers also need to assess the veracity and extent of prior knowledge the adult learners possess. This will shape how the prior knowledge is to be utilized for learning, and not assumed that the prior knowledge adult learners seemingly possess is enough to scaffold their new learning.

The learning style and lesson format preference displayed by adult learners of the case university suggested a preference for a more familiar way of teaching and learning, specifically ways that they have been taught, i.e., face-to-face lessons with the teacher and the learner passively receiving information via reading or listening. This could reflect the learner's past learning experiences' influencing their current learning experience. This also shows a desire for structure in learning, which seems to contradict with self-directedness and flexibility which would be more helpful in view of adult learners' busy lives. For example, online lessons will be more flexible for adult learners as it will reduce the need to come to campus for lessons and they can better manage their schedules. However, only 8.5% chose online learning as their preferred lesson mode. Knowles' andragogy views adult learners as self-directing but the propensity for self-directedness may not be uniform across adult learners.

To help adult learners see the affordances of blended and online learning, where there is greater flexibility and space to learn, teachers of adult

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[15] Ambrose et al., *How Learning Works.*

learners could place greater emphasis on setting the appropriate course climate. Course climate refers to the intellectual, social, physical, and technological environments in which learners learn. Teachers could address the uncertainty around online and blended learning by making it safe. Safety can be introduced to the course climate via principles of respect and inclusion and by providing support. Teachers could scaffold adult learners through the process of learning online. Teachers can first introduce a starter list of e-resources that students have access to, and gradually withdraw the hand-holding and by making accessing digital content count in assessment and interaction. That way, adult learners will know and appreciate blended and online learning, and realise that learning is not always about having face-to-face lessons with the teachers.

One significant finding from the survey result is the amount of time adult learners spent on assignment preparation (i.e., 59.7% spent at least 12 hours completing an assignment). This shows that adult learners are motivated to complete their assignments and teachers of adult learners can capitalize on this to further motivate adult learners. A takeaway for teachers, then, is to ensure that assignments are aligned with the learning outcomes. Not only will the adult learners be motivated to complete the assignments, but more importantly, they also achieve learning goals teachers set out for them as they work on the assignments. Using assessment to drive learning, coupled with targeted feedback, can be viewed as a goal-directed practice according to Ambrose et al.[16]

The notion of practice is to engage learners in the performance, and only in the observable in psychomotor, writing, or discourse are teachers able to provide targeted feedback. Feedback can take two forms—one to indicate progress and the other to indicate areas of improvement. It is common for teachers to focus on weakness when providing feedback. Such feedback is important as learners can then work on improving their performances. For example, the case university should encourage teachers to provide feedback to help adult learners in their weak areas especially if the course is a module with an end-of-course exam. This is because the survey results showed that adult learners put in much effort to revise for their exam (i.e., 43.8% completed at least 76% of exam revision). Therefore, the provision of targeted feedback that directs learners to the correct resource for improvement is an important practice. On the other hand,

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[16] Ambrose et al., *How Learning Works.*

feedback about progress is equally important and should not be excluded as it will serve as motivation for adult learners. It also reinforces confidence in adult learners in their abilities to learn. This is important, particularly for some adult learners who have been away from school for a very long time.

In addition, identifying the appropriate level of challenge in the assessment is important. Pitching has to be appropriate such that it is neither too daunting nor too easy. Besides, there could be opportunities for assessment to be accumulated such that performance can be built iteratively. From an assessment for learning point of view, assignments can be broken into smaller tasks, and iteratively build on one another. With good feedback, this is how learners gradually gain mastery.

On the whole, the education of adult learners can be made more effective by considering both the learner characteristics and the learning sciences. An understanding of the learning process and the incorporation of effective teaching and learning principles and strategies by teachers is equally important, in order to bring about the best learning experiences for adult learners.

Conclusion

In a way, the perception of adult learners may have been unfairly influenced by our perception of what being an adult means, which is being responsible for oneself and knowing what one wants and needs. Adult learners may know what they need to learn but it does not mean that they know how to go about learning it. The results from the survey suggested that the self-directed notions of adult learners may not be homogenous across the adult learner population. Therefore, it is important for teachers to consider both the learner characteristics and the learning process when designing pedagogies. As such, there is a need to continuously assess learning progress of adult learners through well-crafted assessment and to provide the correct level of scaffolding where needed. The same process of assessing students' learning needs and meeting them with pedagogically sound teaching practices should be similarly applied to adult learners as with learners of other ages.

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