Models of Cognitive and Intellectual Development in Older Adults: Two Stories Unfold

Barbara A. Smith

Abstract:

The purpose of the study from which this article is drawn is to explore how older adults (in this study, adults over 60 years of age) experience learning in classroom settings. Based on the literature in adult intellectual and cognitive development, older adult learners differ from young adult learners in significant ways such that they may require different teaching practices to facilitate their learning. In-depth interviews with nine older adults enrolled in degree programs in a university were conducted to elicit their personal narratives of their learning experiences. Participants were asked to keep journals as a means of reflecting on these experiences. One theme that is emerging from the data is how participants' past experiences are treated in the classroom. In general, I found that participants past experiences were not recognized or acknowledged by teachers. This article discusses the stories of two participants and outlines some implications for teachers.

hep.oise.utoronto.ca, Special Issue, March 2006, pp.110-123.
Models of Cognitive and Intellectual Development in Older Adults: Two Stories Unfold.

111

Older adult learners are thought to differ from young adult learners in intellectual and cognitive development such that they require different teaching practices to facilitate their learning. Until recently, there were two models of intellectual and cognitive development in adulthood, a decrement model and a stability model. These models have influenced research, teaching practices, and general perspectives on the learning abilities of older adults for many years. A third model is emerging from contemporary research: the growth model. This model provides a new perspective on the learning abilities of older adults and widens the possibilities for research and teaching practice. This paper discusses each model and its implications for

research and teaching. Although research findings have demonstrated that certain teaching practices can enhance learning for older adults, seemingly no one has asked older adults what helps them to learn best. The purpose of the study on which this article is based is to describe how older adults (in this study, adults over 60 years of age) experience learning in classroom settings. This article discusses how the past experiences of two participants were treated in the classroom and outlines some suggestions for teachers on how they might link learners' past experiences with course material.

Models of Cognitive and Intellectual Development
The Decrement Model

The decrement model suggests that as adults age there is a gradual decrease in their ability to process, recall, and use information as a result of the biological deterioration of the central nervous system (Tennant & Pogson, 1995; Whitbourne & Weinstock, 1986). For the most part, research on teaching strategies for use with older adults has been based on this idea. Consequently, such research has focused on how presumed cognitive deficits may be diminished or reversed. For instance, these strategies have helped older adults to improve their performance on subsequent tests: providing techniques for organizing information (Hultsch, 1971); explicit instructions in how to process to-be-remembered material (Ratner, Padgett & Bushey, 1988; Rissenberg & Glanzer, 1986); training in the abilities of inductive reasoning and spatial orientation (Schaie & Willis, 1986); training in imagery techniques to remember familiar sayings (Schaie & Willis, 1986; Wood & Pratt, 1987), names and faces (Yesavage, 1989); and self-pacing (Hulicka, Sterns & Grossman, 1967; Treat & Reese, 1976). Although this research does show that older adults' learning can be enhanced, it tells us little about what strategies older adults prefer to use or what the most effective teaching strategies may be.

The decrement model can be critiqued in the following ways. Typically, research studies demonstrating cognitive deficits with aging have been cross-sectional studies within an experimental paradigm where learning is measured by recall tests. Although most researchers understand the difference between learning and memory, learning and memory are often confused in studies on learning (Arenberg, 1994). Recall tests are tests of memory and do not necessarily reflect what was learned. Some critics argue that these research methodologies more suitably tap the abilities of younger rather than older adults (Labouvie-Vief, 1990). Labouvie-Vief asserted that research methods fail to recognize that older adults may exhibit a mode of cognitive functioning qualitatively different from that of young adults. Recall tests measure only the acquisition of new information. They

do not measure higher level cognitive skills that adults use to solve everyday, real-life problems. Consequently, such tests are not a particularly appropriate measure of the cognitive abilities of older adults.

Cross-sectional studies comparing the performance of older adults to that of younger and/or middle-aged adults have also been criticized because they fail to take into account two concerns: individual differences that become more pronounced with advancing age, and the variety of confounding factors, such as social and historical factors (Bolton, 1990), cohort differences (Perlmutter, 1983), environmental conditions, poor health and lifestyles (Thornton, 1986), and motivational factors such as anxiety, cautiousness, fear, or disinterest (Whitbourne & Weinstock, 1986) that may influence findings. Learners bring to the learning situation their personal histories, their unique personalities, their particular motivations, hopes, and concerns. The validity of research findings is suspect when such factors are not taken into account.

A further criticism relates to the operational definition of cognition. In cognitive aging research, cognition is narrowly defined as those abilities measured by psychometric tests of intelligence (Salthouse, 1991). Tennant and Pogson (1995) asserted that the intelligence test tradition has a number of shortcomings that may lead to the devaluation of distinctly adult forms of intelligence. Intelligence tests do not take cultural or age differences into account. According to Tennant and Pogson they are constructed from problems and tasks derived from the context of schooling rather than everyday life. Intelligence tests fail to measure precisely those aspects of cognition such as wisdom, sagacity, judgement, insight, effective application of one's capacities, social cognition, and long range planning (Salthouse, 1991) that adults develop as they mature through the experience of solving everyday problems. Similarly, Sinnott (1994) asserted that intelligence test tasks are specifically designed to work with simpler thinking. When they are used to analyze mature thinking, they may capture only part of the complex thought processes of mature adults. Consequently, when cognitive abilities are appraised using conventional intelligence test measures, it is not surprising that older adults perform more poorly than do younger adults. Findings from research based on the decrement model leave educators with little information on what teaching practices may be most effective for older adults' learning.

The Stability Model

The stability model purports that cognitive ability remains essentially the same after maturity (Tennant & Pogson, 1995). This perspective suggests that older adults do not need to be taught differently than younger adults based on differences in cognitive and intellectual development. Consequently, older adults have not been a focus for research in adult education and essentially have been ignored in the adult education literature. Mezirow (1991) referred briefly to cognitive function and aging as "greater awareness of the social context or dimensions of a problem, greater focus on an analysis of premises, greater awareness of psychological factors and individual and social goals in analyzing task situations, and greater integration of logic and feelings" (p.159), but he carried the theme no further. Tennant and Pogson (1995) were the first to discuss the relationship between intellectual and cognitive development and aging. They have linked the idea of cognitive and intellectual growth based on the accumulation of life experiences to lifelong learning and adult education. They identify

hep.oise.utoronto.ca, Special Issue, March 2006, pp.110-123.
Models of Cognitive and Intellectual Development in Older Adults: Two Stories Unfold.

113

three key concerns in adult education: acknowledging the experience of learners, establishing an adult teacher-learner relationship, and promoting autonomy and self-direction.

The significance of past experiences in adult learning has long been recognized. For instance, one of Knowles's (1978) assumptions in adult education was that as people mature, their expanding base of experience serves as a resource and a frame of reference in acquiring new learning. Brundage and Mackeracher (1980) regarded past experience both as a base for new learning and an unavoidable potential obstacle. They suggested that adult learning must focus on modifying, transforming, and reintegrating meanings, values, strategies and skills. Brookfield (1990a) outlined ways in which learners' past experience can be elicited and used in teaching. Although Bolton (1990) asserted that the differences between older and younger adults were based mainly on their experiences and suggested a learner-centred approach to teaching older adults, he did not emphasize the role of past experience. Even though adult education emphasizes a learner-centred approach, the important connection between the notions of life experiences, aging, and learning has not been addressed in the adult education literature.

The teacher-learner relationships that adult educators form with older adult learners may be very different from those formed with younger adults. Tennant and Pogson (1995) asserted that because teachers and learners are adult peers, there is a widely held view that the teacher-learner relationship should be participative and democratic, characterized by openness, mutual respect, and equality. They declared that there are political, social and psychological dimensions to education that create tensions in the teacher-learner relationship, and that adult educators need to have a very clear perception of their role in order to resolve issues of dominance, dependency, and control. Further complexity is added to these issues when teaching older adults. Older adults may have very different expectations of the teacher, based on their previous experiences in school. They have very different needs, wants, and motivations related to their life histories or their current phase in life. Factors such as these will affect the relationships that adult educators establish with older adult learners. In order to develop appropriate relationships, adult educators must understand older adult learners from their perspective.

The final issue for adult education raised by Tennant and Pogson (1995) is that of promoting autonomy and self-direction. It is not clear to what extent older adults are self-directed in their learning. While attending school in their formative years, older adults may have experienced authority-focused teaching methods that do not promote self-directed learning. Consequently, they may expect a teacher-centred learning environment. Conversely, as a result of their particular life experiences, older adults may have very clear learning goals and well-focused plans on how to meet them. Jones (1993) found a positive relationship between self-directed learning and age for art students in university settings, whereas in community settings she found a positive relationship between self-directed learning and educational level. She suggested that self-confidence in learning abilities attained through educational experiences may be the underlying factor in self-directed learning. Kasworm (1992) found that older university students operate as self-directed learners within the formal system regardless of their instructor's strategies. Possibly because older students have learned to be independent over the course of their lives, they take more personal responsibility for their learning activities. Clearly the idea of self-directed learning is complex. It is important not to make assumptions about how

self-directed older adult learners are. The stability model has not lead specifically to a consideration of the learning needs or cognitive abilities of older adult learners. Even though adult education emphasizes the identification of individual learner characteristics as a focus for choosing appropriate teaching methods, without understanding the life experiences of older adult learners, adult educators are not likely to meet their learning needs.

The Growth Model

The growth model contends that growth centres on the accumulation of experience in dealing with concrete problems at work, in the home, and in community life (Tennant & Pogson, 1995). Tennant and Pogson stated that mature adult cognition is characterized by the ability to fit abstract thinking into the concrete limitations of everyday life. Unlike problems on intelligence tests, real-life problems are often poorly defined, may have several right answers, and contain limited, ambiguous or contradictory information. Resolving such problems requires new forms of thinking and reasoning beyond those required to solve abstract problems found on intelligence tests. Thus, experience is seen as the locus for adult cognitive and intellectual development.

Baltes (1993) provided a theoretical perspective for thinking of cognitive and intellectual development as growth. He has described two types of cognitive functioning: cognitive mechanics and cognitive pragmatics. Baltes's ideas have evolved from the earlier work of Cattell (1963) and Horn (1970) who differentiated fluid and crystallized intelligence. According to Baltes (1993), cognitive mechanics – comparable to fluid intelligence – are determined by the evolution-based neurophysiological structure of the mind, while cognitive pragmatics – comparable to crystallized intelligence – reflect the impact of culture. Baltes stated that in cognitive mechanics there is aging loss, whereas in cognitive pragmatics there is evidence for stability and positive change for persons who reach old age without specific brain pathology, and who live in favourable life circumstances. From Baltes's perspective, the power of knowledge and culture enriches and compensates for the decline in the neurophysiological structure of the mind. He suggested that with the principles of culture and cultural evolution it is possible to have a larger vision of cognitive aging that 'outwits' the biological limitations of old age. Thus, according to Baltes, the pragmatics of intelligence become the focus for intellectual growth in adulthood.

The idea of the pragmatics of intelligence as the focus for adult intellectual growth has led to research on practical intelligence, wisdom, and the development of expertise (Tennant & Pogson, 1995). One study on wisdom used a variety of wisdom-related tasks to compare young and old human service professionals and distinguished older citizens identified as being wise through a nomination process (Baltes, 1993). The findings showed that when older adults were resolving problems based on complex life situations, they were more apt than young adults to consider the context of the situations and the importance and salience of an individual's values in making life decisions. The growth model suggests that older adults may need to be taught differently than younger adults based on their developmental trends resulting from their accumulated life experiences. This perspective broadens the possibilities for both research and teaching practice. Rather than attempting only to diminish or reverse presumed cognitive deficits, researchers may turn their attention to considering how to enhance older adults' learning by emphasizing their strengths. Cognizant of developmental trends in adult cognition,

hep.oise.utoronto.ca, Special Issue, March 2006, pp.110-123.
Models of Cognitive and Intellectual Development in Older Adults: Two Stories Unfold.

115

adult educators may develop learner-focused instructional practices that promote the important connection between life experience, aging, and learning.

Exploring Older Adults' Learning Experiences

The learning needs and experiences of older adults have been studied from the perspective of personal and social development. Wolf (1983, 1985, 1990) interviewed older adults from 60 to 80 years of age enrolled in a variety of educational programs. She was interested in determining why older adults returned to school, what they thought about late life education, how they came to choose their courses, what their experiences were in the educational system, and how their life histories were woven into their educational experiences. Wolf found that older adults returned to school for such reasons as concerns for cognitive decrement, dreams of fulfilment, and a need to be productive. Although participants reminisced during the interview, relating their past experiences to their current ones, she found that life review was not a part of the educational experience itself. She recommended the use of eminiscence as an effective learning strategy for older adults. Because of her theoretical perspective, life phase theory, Wolf did not discuss older adults' experience with instructional strategies used in the classroom. Seemingly, no one has studied the learning experiences of older adults from this perspective. Identifying what teaching practices are most effective for older adult learners is particularly important at this time. Johnston (1991) has reported that the world population and the labour force are aging. As the number of older adults grows in the population, increasing numbers of older adults may seek educational opportunities. In response to downward economic trends of the last several years, business, industry, health and social services are restructuring their services and operations. This restructuring entails retraining and cross-skilling employees, many of whom may be older adults. For those who have retired, greater longevity and better health status provide opportunities for interest and leisure education. Consequently, it is increasingly important for adult educators to use teaching practices that will enhance older adults' learning. The purpose of the study related in this article is to describe how older adults experience learning in classroom settings. Specific questions are: What teaching practices do older adult learners think help them to learn best in the classroom? What teaching practices do older adult learners think impede their learning in the classroom? How have older adults perceptions of what helps them learn changed as they have aged?

METHODOLOGY:
Participants and Method

The qualitative study that prompted this preliminary discussion involved in-depth, openended interviews with nine people taking degree courses at university. They were asked to keep journals as a means of reflecting on their current learning experiences. Participants were selected through purposeful sampling based on (a) age – over 60 years old, (b) active engagement in degree courses, (c) both men and women, (d) variety in courses being taken, and (e) willingness to commit a significant amount of time to reflection on and discussion of their learning experiences. These criteria provided good diversity within the sample. Participants were interviewed in their homes over three occasions, one week apart. Each interview was approximately one and one-half hours

hep.oise.utoronto.ca, Special Issue, March 2006, pp.110-123.
Models of Cognitive and Intellectual Development in Older Adults: Two Stories Unfold.

116

long. A general interview guide approach described by Patton (1990) was followed. Not all participants chose to write journals. For those who did,
entries were discussed at subsequent interviews. Their reflections are being analyzed in conjunction with the data collected during the interviews.

Data Analysis

I used inductive data analysis as described by Patton (1990). This method has two phases, a descriptive phase and an interpretive phase. This paper is based on the descriptive phase. Description of the data was done through content analysis of individual case studies. Themes were coded using Folio Views, a computer software program. A case study was written for each person. Once each case study was completed it was sent to the participant for their comments. In this way, I validated identified themes and established data trustworthiness.

Preliminary Findings

One theme that emerged from the data is that, in general, participants' past experiences were not recognized or acknowledged by teachers. I refer to specific experiences of two participants in discussing this theme.

Andrew

Andrew is a 76-year-old man who has completed seven credits in history with grades in the B+ to A- range. Andrew saw active duty during World War II and after the war made the army his career. Consequently Andrew thought his war experiences were quite relevant in his history classes where World War II was the focus. He felt that he had a lot to contribute and was taken aback when his experiences were rejected. One instance involved a paper Andrew wrote where he made reference to his war experiences.

> I had made a statement that one of the legacies that was left behind from the war in North Africa was the proliferation of land mines across the desert. And these things may be carried or the desert winds sometimes blows the sand away and exposes them, but nevertheless they're there in the hundreds of thousands, maybe millions. And in Libya there are probably over a million nomadic people whose life since time immemorial consisted of wandering that desert, and now they wander it at their peril because they're being blown up by these mines – people, children, livestock. And there doesn't seem to be any answer to the problem, or way of putting a stop to it, any practical solution to it....But I mentioned it in the course paper, and then, I thought that I had brought up a cogent point. But I didn't get any marks for it because it wasn't part of the reference material, just something that I had thrown in extemporaneously. The instructor said "That's all well and good but we wanted you to stick to the reference material and I don't think that was covered." But I kind of wondered about that because, on the other hand, we are taught to think, and we are taught to throw in things that cross our mind that are relevant. And to me that was relevant. It wasn't what he was looking for.

This anecdote demonstrates that Andrew's personal knowledge does not count in this class. There is a rigid requirement that Andrew stick to the academic references. The lesson that Andrew is learning in this instance is that if he wants marks, he must provide

the professor with what he is looking for. I question whether Andrew is really being 'taught to think' as it is difficult to see a connection between this requirement to conform and the development of independent thought. When I asked Andrew how he felt about his experiences being rejected, he chuckled and replied, "Well, not a big deal, mildly resentful, but I didn't press the point." I believe that Andrew downplayed his feelings in his response and that he was more upset than he cared to admit. In many ways, he defines himself in terms of his extensive war and military experience and in rejecting this experience, the teacher, in fact, rejects Andrew. Nevertheless, Andrew, as a career army officer, has been socialized in the custom of following orders. He views the professor as a more 'senior officer' and is willing, albeit somewhat reluctantly and resentfully, to give him what he is looking for. As he says, "There is no point in trying to buck the system, and this is what they want, and this is what you should give them, so, pretty good reason."

John

John is a 77-year-old man who is currently taking history courses out of interest. John completed a Bachelor of Commerce degree upon his discharge from the air force at the end of World War II and subsequently ran his own business. When he retired, he completed an honours degree in history maintaining a B average. Now John is quite self-directed in his learning. He has questions on the origin of our values and customs and is searching for answers through the study of history and philosophy. When I asked John whether he believed that his professors gave thought to the life experiences that he brought to the classroom, John replied:

> I think some of them think you shouldn't have an independent thought of your own, you know, and that all the knowledge is tied up in something they gave out and if you're going to become educated then that's what you have to accept…
> Oh I don't think he thought of that at all. I don't think he thought of me any differently than these kids coming out of high school. I mean he never inquired about whether I had any other thoughts other than what we went over, what he brought into the class.

John sees a clear connection between life experiences and learning. He believes that university should be a place to raise questions arising from life experiences. He criticizes the university for not fostering inquisitiveness in students. John said:

> I wondered sometimes in my mind if it wouldn't be a good idea if you had a gap between high school and when a student could start university so they would have a little time to experience life in the workplace and maybe think about things, raise some questions in their mind, and come back to the university to attempt to get answers to it. Being in school all their lives they were trained to, I thought at least, that they were just trained to listen to somebody and try and remember what they said and when exam time came, give it back to them. So if you had a good memory you could do quite well without raising any questions in your mind at all. If I have a complaint about university, that would be it.

John is perturbed that professors do not consider his life experiences as relevant in the classroom. However, he says that he "doesn't hold it against them because that is the

hep.oise.utoronto.ca, Special Issue, March 2006, pp.110-123.
Models of Cognitive and Intellectual Development in Older Adults: Two Stories Unfold.

118

way they were trained." It is clear that he thinks that the link between knowledge and life experiences is quite important when he talks about how students should use what they learn at university. He believes students should apply what they learn to making the world a better place in which to live. His voice becomes quite emotionally charged when he talks about this issue. He challenged his history professor when he said, "What are we supposed to do with that knowledge now that we have this? Are we supposed to try to make things better? Or we just work hard and get as high a mark as we can on the exam and then forget about it all?" John said the professor had no answer.

Not all professors ignored John's life experiences. John related an incident in another history course:

> As a matter of fact there were some professors that just took the opposite view. I mean they were really glad that I was in the class, and they thought that I brought something to the class that maybe somebody at the average age there wouldn't have. I remember particularly in one class the professor, at the end of the year, he said that he was going to do something that he had never ever done before. He was going to give out a prize to the student that he thought brought the most to the class through questions and things like this… So we were all there when he was going to give it out this night, you know, we were all wondering who was going to get it. And he gave it to me.

This anecdote demonstrates that some professors do recognize the positive contributions that older adult learners can make based on their experiences. In this case John's contribution was so substantial that he was awarded a prize. John will continue to be an autonomous, self-directed learner regardless of what professors might expect of him as a student. He does not worry about his marks suffering as he pursues answers to particular questions that interest him. He believes that universities should foster an environment that encourages questions and one in which professors help students to relate learning to current life experiences. John worries about the future of a society whose young people have not been encouraged to question.

These anecdotes from the experiences of Andrew and John are two examples of how participants' past experiences have been ignored in the classroom. These examples represent lost opportunities for both students and professors. The personal learning objectives of Andrew and John were thwarted. The professors lost opportunities to enrich their teaching and their classes by connecting the theory and research of their knowledge domains to the very concrete personal life experiences of these older students. The fact that John's unique contribution to the classroom was recognized and acknowledged by one professor demonstrates that not only do older adults have contributions to make based on their experience, but their contributions can be substantial and perhaps represent real benefits to the learning environment for all students.

Implications for Teachers in Higher Education

These preliminary findings suggest that acknowledging and understanding older adults' past experiences are essential if they are going to have successful learning experiences. This should not be surprising given the emphasis placed on past experiences in adult education. Tennant and Pogson (1995) asserted that "the principle tension in adult education is between the experiences of the learners in a particular domain and the codified knowledge of that domain as represented in theory and research reported in books and journals" (p. 151). The challenge for teachers is to make the connection between personal experience and codified

knowledge. Having learned about students' past experiences, teachers can link the material and the learners' experiences by pointing out similarities and differences, analogous relationships, new applications, logical extensions, and possible synthesis (Tennant & Pogson, 1995). This strategy may not only enhance older adults' learning but can provide opportunities for both other students and the teacher to enrich their own understanding of the course material through the personal stories of older adults.

There is a variety of ways teachers can learn about older adults' prior experiences. Personal interviews held early in the course, pre-course questionnaires, letters about prior experiences, or resumes will provide teachers with opportunities to learn about older adults' previous education and work experience, their goals and expectations, and their hopes and fears. Brookfield (1990b) suggested that if research on students' backgrounds cannot be done prior to the start of class, then one or two sessions should be devoted to this. He recommended a technique using critical incidents – brief written depictions of vividly remembered events – to obtain this information.

During the course, teachers can use teaching methods such as small group discussion, questioning, case studies, critical incidents, and role playing to link the material and learners' experiences. For instance I have used a questioning technique in a workshop where health care providers were learning about a new model of care delivery that they were expected to adopt. The participants had many concerns about what the new model would mean for their practice. I asked them to write down their questions on small cards and submit them to me. I sorted the questions by themes. Participants selected themes on which to work and formed small groups to do so. Subsequently, questions and answers were reported back to the larger group. In this way, students used their own experiences to find possible solutions to some of their concerns. A similar strategy may be used for developing case studies, critical incidents, and role plays. Rather than teachers producing these, students may generate them from their own experiences. This approach makes learning much more meaningful and relevant and provides the link with past experiences.

In undergraduate education, lectures are a very popular teaching method. However they are teacher-centred. Brookfield (1990b) outlined a way to use lectures more creatively that would link the material to learners' past experiences. He suggested beginning a lecture by researching the audience, asking questions about listeners' backgrounds, current work contexts, and common concerns, and by asking for votes on possible themes to address. Brookfield proposed that the instructor then use the critical incident technique to have the audience identify an episode of significance in their experience that connects to the theme of the presentation. Audience members are invited to read what they wrote. The ensuing formal presentation is broken up into short

hep.oise.utoronto.ca, Special Issue, March 2006, pp.110-123.
Models of Cognitive and Intellectual Development in Older Adults: Two Stories Unfold.

120

segments each of which is followed by a question period on issues raised. This format may make the lecture more interesting and at the same time acknowledge and link learners' experiences to the theme of the presentation.

If teachers were to reflect on their own learning, they would become more aware of the effects of their own actions on learners. Brookfield (1990a) recommended that teachers reflect on their experiences at professional development workshops, exploring how their life experiences were acknowledged, and whether they felt humiliated or affirmed and respected as a learner. Through reflection, teachers may develop insights into how to make their teaching more learner-focused. Thus, teachers may use the following strategies to acknowledge and understand older adults' life experiences: reflecting on their own learning, researching students' backgrounds prior to the beginning of a course, and using teaching methods that link older adults' past experiences with new learning. With such methods, older adults will feel affirmed and accepted and will benefit much more from their learning experiences.

Conclusion

This paper has described my preliminary findings on how older adults experience learning while taking degree courses in university. I have focused on one particular theme that has emerged from the data, namely that life experiences of participants have generally not been acknowledged by teachers. I have tried to give voice to the experiences of Andrew and John. I have discussed the implications of these preliminary findings and suggested ways to learn about older adults' past experiences and how to use various teaching methods to make connections between life experiences and course content. John's story demonstrates that older adults can make substantial contributions to the classroom and their personal experiences can be recognized positively by teachers. By understanding and acknowledging past experiences, teachers may provide better learning opportunities for older adults and increase the likelihood that their university experiences are successful. Although this paper has focused entirely on enhancing learning for older adults, such methods will enhance the learning of all students regardless of age.

References

Arenberg, D. (1994). Aging and adult learning in the laboratory. In J. D. Sinnott (Ed.), *Interdisciplinary handbook of adult lifespan learning* (pp. 351-370). Westport, CT: Greenwood Press.

Baltes, P. (1993). The aging mind: Potential and limits. The Gerontologist, 33(5), 580-594.

Bolton, C. (1990). Instructing experienced adult learners. In R. Sherron & B. Lumsden (Eds.), Introduction to educational gerontology (pp. 135-149). Washington: Hemisphere Publishing Corporation.

Brookfield, S. (1990a). The skillful teacher. San Francisco: Jossey-Bass.

Brookfield, S. (1990b). Using critical incidents to explore learners' assumptions. In M. A. Associates (Ed.), Fostering critical reflection in adulthood: A guide to transformative learning (pp. 177-193). San Francisco: Jossey-Bass.

Brundage, D., & Mackeracher, D. (1980). Adult learning principles and their application to program planning (ONO1615). Toronto: The Ontario Institute for Studies in Education.

Cattell, R. (1963). Theory of fluid and crystallized intelligence: A critical experiment. *British Journal of Educational Psychology,* 54, 1-22.

Horn, J. L. (1970). Organization of data on lifespan development of human abilities. In L. R. Goulet & B. P. Baltes. (Eds.), *Lifespan Developmental Psychology: Research and Theory*. New York: Academic Press.

Hulicka, I., Sterns, H., & Grossman, J. (1967). Age group comparisons of paired-associate learning as a function of paced and self-paced association of response times. *Journal of Gerontology*, 22, 46-51.

Hultsch, D. F. (1971). Adult age differences in free classification and free recall. *Developmental Psychology*, 4, 338-342.

Johnston, W. (1991). Global work force 2000: The new world labor market. *Harvard Business Review*, 69, 115-127.

Jones, J. (1993). The influence of age on self-directed learning in university and community adult art students. Studies in Art Education, 34(3), 158-166.

Kasworm, C. (Ed.). (1992). *Adult learners in an academic setting: Self-directed learning within the formal learning context.* Norman, OK: Oklahoma Research Centre for Continuing Professional and Higher Education of the University of Oklahoma.

Knowles, M. (1978). *The adult learner: A neglected species.* (2nd ed.). Houston: Gulf Publishing. Labouvie-Vief, G. (1990). Models of cognitive functioning in the older adult: Research needs in educational gerontology. In R. Sherron & B. Lumsden (Eds.), Introduction to educational gerontology (pp. 243-268). Washington: Hemisphere Publishing Corporation.

Mezirow, J. (1991). Transformative dimensions of adult learning. San Francisco: Jossey-Bass. Patton, M. Q. (1990). Qualitative evaluation and research methods (2nd ed.). Newbury Park: Sage Publications.

Perlmutter, M. (1983). Learning and memory through adulthood. In M. W. Riley, B. B. Hess, & K. Bond (Eds.), *Aging in society: Selected reviews of recent research* (pp. 219-241). Hillsdale, NJ: Erlbaum.

Ratner, H., Padgett, R., & Bushey, N. (1988). Old and young adults' recall of events. Developmental Psychology, 24, 664-671.

hep.oise.utoronto.ca, Special Issue, March 2006, pp.110-123.
Models of Cognitive and Intellectual Development in Older Adults: Two Stories Unfold.
122

Rissenberg, M., & Glanzer, M. (1986). Picture superiority in free recall: The effects of normal aging and primary degenerative dementia. Journal of Gerontology, 41, 64-71.

Salthouse, T. (1991). Theoretical perspectives on cognitive aging. Hillsdale, NJ: Lawrence Erlbaum Associates.

Schaie, K. W., & Willis, S. L. (1986). Can decline in adult intellectual functioning be reversed? Developmental Psychology, 22, 223-232.

Sinnott, J. (1994). The relationship of postformal thought, adult learning, and lifespan development. In J. Sinnott (Ed.), Interdisciplinary handbook of adult lifespan learning (pp. 105-119). Westport, CT: Greenwood Press.

Tennant, M., & Pogson, P. (1995). Learning and change in the adult years. A developmental perspective (1st ed.). San Francisco: Jossey-Bass.

Thornton, J. (1986). Life span learning and education: A conceptual progression in the life course. In D. Peterson, J. Thornton, & J. Birren (Eds.), Education and aging (pp. 62-92). Englewood Cliffs, NJ: Prentice-Hall, Inc.

Treat, N. J., & Reese, H. W. (1976). Age, pacing, and imagery in paired-associate learning. Developmental Psychology, 12, 119-124.

Whitbourne, S. K., & Weinstock, C. S. (1986). Adult development (2nd ed.). New York: Praeger Publishers.

Wolf, M. A. (1983). *The older learner: Education as a means to one's past*. Paper presented at the annual meeting of the American Association for Adult and Continuing Education, November 29 - December 21, 1983, Philadelphia, PA.

Wolf, M. A. (1985). The experience of older learners in adult education. *Lifelong Learning*, 8(5), 8-11.

Wolf, M. A. (1990). *Older learners: Inner reflections*. Paper presented at the Annual Meeting of the American Association for Adult and Continuing Education, November 1990, Salt Lake City, UT.

Wood, L., & Pratt, J. (1987). Pegword mnemonic as an aid to memory in the elderly: A comparison of four age groups. *Educational Gerontology*, 13, 325-339.

Yesavage, J. (1989). Techniques for cognitive training of memory in age-associated memory impairment. Lausanne, Switzerland: Elsevier Science Publishers.