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ABSTRACT

Although andragogy became an article of faith among many adult educators in the 25 years since Knowles first popularized the concept, relatively few studies have attempted to compare andragogy and pedagogy experimentally. Eighteen studies that attempted to do so included 15 dissertations and 3 journal articles. The studies were organized by setting: studies in college settings, studies in health settings, and studies in technical skills, reading skills development, and teacher inservice settings. Of the 16 studies that examined achievement in terms of either cognitive gain or skill performance, 10 found no significant differences between control and experimental groups; 2 found the control or "traditional" group performed better. On the important variable of satisfaction with the learning experience, one study found significant differences favoring the andragogical group; three found no significant differences. Most examined variables showed no statistically significant differences: perceived achievement, perception of pain reduction and of rehabilitation outcome, student evaluation of teachers, and dropout from adult basic education. Two other variables showed statistically significant differences favoring andragogy: application of the learned material and attendance. Despite some issues of design and questions of andragogical "purity," the trend of the available empirical literature runs counter to many of the anecdotal claims for andragogy superiority over pedagogical methods. Contains 22 references. (YLB)

Andragogical and Pedagogical Methods Compared:

A Review of the Experimental Literature

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Running head: ANDRAGOGICAL METHODS

Abstract

Although andragogy has become an article of faith among many adult educators in the 25 years since Knowles first popularized the concept, and despite numerous anecdotal and expository accounts of andragogy's effectiveness, relatively few studies have attempted to compare andragogy and pedagogy experimentally. Of 18 studies reviewed here which, in varying fashions, attempt to do so, achievement and satisfaction were the most commonly examined variables. A few studies revealed statistically significant differences favoring one method or the other, but a majority found no significant differences between the two approaches. Despite some issues of design and questions of andragogical "purity," the trend of the available empirical literature runs counter to many of the anecdotal claims for andragogy's superiority over pedagogical methods; in general the investigations suggest an approximate equivalence between the two approaches on achievement and satisfaction.

Andragogical and Pedagogical Methods Compared:

A Review of the Experimental Literature

A full quarter century after Malcolm Knowles (1968) introduced the concept of andragogy to American adult educators in 1968, students of the field still argue its merits as well as its applicability to all adult education settings. Andragogy has been the most persistent methodological issue in American adult education since its appearance 25 years ago. Knowles' (1970) original four assumptions about andragogy are part of the operating vocabularies of most adult educators even when andragogy itself is not fully implemented. The assumptions also have philosophical implications since methodology has philosophical roots; that is, our beliefs about the adult learner guide our methodological practice. This accounts, in part, for the vitality of the issue in adult education circles today; it is not merely a technical question, but a philosophical one at the heart of the adult education enterprise.

The vitality of the "debate" concerning andragogy (Davenport and Davenport, 1985) is also derived from the multiple interpretations of its meaning and especially its application. Andragogy's "purest" form, perhaps, is the Knowlesian model, using a learning contract in which learning objectives, strategies and resources, evidence of achievement, and criteria for evaluation are all collaboratively determined by the learner and a facilitator. But the elasticity of the concept of andragogy has resulted in the term being applied to learning

situations that include discussion format, individualized programmed learning, collaborative development of objectives, and various means of implementing learning contracts. A third reason for the continuing interest in andragogy is that questions of its efficacy--at least as a universal principle for adult education--still seem unsettled. The anecdotal evidence, usually in its favor, far outweighs the experimental evidence, and this seems especially true when achievement gain is the dependent variable being examined rather than satisfaction level, attendance rates, or persistence in a program.

Given the continuing interest in andragogy as a guiding principle of adult education and the quarter century in which it has been discussed, relatively few investigations have examined it experimentally. Most attempts to do so have been made by doctoral students writing dissertations which usually do not come to the attention of a wide adult education audience. But the importance of andragogy as a theme of the field would seem to justify a review of both the journal and the dissertation experimental literature attempting to answer the general question: Is andragogy more effective than pedagogy in adult learning situations?

For inclusion in the review, studies had to be experimental or quasi-experimental with at least one group of subjects using andragogical (however defined) or contract learning approaches and at least one other group using traditional pedagogical (however defined) approaches. Random assignment of subjects was not required for inclusion, but comparisons of the two or more groups using inferential statistics to determine significant differences was. Expository and

anecdotal accounts were not included. A total of 18 studies met these criteria, including 15 dissertations and 3 journal articles. The works reviewed are organized by setting: studies done in college settings, studies in health settings, and studies in technical skills, reading skills development, and teacher inservice settings. This classification is, of course, a structural convenience; the studies could also be broken into what Coombs, Prosser, and Ahmed (1973) have designated formal, non-formal, and informal, with the studies taking place in educational institutions representing formal and those outside of educational institutions representing non-formal.

The College Setting

One recent study by Black (1989) illustrates some of the strengths and ambiguities of several of the andragogy studies. Nine college mathematics instructors each taught at least one control class and one experimental class, in which a learning contract was utilized. Students were pre-tested during the first week, and final exam scores constituted the post-test. There were no statistically significant differences in achievement in mathematics when comparing the mean differences of scores for the control sections (N=41) and the mean differences of scores for the treatment sections (N=52). Strengths of the study include its well thought out design and its specific examination of the variable of achievement. On the other hand, while Black does not claim to be using andragogy but simply learning contracts, the contract format was essentially an agreement which specified a minimum test average for the grade contracted and participation in a

number of planned interviews to discuss progress toward contract completion. Moreover, the subjects were not identified as adult, though age was found to be a non-significant variable.

Looking exclusively at technical achievement, Barta (1989) also studied college students who were not necessarily all adult. A teacher-directed group learning keyboarding skills used teacher-selected software program in a class meeting four days per week for 50 minutes. In addition, "they received explanations, correction, pacing, reinforcement, and drill activities from the teacher" (p. 12). A self-directed group of 23 were pre-tested and used the same program, text, and class supplements, but did all of the work on their own after a classroom introduction to the computer. They were free to seek aid from the instructor, and were required to turn in disks weekly and take the final exam. Barta found that the self-directed group made significantly more formatting errors ($p = .05$) than the classroom group. Also the self-directed group was significantly more likely to drop out, with 43% attrition as compared to the classroom group's 29%. However, there were no statistically significant differences between the groups on skill achieved on timed writings or on elapsed time or accuracy on a production test. Out of 32 subjects completing the study, 10 were over 22 years old; there were no differences in performance between the older and younger students. Barta concluded that although both methods "resulted in usable keyboarding skill," classroom instruction is more effective in teaching document preparation (formatting), and that self-directed instruction may be appropriate "only

when there is some indication of students' commitment to learn keyboarding on their own" (p. 13).

Farrar (1990) randomly assigned a small sample of art education students at a community college to one of three groups: Concept mapping, Journal/Sketchbooks, or Traditional Assignment. Specifically utilizing Knowles's andragogical model, she emphasized self-direction and individual decision-making and planning procedures in the treatment groups. After two weeks of establishing a common base of knowledge, and six weeks of treatment, there were no significant differences among the groups on the dependent measure of Technical, Sensory, Formal, and Expressive qualities.

The last two college-setting studies are the only ones exclusively using adults as subjects. Like Black (1989). French (1984) also used learning contracts to examine 32 adults either enrolled in a classroom or utilizing an individualized learning contract at a college-based center for labor studies. Participants were asked to rate their perceptions of success in meeting the objectives of an Occupational and Environmental Cancer course, using a 21 item questionnaire at three intervals during the course. Of six curriculum component areas, one, understanding of cancer research, showed the classroom group rating their perceived achievement higher that the contract group. At the end of the term an achievement test covering four of the curriculum component areas was administered, which revealed no statistically significant differences between the two groups.

A very different approach to the application of andragogy in a higher education setting was conducted by Krom-Braen (1979). She mailed questionnaires to 269 women over 24 years of age who were returning as undergraduates to three types of institutions: a traditional college, a contract learning college, and a credit-by-examination college. She was interested in whether or not the women experienced differences in the types and intensity of problems they had as a result of returning to school. Using chi square, she found that: women in the two non-traditional settings reported significantly more "system-procedural" problems than women in the traditional college; women in the traditional setting reported significantly more "personal-psychological" problems than those in the non-traditional programs; and that the frequency of system-procedural problems was significantly greater than personal-psychological problems, while there were no differences in the "intensity" of the two types of problems. Though utilizing in situ groups composed of people with varying rationales for attending the school of their choice, the study, like that of French (1984), does clearly restrict itself to adult students in the higher education setting.

Health and Nursing Education

Perhaps because many health industry practitioners pursue graduate degrees in adult education, a number of studies examining andragogy or contract learning experimentally have occurred in a health setting. Stevens (1985) randomly assigned 28 dental hygiene students to two groups, one of which was to use andragogical methods and the other which was to use pedagogical methods to teach

brushing and flossing to 116 patients at a dental hygiene clinic. Teaching method, age, sex, new or recall patient, and amount of instruction time were the independent variables, while brushing and flossing skill performance and attitude toward instruction were dependent. Stevens found no significant differences between the patients taught andragogically and those taught pedagogically on either of the dependent variables, though female patients brushed and flossed better than males and younger patients did so better than older ones.

Three studies were specifically conducted in nursing settings. Clark (1991) randomly assigned 86 clinical-laboratory students in a diploma nursing program into a Knowles-type learning contract group and a traditionally-taught group. The researcher conducted in-depth training and orientation with all twelve faculty, ten of whom volunteered to utilize the contract method. The six selected to use contracts were also given specific methods for orienting the students to the contract method, including the importance of focusing on the course objectives. All students were administered the Self-Directed Learning Readiness Scale (SDLRS) as a pre- and post-test. Clark found that the traditionally-taught students had significantly higher clinical performance skills and higher post-SDLRS scores than the learning contract group.

A second study examining the efficacy of learning contracts in a nursing setting was conducted by Reinhart (1976). Subjects were practicing registered nurses in continuing education, with cognitive gains (achievement) attitude change toward 9 items (e.g., "self-directed study," "me as a learner") and satisfaction with

10 aspects of the learning experience ("ability to apply learning," "interest in future self-directed study") as dependent variables. All subjects used independent study as the format for a course on Crisis Intervention in Nursing Practice which included a study guide on the topic. The 62 subjects were randomly assigned to either an experimental group which used a Knowles contract or a control group which pursued the study guide on their own. Reinhart found no significant differences between the two groups in cognitive gains. However, the experimental group was significantly more positive in one of the nine attitude factors ("self-discipline"), and it was significantly more satisfied with one of the ten satisfaction factors ("new skill attained"); on the other hand, there was greater satisfaction with the "time invested" in the independent study portion by the control group. But since both attitude and satisfaction were treated as composite hypotheses, the one significant difference found in attitude and the two in satisfaction were not sufficient to reject the null.

Examining the premise that "adults who participate in planning their own learning experiences should learn more and be more satisfied with the experience than those adults who do not," Rosenblum and Darkenwald (1983, p. 147) randomly assigned 28 nursing supervisors with a mean age of 42.6 to control and experimental groups. The same instructor was used for both groups in a short course on supervision. The experimental group participated with the instructor in the Nominal Group Technique in which the group identified and prioritized needs and agreed upon four objectives; they were also asked which learning formats they

preferred and agreed upon a mixture of lecture, discussion, role playing and case study. The instructor simply informed the control group of the same set of needs, objectives, and instructional formats that were identified by the experimental group, but without identifying the experimental group as the source. The instructor insured that each topic, activity, and handout covered in the experimental group also was covered in the control group. The entire experiment was repeated with support service supervisors. Using the Supervisory Practices Test Revised for achievement and a semantic differential scale to test satisfaction, the authors found no significant differences between the two experimental groups and the two control groups on either achievement or satisfaction. The authors note, however, that the results do not discredit the possibility that student participation in planning may result in a better designed course which could yield higher achievement and satisfaction, and that the control groups benefited from the planning done by their counterparts in the experimental groups.

A final study in a health setting was conducted by Cross (1988). Again, learning contracts were used, in this case with patients suffering from non-surgical lumbar syndrome. Subjects were assigned randomly to one of four treatment groups with 18 subjects per group: learning contract with ultrasound treatment; traditional patient education with ultrasound; learning contract with placebo ultrasound; and traditional patient education with placebo ultrasound. All subjects received six 45 minute physical therapy and exercise sessions over a two-week period. Trunk strength, subjective pain reduction, and perceived self-control of

rehabilitation outcome were the three variables pre- and post-tested. There were no statistically significant differences at the .01 level among any of the four groups on any of the three variables. Nevertheless, the author felt compelled to note that the learning contract with ultrasound group had a higher gain score in perceived control of rehabilitation outcome and speculated that the learning contract might facilitate a "'therapy bond' or 'shared recovery' between the therapist and patient" (p. 58).

Reading skills, Technical Skills, and Teacher Inservice

Eight experiments investigated reading skills, technical skills, or teacher inservice in a non-health related setting. Cartor (1990) sought to examine relationships between three outcome variables--cognitive gain, satisfaction, and self-reported learning--and four instruments measuring learning style, achievement levels, locus of control, and ego development level. Subjects were 213 supervisors in a federally operated electric utility attending a mandatory 4 day training program. One topic of the training program was selected for the experiment, with the sample being approximately equally divided into lecture-based ("pedagogy") and participative training ("andragogy") groups taught over several months by four pedagogically-trained and three andragogically-trained instructors. One useful and interesting instructional check was the use of audio tape to assess time usage by the instructor; the pedagogical trainers spent 87% of the time in delivering information and speaking before the group while the andragogical trainers spent less than 50%. Kolb's Learning Style Inventory, Gough's California Psychological Inventory,

Rotter's Locus of Control Scale, and Loevinger's Measure of Ego Development, along with a post-test, satisfaction scale and self-reported learning scale were all administered, resulting in 16 hypotheses and numerous additional regression analyses. Regrettably Cartor did not compare the total andragogical group to the total pedagogical group, but rather numerous relationships among participants' scores on the instruments and the outcome variables. For example, Cartor hypothesized that subjects in the andragogy sessions with "active" learning styles would have higher cognitive gains and report higher Self-Reported Learning scores and higher Satisfaction scores than the "reflective" learners in the andragogy sessions. There were no significant relationships between any of the personality measures and the effectiveness of, and reactions to, the two training methodologies (andragogy and pedagogy).

In another study where the learning was mandatory, White's (1988) subjects were adults enrolled in a legislatively mandated pesticide re-certification program. The program was six hours in length and included material on seven component areas, including pesticide safety which became the subject matter content for the experimental part of the program. Subjects were divided into a lecture group, which White identified as a "pedagogical" method, and small group discussion, which she identified as an "andragogical" method. At the conclusion of the safety component of the program, subjects were given an attitudinal scale and a measure of learning outcome. Mean scores on learning outcome were significantly higher for the lecture group, and attitude was significantly related to learning outcome,

with attitude toward instructional method accounting for 58% of the variance in learning outcome.

Anaemena (1985) studied the relative effects of andragogical (identified as such) and pedagogical methods of instruction on achievement among students in Basic Electronics at three Nigerian technical colleges. In each college, 30 students were randomly assigned to each treatment group, totaling 90 andragogical and 90 pedagogical subjects. The researcher/instructor prepared three lesson plans and delivered lectures to each of the three pedagogical groups. The andragogical groups received well-written programmed instruction sheets also prepared by the instructor and studied the contents on their own. Results indicated that on a post-treatment evaluation there were no significant differences between the two groups, which Anaemena interpreted as a rationale for advertising the andragogical approach as an appropriate alternative to more traditional technical college methods.

Saxe (1986) investigated the achievement on a criterion-referenced test of 106 volunteer adults participating in a 6 hour course entitled "How to Read a Bank's Annual Report." Subjects were randomly assigned to one of three treatment groups, high, moderate, and low levels of peer interaction. Half the subjects in each group received an incentive based on their group's performance, while the other half in each group received an incentive based on individual performance. The results indicated that moderate levels of peer interaction positively and significantly affected learner achievement. High and low levels of

interaction as well as incentive structure had no significant effect on achievement. Among other conclusions, Saxe notes that the nature of the specific learning task may affect the degree and efficacy of peer interaction.

Beder and Carrea (1988) took a different tack. Rather than focusing on post-treatment differences among subjects (teachers) in treatment, placebo, and control groups, they studied the impact of andragogical teacher training on the attendance and teacher evaluations of the adult students in those teachers' classes. One-hundred thirty volunteer teachers in a large public school adult education program were assigned, based on the night they were available, to either the andragogical training group, a control group receiving no treatment, or a placebo group. Group comparisons according to socio-demographic variables, subject taught, and class structure indicated that differences among the groups did not bias the research. The treatment group teachers received nine hours of instruction "designed to facilitate acquisition of andragogically oriented teaching methods" (p. 78) using instructional objectives derived from Knowles' 1970 edition of The Modern Practice of Adult Education. The placebo group teachers' instruction was neither pedagogical nor andragogical and consisted of their teaching a half-hour introduction to their regularly taught subject in their normal manner, thus recycling their normal teaching behaviors. The control group teachers received no instruction and, unlike the treatment and placebo groups, received no payment. The researchers hypothesized that students in the classes taught by the teachers in the treatment group would have higher rates of attendance and would evaluate their

instructors more positively than students of the teachers who had not received the andragogical instruction. The low N's, due to both the need for payment and to attrition within the teacher groups, led to the researchers setting the confidence level at $p = .10$. Results indicated a positive and significant effect on attendance, but no effect on student evaluation between those who were andragogically trained and those who were not. The researchers note that the attendance difference "is not convincingly strong" (p. 85), and that while the difference between the treatment and control groups was significant, the difference between the treatment and placebo was not. Beder and Carrea conjectured that the placebo treatment may in fact have unintentionally modeled good teaching behaviors as the instructors conducted their mini-lessons.

Madriz (1987) also utilized public school teachers as subjects, specifically teachers from four primary schools in Venezuela. Ninety randomly selected teachers were equally divided into two groups: an experimental (andragogical) group emphasizing a high degree of learner planning in the inservice training, and a traditional group where the planning was done by the researcher and the subjects played a "passive role in the instructional process" (p. 68). The topic for both groups was a two-day inservice workshop entitled "Writing Worthwhile Objectives." The three dependent variables--achievement, level of satisfaction, and application of the learned material, based on a questionnaire, after a two month interval--all used researcher-developed instruments. Satisfaction and application showed statistical significance favoring the andragogical group, but achievement

showed mixed results. Of four content objectives under achievement, two were statistically significant favoring the andragogical group and two were not. Unfortunately, Madriz wrote the null hypothesis as if it were a composite of the four objectives and rejected it, though the composite was apparently not tested and only two of the four showed significance.

Ogles (1990) and Familoni (1991) both attempted to test the efficacy of collaborative methods with adult beginning readers. Ogles' treatment group (N =39) utilized a learning contract which was a tutor-student check list of mutual expectations, student goals, and choice of materials. The control group (N =37) continued in the traditional one-on-one tutorial format. There were no statistically significant differences in dropout, but the contracting group attended significantly more twice-weekly tutoring sessions and significantly more weeks in the program than the non-contracting students. However, in terms of achievement, specifically reading level gains, there was no statistically significant difference between the two groups. Familoni (1991) also found no significant differences in the learning of 11 female beginning readers. The subjects were administered a pre-test consisting of 10 known words and 10 unknown words from the Wangberg Adult Word List, given a non-collaborative lesson on the words, and administered a post-test. A week later, the same procedure was repeated, except that the lesson was collaborative in nature. There were differences from pre- to post- with both methods, but no differences attributable to the methods themselves.

Discussion

Even after 25 years, the empirical research on the efficacy of andragogy, being limited, has never been reviewed. And yet andragogy is an article of faith among many adult educators, and almost all would embrace it to a greater or lesser degree in some circumstances. Nor is a single study likely to resolve the question of whether andragogy is preferable to pedagogy. Even the cumulative effect of the studies reviewed here is suggestive rather than conclusive. Nevertheless, looked at in the aggregate, these studies do carry us a little closer to an answer to Beder and Carrea's (1988) implied question: "What we do not know from an empirical point of view is whether andragogical approaches are preferable to pedagogical ones" (p. 77).

Vantage point is critical to an answer: skeptics might argue that, given some of the claims of andragogy, statistically significant differences favoring it over pedagogy would be the only allowable standard of success. Advocates, on the other hand, might be more forgiving, suggesting that differences between the methods are reflected more in tone and ambience than in achievement, or possibly even suggesting that andragogical approaches need only compare equally with traditional approaches. Nevertheless, achievement does seem to matter, at least among most of these researchers. Of 18 studies reviewed, 16 examined achievement in terms of either cognitive gain or skill performance. Of these, 10 found no significant differences between control and experimental groups (Anaemena, 1985; Black, 1989; Cross, 1988; Familoni, 1991; Farrar, 1990;

French, 1984; Ogles, 1990; Reinhart, 1976; Rosenblum and Darkenwald, 1983; and Stevens, 1985). Two others found that the control or "traditional" groups performed better (Clark, 1990; and White, 1988). An additional two had mixed results: Madriz (1987) found the andragogical group performing significantly better on two items but without statistically significant differences on two other items, while Barta (1989) found the opposite, with one item significantly favoring the traditional group and no differences on two others. The last two studies examining cognitive gain or performance are not so easily classified: Saxe (1986) found that the group using a moderate degree of peer interaction learned how to read a bank statement significantly better than groups using high or low levels of peer interaction, while Cartor (1990) found no relationship between andragogical or pedagogical teaching methodology and any of several variables.

Numerous other variables were also examined. On the important variable of satisfaction with or attitude toward methodology or other aspects of the learning experience, Madriz (1987) found significant differences favoring the andragogical group. However, Rosenblum and Darkenwald (1983), Reinhart (1976), and Stevens (1985) all found no significant differences on this variable. Most of the other examined variables also showed no statistically significant differences: perceived achievement (French, 1984); perception of pain reduction and perception of rehabilitation outcome (Cross, 1988); student evaluation of teachers (Beder and Carrea, 1988); and dropout from adult basic education (Ogles, 1990). Two non-achievement variables did show statistically significant differences favoring

andragogy, however: application of the learned material, based on a questionnaire, after two months (Madriz, 1987); and attendance (Beder and Carrea, 1988; Ogles, 1990). On the other hand, Barta (1989) found significantly more dropout among the "self-directed" group on keyboarding skills.

In terms of achievement, specifically cognitive gain or other types of performance, these studies offer scant evidence for the superiority of andragogical procedures over pedagogical ones. Two, in fact, suggest andragogical procedures' inferiority. Moreover, most--though not all--of the other examined variables showed similar outcomes with the two methods. Obituaries for andragogy, however, are premature. Issues of both research design and, more importantly, the "purity" of the andragogical applications in these studies indicate a need for caution in interpretation.

Certain design issues confronted most of the researchers. One concerned the issue of multiple instructors, each using one method, versus a single instructor utilizing andragogy in one group and pedagogy in the other. The obvious advantage of the single instructor was that instructor variability was more controlled than with multiple instructors who might have very different abilities, energies, content knowledge, and amiability, any of which might be more influential on the outcome variables than teaching methodology. An obvious disadvantage was that the instructor (who was often the researcher) could have been predisposed toward one method and thus have unconsciously favored it in the classroom. Another concern with multiple instructors was that they usually

required training in what to many of them was a new method, andragogy, and that conclusions were drawn based on their first attempt at it.

A second and related issue is that a new approach might have effects on the learners simply because it is new. This "novelty effect" could work both ways; for some, it might be a pleasant change of routine, resulting in potentially higher satisfaction or attitude scores, which might in turn lead to higher achievement. By contrast, the novelty could be unnerving to students accustomed to other approaches, resulting in both lower satisfaction and lower achievement scores. In fact, the relationship between satisfaction and achievement is itself worthy of study, though none of the reviewed investigations indicated any clear causal relationships. An ideally designed study might use instructors and subjects who were already familiar with the methods utilized.

A third design issue is that of in situ groups. The nature of many of the studies precluded random assignment. Thus several of the studies are quasi-experimental in nature. One dissertation in which this might particularly have influenced the outcome was that of Krom-Braen (1979), who investigated differences in different types of problems encountered by adult women attending either a traditional, contract learning, or credit-by-examination college. Results would have to be interpreted in light of the fact that the women selected their colleges ("groups").

More problematic is the "purity" issue. Not all of the studies measure up to the Knowlesian standard of andragogy, i.e., a voluntary adult pursuing self-

determined learning objectives with the help of a facilitator, usually through the use of a learning contract. Several of these studies utilized contracts (Black, 1989; Clark, 1990; Cross, 1988; French, 1984; Ogles, 1990; Reinhart, 1976; Rosenblum and Darkenwald, 1983), but the degree to which they were andragogical varied along the pedagogy-andragogy continuum. For example Black's (1989) contract was essentially an agreement between learner and instructor which specified a minimum test average and several scheduled interviews to discuss students' progress. Clark (1990), Cross (1988), and Ogles (1990) employed more recognizably andragogical contracts, such as more emphasis on self-directedness, but in Clark and Cross the objectives were still largely pre-determined although approaches to meeting them were more negotiable. For Ogles, the contract was a tutor-student checklist of mutual expectations, goals, and materials.

Several other studies not using contracts nevertheless specifically identified andragogy as the guiding theoretical principle in their experimental groups (Anaemena, 1985; Beder and Carrea, 1988; Cartor, 1990; Farrar, 1984; Madriz, 1987; Stevens, 1985; and White, 1988). The way andragogy was operationalized varied: for White, andragogy was identified as small group discussion, and pedagogy was lecture; for Madriz, andragogy involved a high degree of teacher participation in planning the training, and pedagogy consisted of little such collaborative planning; for Anaemena, pedagogy meant classroom lecture based on programmed instruction sheets, while andragogy meant that the students received the sheets and studied on their own. Multiple implementation strategies of

andragogy complicate--but do not preclude--comparison, and suggest that andragogy is more of an attitude about adult learning or a set of philosophical premises than the application of a particular method or technique.

At least two other "purity" issues deserve mention, both regarding practices that are more or less anathema to Knowlesian principles: some studies examined learning situations which were mandatory, and several studies examining cognitive gains utilized paper and pencil post-tests to determine those knowledge gains. Typically andragogy eschews testing and favors portfolios of evidence or other non-threatening measures of accomplishment; yet, as Cartor (1990) notes, "to rely upon self-reported learning might provide little or no accurate information regarding the effectiveness of the program" (p. 128). Thus, at least concerning cognitive gains, we are in a kind of intellectual cul-de-sac--the primary way to determine a method's efficacy is by using measures inimical to that method. Though more difficult to design than paper and pencil tests, some form of post-instructional application of the knowledge gained could partially circumvent this dilemma; Madriz (1987) attempted to do so, and found results favoring the andragogical group on the "application" variable. In fact Madriz's findings partially favorable to andragogy might well be attributed to a relatively pure andragogical format, especially the collaborative determination of methods to achieve the teacher inservice program objectives.

A full implementation of andragogy is also not possible when the learners are required to be there. This was very clearly the case in Cartor (1990), where

electrical utility supervisors were participating in a mandated training program, and in White (1988), where subjects were pesticide applicators in a required program for re-licensure. It is worth noting that in the White study, small group discussion was significantly less effective than instructor lecture. Obviously group discussion may suffer when the participants are there involuntarily; yet in this study 67% claimed they would have participated anyway and 94% were favorable to the strategy they received. It would thus be difficult to ascribe the result unfavorable to andragogy ("group discussion") solely to the mandated nature of the learning experience. The problem of voluntariness is also somewhat present in some of the college studies, including Barta (1989), Black (1989), Clark (1990), and Reinhart (1976), as is the problem of not having an exclusively adult population. It might well be more accurate to portray voluntariness not as a dichotomous variable, but as a continuous one. Similarly, other variables, like problem-solving orientation (vs. content transmission), institutional constraints (e. g., the need to assign grades), certification constraints (e. g., prescribed learning objectives and methods), relevant learner experience, and learner motivation could each be placed on a continuum, and the degree of their presence or absence might help determine whether andragogical methods might or might not be suitable.

Caveats about design issues and the "purity" of these studies must be taken into account; nevertheless, taken as a whole, the trend of the available empirical literature runs counter to many of the anecdotal and expository claims for andragogy's superiority over pedagogical approaches. In general, the bulk of the

experimental and quasi-experimental work done to date suggests an approximate equivalence between andragogical approaches and pedagogical ones on both achievement and learner satisfaction. Andragogical methods do not transform an educator bereft of instructional ability into a paragon of teaching effectiveness; nor are pedagogues inescapably doomed to a sterile didacticism. Pedagogy is not, after all, synonymous with pedantry. Ultimately, practitioners will continue to employ methods that work for them. But advocacy of andragogy as a superior strategy for facilitating adult learning does not seem to be borne out by the existing empirical studies, however imperfect those studies may be.

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