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ACTIVE LEARNING TECHNIQUES IN ADULT TEACHER TRAINING: TRAINER PERCEPTIONS, FORMAL TEACHER TRAINING, AND PERCEIVED LEARNING OUTCOMES

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Abstract:
Active learning techniques are central to adult education theory, yet empirical evidence on the conditions under which specific techniques are implemented and linked to learning outcomes remains limited, especially in continuing professional development settings. This article explores two widely used active learning techniques -group work and exercises- within a Greek teacher education program. The study investigates, first, whether trainers' perceptions of these techniques and their formal training on these techniques are associated with how frequently and how well they use them, and second, whether frequency and quality of use of these techniques are related to trainees' perceived learning outcomes. The sample comprised 30 trainers and 152 adult trainees enrolled in a national teachers' training program. Data were collected through parallel questionnaires administered to trainers and trainees, and trainee responses were aggregated at the trainer level to permit cross-source analysis. Results show that trainers who held more positive views of group work and exercises used these techniques more frequently and, in the case of exercises especially, with higher implementation quality. Training in adult education was also positively associated with more frequent use of both techniques and with stronger implementation quality. At the learner level, more frequent use of group work and exercises was positively associated with perceived knowledge acquisition, development of skills, changes in attitudes and perceptions, satisfaction, and attendance. Higher implementation quality was positively associated with knowledge, skills, attitude change, and satisfaction; however, it was not associated with attendance. More heterogeneous and rotating groups were linked to more favorable outcomes. The article argues that what matters is not only whether active techniques are used, but also how they are designed and facilitated. Implications are drawn for trainer development, instructional design, and future adult education research.

Keywords: adult education; active learning; group work; trainer beliefs; learning outcomes

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1. Introduction

The use of educational techniques in adult learning settings is never pedagogically neutral. According to Rogers (Kokkos, 2005), in adult education, techniques are bound up with assumptions about learners, teaching, participation, and the conditions under which learning becomes meaningful. This article draws from a classic insight in adult education theory: Adults learn more effectively when they participate actively in the learning process, when their experience is mobilized, and when the educational climate supports dialogue, experimentation, and shared inquiry (Knowles, 1988). Active techniques are therefore treated not as secondary classroom "add-ons" but as constitutive elements of effective adult learning environments.

Within this broad family of active techniques, two stand out because of both their practical relevance and their uneven treatment in the literature: group work and exercises. Group work has attracted considerable attention in prior scholarship because of its association with knowledge acquisition, social support, collaboration, interpersonal development, and attitude change. By contrast, exercises—despite being one of the most common pedagogical tools in adult and professional learning—have been far less systematically investigated, especially as an object of empirical inquiry in their own right. This study sought to analyze the educational significance of both techniques and, crucially, to examine the trainer-side conditions under which they are used.

That emphasis is important. Much of the available literature on active learning focuses on learner outcomes while treating the educational technique as though it were self-executing. Yet the practical effectiveness of group work and exercises depends heavily on the educator: on what the trainer believes about these techniques, on the preparation the trainer has received in adult education, and on how the trainer structures activities, groups participants, gives instructions, supports interaction, and synthesizes outcomes. The study's core contribution lies precisely in connecting trainer-related variables to implementation patterns, and implementation patterns to learner-related outcomes.

The article focuses on an explanatory framework in which trainer perceptions and training in adult education are related to the implementation of group work and exercises, and implementation variables are, in turn, related to trainees' perceptions of learning outcomes.

The empirical setting also makes the study noteworthy. The research was conducted in a Greek teacher training program, a national professional development initiative aimed at helping school teachers integrate information and communication technologies into teaching practice. This context is particularly appropriate for investigating active learning techniques: participants were adult professionals, the program was relatively extended in duration, and the curriculum required not only conceptual understanding but also practical application, collaboration, and attitude change toward educational technology. In such a setting, group work and exercises are

not peripheral techniques; they are central mechanisms through which adult learners connect theory and practice.

The article addresses three broad questions. First, are trainers' perceptions of group work and exercises associated with how frequently and how well they use these techniques? Second, is training in adult education related to these implementation patterns? Third, are frequency and quality of implementation associated with trainees' perceptions of knowledge acquisition, skill development, change in attitudes and perceptions, satisfaction, and attendance? By answering these questions, the article contributes to a more fine-grained account of active learning in adult education—one that moves beyond the question of whether techniques matter to the more consequential question of how pedagogical beliefs and instructional enactment shape their educational value.

2. Literature review

2.1 Active participation as a cornerstone of adult learning

The study's theoretical foundation is anchored in major traditions of adult education. Despite important differences among andragogical, experiential, humanistic, dialogical, and transformative perspectives, a common thread runs through them: adult learning is strengthened when learners are not positioned as passive recipients of transmitted content but as active participants in inquiry, reflection, and application. In Knowles's (1988) account of andragogy, adults tend toward self-direction and are motivated when learning is relevant, participatory, and connected to experience. Rogers's (1999) humanistic perspective similarly highlights self-directed, personally meaningful learning through action and involvement. Freire (1977) foregrounds dialogue, problem-posing, and the co-construction of knowledge, while experiential and transformative approaches emphasize action, reflection, and the revision of assumptions through critical engagement.

This broad theoretical convergence gives active techniques a privileged place in adult education. Techniques such as discussion, question-and-answer, case study, problem solving, role play, brainstorming, exercises, and group work do not merely vary classroom tempo; they operationalize a distinctive pedagogy. According to Kokkos (2005), they invite adult learners to work with prior experience, apply ideas, test interpretations, negotiate meaning with others, and move from exposure to understanding and action.

2.2 Exercises as a bridge between theory and application

In this study, exercises are defined broadly as individual or collective tasks conducted within an instructional unit with the purpose of leading learners into action, followed by analysis of the resulting experience, abstraction of general principles, and reconnection with theory. This definition is pedagogically significant because it positions exercises not

as mere practice drills but as structured opportunities for linking conceptual input to application and reflection.

The source text attributes several benefits to exercises. According to Kokkos (2005), they help learners connect theory to practice, increase responsibility for learning, strengthen self-confidence, stimulate interest, and support active participation. The literature review also suggests that exercises can foster problem solving, critical thinking, and deeper understanding when they are carefully framed (Knowles, 1988). At the same time, the study notes that research on exercises is comparatively thin. This gap increases the value of empirical attention to how exercises are perceived and used in actual adult learning programs.

The study also outlines conditions for effective use. Trainers need to provide clear written instructions, specify time limits, and offer prompts or audiovisual stimuli where useful. These design elements matter because adult learners are more likely to benefit from exercises when expectations are transparent, and the task structure supports purposeful engagement. Exercises, then, are pedagogically promising, but their effectiveness is contingent on implementation quality.

2.3 Group work and the social organization of adult learning

The second focal technique is group work. The study conceptualizes the group as a dynamic, relational process organized around shared work and interdependence. In educational terms, group work involves dividing participants into smaller groups in order to complete a task, discuss a topic, solve problems, or formulate a collective response (Polemi-Todoulou, 2005). Group work is more than a logistical arrangement. It establishes a specific form of social learning in which interaction among participants becomes part of the learning process itself.

The literature reviewed attributes a wide range of benefits to group work. These include improved academic performance, stronger knowledge acquisition and retention, growth in critical and problem-solving abilities, increased willingness to undertake challenging tasks, improved interpersonal relationships, and greater self-confidence (D. W. Johnson& R. Johnson, 1989). Group work is also associated with social support and with the kinds of collaborative and dialogical climates that are particularly important in adult learning environments (D. W. Johnson, R. T. Johnson & K. A. Smith, 1998; Ghaith, 2002). In this sense, group work supports both cognitive and socio-emotional dimensions of learning.

The study is equally attentive to implementation conditions. Effective group work requires clear instructions, monitoring by the trainer, presentation and synthesis of group products, and thoughtful group composition. In particular, heterogeneous groups may be more effective than homogeneous ones, because diversity of experience and perspective can enrich discussion and problem solving (Brown & Atkins, 1997). It also highlights the importance of the trainer's role in fostering democratic, supportive, non-dominating interaction and in facilitating rather than controlling the process.

2.4 Trainer beliefs, preparation, and pedagogical enactment

A key premise of this study is that active techniques do not operate independently of the trainer. Adult educators are not simply transmitters of content; they are facilitators, organizers of learning activity, and mediators of the climate in which participation can occur (Rogers,1999). From this follows a central analytic proposition: trainers' perceptions of group work and exercises are likely to shape whether they use these techniques and the extent to which they align implementation with established pedagogical principles.

Trainers who value active techniques and recognize their benefits should be more inclined to invest time and effort in using them. Conversely, trainers who see such techniques as peripheral or inefficient may use them less often or less carefully. The same logic applies to training in adult education. Training in adult education should provide conceptual and practical resources for planning and facilitating active learning, including knowledge of learner-centered methods, participation, group dynamics, and appropriate instructional support.

From this perspective, active techniques should be understood as enacted practices rather than stable instructional "treatments." Their educational consequences are inseparable from how they are organized: how often they are used, how clearly they are introduced, whether group processes are scaffolded, whether outcomes are synthesized, and whether group composition supports productive exchange.

2.5 Implementation and learning outcomes

The study does not treat learning outcomes narrowly. It adopts a multidimensional view that includes perceived knowledge acquisition, development of skills, change in attitudes and perceptions, satisfaction with the educational process, and frequency of attendance. This broader conceptualization is especially appropriate in adult education, where the goals of learning often include application, confidence, collaboration, and continued engagement as much as the acquisition of information.

The literature reviewed in this study provides plausible grounds for expecting that frequent and well-implemented use of group work and exercises will be linked to positive outcomes across these domains. Group work is associated with knowledge gains, social support, and attitude change; exercises with application, consolidation of learning, and responsibility; and both with learner engagement. Moreover, the specific form of implementation should matter. Heterogeneous and rotating groups may expose learners to wider perspectives and richer interaction, while clear instructions, time boundaries, facilitation, and plenary synthesis may help participants transform activity into articulated learning.

5.6 Hypotheses

Based on the theoretical arguments and the empirical rationale, the present article tests the following hypotheses:

H1: Trainers' positive perceptions of group work and exercises will be positively associated with the frequency and implementation quality of these techniques.

H2: Trainers' formal preparation (training) in adult education will be positively associated with the frequency and implementation quality of group work and exercises.

H3: More frequent use of group work and exercises will be positively associated with trainees' perceived knowledge acquisition, skill development, change in attitudes and perceptions, satisfaction, and attendance.

H4: Higher implementation quality of group work and exercises will be positively associated with trainees' perceived knowledge acquisition, skill development, change in attitudes and perceptions, and satisfaction.

H5: More heterogeneous and rotating group arrangements will be positively associated with trainees' perceived learning outcomes and, to a lesser degree, attendance.

3. Material and Methods

3.1 Research design

The present article focuses on the survey-based research that can facilitate effective empirical analysis. It examines associations among trainer-related variables, implementation variables, and learner-perceived outcomes. The aim is not causal inference but theory-informed analysis of relationships within an authentic adult education setting.

3.2 Setting

The study was conducted in a Greek teacher training program. The program trained primary and secondary school teachers in the educational use of ICT and was delivered in specially equipped training centers across Greece. It involved 96 hours of instruction and was facilitated by specially prepared trainers. This context matters methodologically because it provided a relatively intensive adult learning environment in which active techniques had clear pedagogical relevance and enough exposure time to be meaningfully perceived by participants.

3.3 Participants

For the quantitative component, the sample consisted of 30 trainers and 152 trainees. The trainers were the adult educators responsible for delivering the program to their respective trainee groups. According to the study, 24 trainers were men (80%) and 6 were women (20%). Their average age category fell between 40 and 55 years. The trainees were primary school teachers participating in the program and constituted the adult learner sample whose perceptions of outcomes and implementation were measured.

Sampling was non-random and relied on volunteer participation. The study explicitly characterizes the sample as a convenience or empirical sample rather than a representative one. As a result, the findings should be interpreted as analytically

informative rather than statistically generalizable to all adult education programs or even to all trainers within the national initiative.

3.4 Data collection

Two questionnaires were developed: one for trainers and one for trainees. Trainers reported on the frequency with which they used group work and exercises, their perceptions of these techniques, selected background variables, and aspects of group formation. Trainees reported on their perceived learning outcomes and on the way trainers used the two techniques during the program. This division of measurement sources was methodologically important in the original design. The study deliberately used trainer self-reports for frequency of use, on the grounds that trainers knew how often they used each technique, while it used trainee reports for implementation quality in order to reduce the risk of socially desirable trainer self-assessment.

Questionnaires were distributed electronically via email links. Trainers first completed their questionnaire and were then asked to forward a separate link to the trainees they had taught. To preserve anonymity while enabling trainer–group matching, trainer and trainee questionnaires were linked by a code rather than by personal identifiers. The study proceeded in performing pilot testing and revision of the instruments before full administration.

3.5 Measures

The study employed multi-item scales with five-point Likert-type response formats for most constructs. The reliability coefficients (Cronbach's alpha) for the key outcome and implementation scales.

3.5.1 Trainer perceptions of group work and exercises

Two perception scales captured trainers' views of the educational value of group work and exercises. The items reflected benefits discussed in the literature review, including contributions to knowledge, skill development, attitude change, responsibility, confidence, and active participation. The mean score for perceptions of exercises was 4.02 (SD = 0.51), and for perceptions of group work, 4.20 (SD = 0.76), suggesting generally favorable views.

3.5.2 Training - Formal preparation in adult education

Training in adult education was measured through trainers' educational or certified preparation in the field. The questionnaire included items such as degree-level specialization, postgraduate study, substantial formal training, and certified instructional competence in adult education. In the present article, this variable is retained because it reflects formal preparation rather than years of experience.

3.5.3 Frequency of use

Trainers reported the frequency with which they used group work and exercises. Mean scores were high for both group work (M = 4.03, SD = 0.93) and exercises (M = 4.10, SD = 0.80), indicating that both techniques were used in most sessions.

3.5.4 Implementation quality

A trainee-reported scale measured the quality with which the two techniques were implemented. Items assessed whether the trainer gave clear instructions, specified time limits, appointed a group representative, monitored group functioning, ensured presentation of results in plenary, and synthesized conclusions. Reliability for this scale was satisfactory (α = .77), with a mean of 3.58 (SD = 0.56).

3.5.5 Group characteristics

Two additional variables captured how group work was organized: whether groups were rotating or stable, and whether they were heterogeneous or homogeneous. Descriptive statistics indicated that trainers more often organized rotating groups (M = 0.77, SD = 0.43, where 1 indicated rotating groups) and heterogeneous groups (M = 0.83, SD = 0.38, where 1 indicated heterogeneous groups).

3.5.6 Trainee outcomes

Five dimensions of trainee-perceived outcomes were measured. Knowledge acquisition included five items addressing new knowledge, understanding, retention, recall, and ability to apply knowledge; reliability was high (α = .89). The mean score was 3.83 (SD = 0.66). Skill development included collaboration, critical thinking, problem solving, and interpersonal skills (α = .70). The mean score was 3.84 (SD = 0.44). Change in attitudes and perceptions included improved attitudes toward group members, more positive views of teamwork, increased self-perception and self-confidence, and a more positive view of using computers in learning (α = .71). The mean score was 3.69 (SD = 0.40). Satisfaction included overall satisfaction with the educational process, a positive judgment of program results, and perceived improvement in the use of ICT in teaching (α = .79). The mean score was 3.91 (SD = 0.64). Attendance frequency was measured separately as an indicator of participation continuity (M = 3.10, SD = 0.84).

3.6 Data aggregation and analysis

A distinctive feature of the study's quantitative analysis is that trainee responses were aggregated by trainer. The researcher calculated the mean of each trainee group corresponding to each trainer, thereby producing a trainer-level dataset that combined trainer questionnaire data with aggregated trainee perceptions. This procedure enabled cross-source correlational analysis between trainer variables and trainee outcomes.

Data were analyzed in SPSS. The study reports descriptive statistics, Cronbach's alpha coefficients for scale reliability, and Pearson linear correlation coefficients among the study variables. The present article follows the source study in reporting these

bivariate relationships. Because the original analysis was correlational, the term "association" is used here rather than stronger causal language.

4. Results and Discussion

4.1 Descriptive overview

The descriptive findings portray a sample of trainers who, on average, held favorable views of both group work and exercises and reported using both techniques frequently. Trainees, in turn, reported moderately positive to clearly positive outcomes across all measured domains. On average, they indicated that they had acquired knowledge, developed skills, experienced some positive change in attitudes and perceptions, and felt satisfied with the program. They also tended to perceive that trainers used group work and exercises in ways broadly consistent with the pedagogical specifications developed in the literature review.

These descriptive results are already significant. They suggest that the educational setting was not one in which active techniques were rare innovations. Rather, both techniques appeared to form a regular part of instructional practice. The more analytically interesting question, however, is whether differences among trainers in perceptions, preparation, and implementation corresponded to meaningful variation in how techniques were used and in what trainees reported as outcomes.

4.2 Trainer perceptions and implementation

The first set of analyses addressed whether trainers' perceptions of group work and exercises were associated with implementation variables. The pattern was consistently positive and broadly supportive of H1 (see Table 1).

More positive perceptions of group work were strongly associated with more frequent use of group work ($r = .677$, $p < .01$). They were also positively associated with more frequent use of exercises ($r = .709$, $p < .01$), suggesting that trainers who valued one active technique tended, more broadly, to teach in an active-learning orientation rather than in technique-specific isolation. In addition, positive perceptions of group work were associated with more heterogeneous group composition ($r = .532$, $p < .01$), more rotating group structures ($r = .465$, $p < .01$), and better overall implementation quality ($r = .442$, $p < .05$).

Perceptions of exercises showed a somewhat different but equally meaningful pattern. They were positively associated with more frequent use of group work ($r = .508$, $p < .01$), more frequent use of exercises ($r = .443$, $p < .05$), more heterogeneous grouping ($r = .515$, $p < .01$), more rotating groups ($r = .435$, $p < .05$), and, most strongly, higher implementation quality ($r = .733$, $p < .01$). This last coefficient is especially notable. It suggests that trainers who believed in the value of exercises were not merely more likely to use them; they were substantially more likely to organize and support them in pedagogically appropriate ways.

Taken together, these findings indicate that trainer perceptions were linked to enactment in quantitative terms. Trainers who more strongly endorsed the value of active techniques used them more often and, in important respects, better. The results, therefore, support the proposition that beliefs about pedagogy matter for instructional practice in adult education.

4.3 Formal preparation in adult education and implementation

The second hypothesis is related to training in adult education. Here, too, the results are supportive (see Table 1).

Individuals' training in adult education was positively associated with more frequent use of group work ($r = .578$, $p < .01$) and more frequent use of exercises ($r = .614$, $p < .01$). It was also positively associated with implementation quality ($r = .515$, $p < .01$). Individuals trained in adult education, then, not only used active techniques more often but also implemented them more effectively, at least as perceived by trainees.

Training in adult education was also positively associated with heterogeneous group composition ($r = .424$, $p < .05$), though its association with rotating rather than stable groups was weaker and not statistically significant at the conventional .05 threshold ($r = .358$, $p = .052$). This suggests that training in adult education may matter more for the pedagogical rationale of grouping—such as valuing heterogeneity—than for every operational choice of group organization.

These findings support H2 and strengthen the argument that active learning techniques require pedagogical knowledge as well as goodwill. Trainers appear more likely to align their practice with adult education principles when they have trained in adult education in the field.

4.4 Frequency of use and trainee outcomes

The strongest and most systematic results concern the relationship between the frequency of active technique use and trainees' perceived outcomes. These findings provide support for H3 (see Table 1).

Frequency of group work use was positively associated with all five outcome dimensions: knowledge acquisition ($r = .627$, $p < .01$), skill development ($r = .675$, $p < .01$), change in attitudes and perceptions ($r = .646$, $p < .01$), satisfaction ($r = .703$, $p < .01$), and attendance ($r = .564$, $p < .01$). In practical terms, trainers who used group work more frequently tended to have trainee groups that reported learning more, developing more capabilities, experiencing more positive attitudinal change, feeling more satisfied, and attending more regularly.

The pattern for exercises was similarly robust. More frequent use of exercises was positively associated with knowledge acquisition ($r = .676$, $p < .01$), skill development ($r = .592$, $p < .01$), change in attitudes and perceptions ($r = .515$, $p < .01$), satisfaction ($r = .714$, $p < .01$), and attendance ($r = .606$, $p < .01$). In fact, exercise frequency was even slightly more strongly associated than group-work frequency with knowledge, satisfaction, and attendance.

These findings are important for two main reasons. First, they show that both techniques matter, not just group work. This is especially relevant given the study's observation that exercises have received less empirical attention. Second, they suggest that active technique use is linked not only to cognitive outcomes but also to motivational and participation-related dimensions that are central in adult learning environments.

4.5 Implementation quality and trainee outcomes

H4 was concerned with exploring the quality of implementation. The results (see Table 1) show that trainee-reported implementation-quality scale was positively associated with knowledge acquisition ($r = .653$, $p < .01$), skill development ($r = .524$, $p < .01$), change in attitudes and perceptions ($r = .664$, $p < .01$), and satisfaction ($r = .503$, $p < .01$). However, its association with attendance was not statistically significant ($r = .309$, $p > .05$).

This pattern is theoretically coherent. High-quality implementation—clear instructions, time structuring, monitoring, assignment of group roles, plenary presentation, and synthesis—appears strongly related to what trainees believe they learned and how they evaluated the educational process. Yet attendance may depend on additional factors beyond classroom process, including scheduling constraints, professional obligations, or institutional conditions.

The results nevertheless underscore a crucial point: frequent use alone is not the whole story. How group work and exercises are enacted matters substantially for learning, skill formation, attitudinal change, and satisfaction. The positive correlations are moderate to strong, especially for knowledge and attitudinal outcomes.

4.6 Group characteristics and trainee outcomes

H5 proposed that heterogeneous and rotating group arrangements would be associated with more favorable trainee outcomes. The findings again support this expectation, albeit with some nuance (see Table 1).

Rotating rather than stable groups were positively associated with knowledge acquisition ($r = .591$, $p < .01$), skill development ($r = .571$, $p < .01$), change in attitudes and perceptions ($r = .524$, $p < .01$), and satisfaction ($r = .373$, $p < .05$). Their association with attendance was not statistically significant ($r = .321$, $p > .05$). This indicates that rotation may enrich the quality of learning and the learner experience, even if it does not clearly affect attendance.

Heterogeneous rather than homogeneous groups were positively associated with knowledge acquisition ($r = .704$, $p < .01$), skill development ($r = .635$, $p < .01$), change in attitudes and perceptions ($r = .622$, $p < .01$), satisfaction ($r = .590$, $p < .01$), and attendance ($r = .375$, $p < .05$). The coefficient for knowledge acquisition is especially large, suggesting that heterogeneous grouping may have strong pedagogical value in this adult professional learning context.

These results reinforce the idea that the social design of group work is not incidental. Group composition and turnover appear to shape the quality of interaction and, by extension, the range of learning outcomes participants perceive.

4.7 Training in adult education and trainee outcomes

In the simplified model used for this article, training in adult education is retained not only as a predictor of implementation but also as a trainer characteristic potentially linked to trainee outcomes. The results show a differentiated pattern (see Table 1).

Training in adult education was positively associated with knowledge acquisition ($r = .472$, $p < .01$), skill development ($r = .406$, $p < .05$), satisfaction ($r = .610$, $p < .01$), and attendance ($r = .479$, $p < .01$). Its association with change in attitudes and perceptions was positive but not statistically significant ($r = .341$, $p > .05$). These findings suggest that adult education preparation may contribute to better learner experiences and outcomes, although its relationship to attitude change is less direct or less consistently perceived.

The strongest association was with satisfaction. This is plausible as trainers with stronger adult education preparation may be better able to structure the learning environment, support participation, and make the program feel educationally coherent and relevant. The association with attendance also suggests that formally prepared trainers may foster conditions that sustain learner commitment.

4.8 Summary of hypotheses

Overall, the empirical evidence supports the simplified model quite strongly. H1 and H2 are supported: trainer perceptions and training in adult education were positively related to frequency and quality of technique use. H3 is supported: frequent use of both group work and exercises was positively associated with all measured trainee outcomes. H4 is supported for knowledge, skills, attitude change, and satisfaction, but not for attendance. H5 is also supported, with heterogeneous and rotating groups showing positive associations with most trainee outcomes, though rotation was not significantly related to attendance.

4.9 Discussion

This article set out to contribute to the adult education literature. Its central claim is straightforward: active learning techniques matter in adult professional education, but their value depends not only on their presence but on the beliefs, preparation, and enactment of the trainer.

Three contributions stand out.

First, the study shows that trainer perceptions are not trivial background dispositions. They are meaningfully connected to practice. Trainers who more strongly believed in the educational value of group work and exercises used them more often and, especially in the case of exercises, implemented them with greater pedagogical fidelity. This finding speaks to a recurrent blind spot in active learning research. Techniques are often treated as if they can be inserted into a program with stable effects, but the results here suggest that their implementation is filtered through professional judgment. In adult education, where facilitation, responsiveness, and the management of participation are central, trainer beliefs are likely to play a particularly important role.

Second, the study lends empirical support to the idea that training in adult education matters. Trainers who have trained in adult education used active techniques more frequently and more effectively, and their trainees reported more favorable outcomes in several domains. This does not mean that training is a simple guarantee of quality. Yet it strongly suggests that adult education expertise is consequential. In policy and practice terms, this supports continued investment in specialist trainer development rather than assuming that subject expertise alone is sufficient for adult learning programs.

Third, the findings broaden the evidence base on active learning outcomes by bringing exercises into the picture alongside group work. The literature reviewed indicated that group work had attracted much more empirical attention than exercises. The present results show that exercises are at least as important in this setting and, on some dimensions, even more strongly associated with positive outcomes. Frequent use of exercises was strongly related to knowledge, satisfaction, and attendance. This is theoretically sensible in a professional development environment centered on ICT integration, where adults may need repeated opportunities to apply, test, and consolidate what they are learning. Exercises appear to work as a bridge from conceptual input to actionable competence.

The findings on implementation quality also deserve emphasis. In adult education, there can be a temptation to treat activity-based methods as inherently participatory and therefore inherently effective. The results complicate that assumption. Clear instructions, time structuring, monitoring, assignment of group roles, plenary presentation, and synthesis all appear to matter. In other words, activity without facilitation is not enough. This resonates with adult education theory at its best. Participation is educationally valuable not as movement or talk for its own sake, but when it is scaffolded in ways that enable reflection, exchange, and connection to broader learning aims.

The group-formation findings add a further layer. Heterogeneous and rotating groups were associated with more positive outcomes, especially knowledge acquisition, skill development, and attitudinal change. These results align with theoretical claims that diversity within groups can enrich problem-solving and mutual learning, and that changing group composition can expand networks of interaction and reduce stagnation. For adult learners, who bring varied backgrounds and prior experiences, heterogeneous grouping may be particularly powerful because it enables the very exchange of perspectives on which adult education theory places such weight.

A more critical perspective, however, is necessary in order to fully interpret these findings. Although heterogeneous and rotating groups were positively associated with learning outcomes in this study, there are to potential challenges associated with such arrangements. Heterogeneity, may introduce difficulties related to group cohesion, uneven participation, and disparities in prior knowledge or confidence. In some cases, more experienced or assertive participants may dominate group processes, while others may withdraw, thereby limiting the intended benefits of collaborative learning.

Similarly, frequent rotation of group membership, although beneficial for exposure to diverse perspectives, may reduce the stability required for trust-building and deeper collaboration. These dynamics suggest that the positive effects observed in this study are contingent on careful facilitation and cannot be assumed to arise automatically from group composition alone.

A second point concerns the broader pedagogical stance underpinning the study. The findings are consistent with a constructivist orientation that emphasizes active participation, collaboration, and experiential learning. However, the implicit assumption that increased frequency and higher-quality implementation of active learning techniques will necessarily lead to improved outcomes warrants qualification. In certain educational contexts—particularly in professional training environments characterized by limited time, tightly specified learning objectives, or the need for efficient transmission of standardized knowledge—more structured, instructor-led approaches may be equally or, in some cases, more effective. For example, direct instruction may be better suited to introducing complex technical material, ensuring coverage of essential content, or supporting learners who prefer clear guidance over exploratory processes.

From this perspective, the value of active learning techniques such as group work and exercises should be understood as context-dependent rather than universally optimal. Their effectiveness is likely moderated by factors such as instructional goals, time constraints, learner characteristics, and the nature of the subject matter. The present findings therefore support the importance of active learning within adult education, but they should not be interpreted as prescribing a single pedagogical model. Instead, they point toward the need for a flexible and context-sensitive approach in which trainers are able to combine participatory and directive methods in ways that best support learning in specific settings.

At the same time, the findings point to an interesting distinction between learning-process outcomes and attendance. Frequency of use for both techniques was associated with attendance, but implementation quality was not. Group heterogeneity had a modest association with attendance, while group rotation did not. This suggests that regular exposure to active techniques may contribute to sustained engagement or willingness to attend, but that attendance is not simply a function of how carefully a trainer structures each activity. Attendance in adult learning likely reflects a broader ecology of motivation, relevance, competing obligations, and institutional support.

The study also contributes methodologically by pairing trainer reports with aggregated trainee perceptions. That strategy partly reduces the common problem of relying on a single source for both predictor and outcome variables. Although still based on self-reports, the analysis benefits from cross-source linkage: trainers report frequency and preparation, while trainees judge implementation quality and outcomes. This design feature increases confidence that the observed relationships are not merely artifacts of same-source response tendencies.

Several limitations, however, must be acknowledged. The sample was non-random and drawn from one national program in one country. The participants were

adult professionals in a specific training environment, which means the findings cannot be generalized without caution to all adult education contexts. The analysis is correlational, so causal claims are unwarranted. Outcomes are perceived rather than objectively tested, and attendance is only a limited behavioral indicator. Moreover, trainee responses were aggregated at the trainer level, which is analytically useful but can obscure within-group variation.

Even with these limitations, the study has clear implications for adult education practice and research. For practice, the message is that active learning techniques should be designed systemically. Programs should not merely exhort trainers to "use more participation." They should support trainers in understanding why techniques matter, how to implement them well, and how to compose and rotate groups strategically. For trainer education, the results suggest that training in adult education should address not only theory and philosophy but also the micro-pedagogies of facilitation, task design, and group organization.

5. Recommendations

For research, the study opens several lines of inquiry. Future work could test similar models in other adult education sectors, compare different active techniques beyond exercises and group work, and combine perceived outcomes with performance-based measures. Multilevel models with larger samples could more precisely separate trainer-level and learner-level effects. Experimental or quasi-experimental designs could also strengthen causal inference. Finally, qualitative studies could illuminate how adult learners actually experience different forms of group heterogeneity, task framing, and plenary synthesis.

6. Conclusion

In conclusion, the article supports a practical but theoretically important proposition: in adult education, active learning techniques are not simply tools to be selected from a pedagogical menu. They are relational and design-dependent practices whose educational force emerges through trainer beliefs, professional preparation, and effective. Group work and exercises appear to be especially valuable in sustained professional education, but they realize their promise most fully when they are frequent, well facilitated, and embedded in a learning environment organized for participation, diversity, and reflection.

Conflict of Interest Statement

The author declares no conflicts of interest.

About the Author

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References

Brown, G., & Atkins, M. (1997). *Effective teaching in higher education.* London: Routledge. Retrieved from https://www.routledge.com/Effective-Teaching-in-Higher-Education/Atkins-Brown/p/book/9780415036757

Freire, P. (1977). Η αγωγή του καταπιεζόμενου. Αθήνα: Ράππας

Ghaith, G. M. (2002). The relationship between cooperative learning, perception of social support, and academic achievement. *System, 30*, 263–273. https://doi.org/10.1016/S0346-251X(02)00014-3

Johnson, D. W., & Johnson, R. T. (1989). *Cooperation and competition: Theory and research.* Edina, MN: Interaction Book Company. Retrieved from https://psycnet.apa.org/record/1989-98552-000

Johnson, D. W., Johnson, R. T., & Smith, K. A. (1998). Cooperative learning returns to college: What evidence is there that it works? *Change: The Magazine of Higher Learning*, *30*(4), 26–35. https://doi.org/10.1080/00091389809602629

Κόκκος, Α. (2005). Μεθοδολογία Εκπαίδευσης Ενηλίκων, Θεωρητικό Πλαίσιο και Προϋποθέσεις Μάθησης, Πάτρα: ΕΑΠ.

Knowles, M. (1988). *The modern practice of adult education: From pedagogy to andragogy (Rev. ed.).* New York: Cambridge Books. Retrieved from

https://books.google.ro/books/about/The_Modern_Practice_of_Adult_Education.html?id=_gifAAAAMAAJ&redir_esc=y

Πολέμη – Τοδούλου, Μ. (2005). Μεθοδολογία Εκπαίδευσης Ενηλίκων, Η Αξιοποίηση της Ομάδας στην Εκπαίδευση Ενηλίκων. Πάτρα: ΕΑΠ

Rogers, A. (1999). Η εκπαίδευση ενηλίκων. Αθήνα: Μεταίχμιο.

Appendix

Table 1: Correlations between study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Trainer gender	1	-,477**	,197	,114	,300	,256	,253	,034	,276	,224	,246	,133	,144	,345	,284
2. Trainer age	-,477**	1	-,097	,092	-,090	-,229	-,255	-,073	-,309	-,332	-,125	-,130	-,033	-,154	-,039
3. Trainers' perceptions of working groups	,197	-,097	1	,434*	,570**	,677**	,709**	,442*	,465**	,532**	,582**	,451*	,328	,680**	,658**
4. Trainers' perceptions of working groups	,114	,092	,434*	1	,476**	,508**	,443*	,733**	,435*	,515**	,606**	,463**	,571**	,277	,193
5. Trainer training in adult education	,300	-,090	,570**	,476**	1	,578**	,614**	,515**	,358	,424*	,472**	,406*	,341	,610**	,479**
6. Frequency of using working groups	,256	-,229	,677**	,508**	,578**	1	,782**	,422*	,625**	,703**	,627**	,675**	,646**	,703**	,564**
7. Frequency of using exercises	,253	-,255	,709**	,443*	,614**	,782**	1	,530**	,569**	,736**	,676**	,592**	,515**	,714**	,606**
8. Method of using the technique	,034	-,073	,442*	,733**	,515**	,422*	,530**	1	,410*	,582**	,653**	,524**	,664**	,503**	,309
9. Group characteristics (fixed – rotating)	,276	-,309	,465**	,435*	,358	,625**	,569**	,410*	1	,811**	,591**	,571**	,524**	,373*	,321
10. Group composition (homogeneous – heterogeneous)	,224	-,332	,532**	,515**	,424*	,703**	,736**	,582**	,811**	1	,704**	,635**	,622**	,590**	,375*
11. Knowledge acquired	,246	-,125	,582**	,606**	,472**	,627**	,676**	,653**	,591**	,704**	1	,569**	,736**	,634**	,483**
12. Skill development	,133	-,130	,451*	,463**	,406*	,675**	,592**	,524**	,571**	,635**	,569**	1	,659**	,521**	,340
13. Change in attitudes and perceptions	,144	-,033	,328	,571**	,341	,646**	,515**	,664**	,524**	,622**	,736**	,659**	1	,561**	,247
14. Satisfaction with training	,345	-,154	,680**	,277	,610**	,703**	,714**	,503**	,373*	,590**	,634**	,521**	,561**	1	,781**
15. Frequency of trainee attendance	,284	-,039	,658**	,193	,479**	,564**	,606**	,309	,321	,375*	,483**	,340	,247	,781**	1

Note: ** $p < .01$. The article excludes all model paths and findings relating to trainers' experience in adult education.