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INTRA - INNOVATIVE TECHNOLOGIES FOR RESPONSIBLE AUTOMATION

2022-1-EN02-KA220-ADU-000085744



Scientific article on the validation of the INTRA model

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A mixed-methods validation of a modular e-learning model for the development of adult competences: evidence from three European pilot cycles

Abstract

This article reports the validation of INTRA, a modular e-learning model designed to strengthen the personal, social and digital skills of adults in contexts shaped by rapid digitization and automation. The validation was conducted within WP4 (“Capacity building”) of the Erasmus+ INTRA project (project code: 2022-IT02-KA220-ADU-000085744) through three progressive pilot cycles implemented in Italy, Romania and Poland in the period 2024–2025. The assessment framework combined (i) learning analyses generated via platform monitoring (progress, completion, attempts and quiz results) and (ii) qualitative evidence collected through post-training interviews and focus groups guided by a shared protocol. The learning path comprises three modules—Stress and Emotional Management, Personal Development and Motivation and Time Management—each concluding with a short knowledge quiz used as a consolidation tool. In national implementations, quantitative indicators show high continuity of participation and consistently strong performance in quizzes, with scores typically grouped between 8/8 (100%) and 7/8 (87.5%), reflecting the alignment between learning content and assessment design. Qualitative evidence converges on the perceived clarity and relevance of materials, intuitive navigation, the value of self-paced learning and transfer carried over into daily routines and professional settings. The study discusses how INTRA functions as an integrated competence development system (platform + modular content + practical tools + guide-oriented assessment) and proposes adoption conditions that support transferability in adult education environments: brief onboarding, light facilitation and optional visual/multimedia enrichment.

Keywords: adult education; e-learning; soft skills; learning analysis; blended methods; stress management; motivation; time management; guidance

Structure

1. Introduction (adult learning + competence-based e-learning)
2. The INTRA model (modules + toolkit + guide level)
3. Methods (Tracking + Quiz + Qualitative Format)
4. Results (how much + which)
5. Discussion (system effect, transferability, conditions of adoption)
6. Limitations and future research
7. Conclusion

Introduction

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Adult education is currently operating at the intersection of three pressures: (1) rapid digital transformation of work processes, (2) widening gaps in participation and adherence among adults with lower skills and (3) a growing need for soft skills that support well-being, adaptability and lifelong learning. The 'Innovative Technologies of Responsible Automation' (INTRA) project addresses these pressures through a skills upgrade pathway for electronic wellbeing and an integrated digital model that supports adults in mapping and strengthening skills relevant to daily life and work.

Since the design phase, INTRA has positioned competence development as a practical and observable process: adults interact with structured content and tools, produce learning tracks on the platform (progress, completion, assessment results) and provide reflective feedback through guided interviews. This article focuses on the validation of WP4, where the model was tested in three partner countries through three pilot cycles that supported iterative refinement and increased heterogeneity of learner profiles.

Two choices define the distinctiveness of INTRA as a model of competence development for adults. First, the track focuses on self-regulation skills—stress and emotion management, motivation, goal setting and time management—because these are repeatedly associated with adults' ability to persevere in learning and apply new strategies in everyday settings. Second, the model treats the digital environment as both a learning space and a evidence-generating tool: platform monitoring and quiz results provide behavioural indicators of engagement and consolidation, while qualitative interviews capture perceived utility, contextual transfer and usability experience.

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This article therefore addresses the following research questions:

- RQ1. How does the INTRA model perform in terms of adult learner engagement and continuity, as observed through the platform's monitoring and completion data?
- RQ2. What patterns emerge from the end-of-module quizzes as indicators of consolidation of learning between modules and pilot cycles?
- RQ3. How do adult learners describe the usability of the platform, the value of the content and the development of skills through a post-training qualitative assessment?
- RQ4. Which implementation conditions seem most conducive to transferability and adoption in adult education settings?

The INTRA model: learning design and focus on skills

Modular learning path

INTRA offers an adult training course organized in three modules:

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1. Stress and emotional management
2. Personal development and motivation
3. Time management

Among the implementations, each module integrates:

- essential theoretical content (presented in an accessible sequence),
- practical ideas/exercises that anchor learning in everyday situations,
- An end-of-module quiz used as a consolidation tool.

This structure supports adult learning rhythms, including short learning sessions spread over days and allows learners to progress at their own pace while maintaining a consistent trajectory of skills.

Assessment as consolidation: 8-item quiz

A key design element in WP4 pilots is the quiz format: after completing each module, participants complete a quiz consisting of 8 test questions. This quiz design produces two highly interpretable score values—8/8 (100%) and 7/8 (87.5%)—that support aggregate analysis across cohorts. In WP4 reporting, quizzes are primarily interpreted as verification and consolidation of learning, rather than as high-risk tests and provide a consistent quantitative indicator across modules and national contexts.

Driver-oriented assessment

INTRA's evaluation logic integrates qualitative reflection as a structured component rather than as an optional complement. The shared interview protocol used among the pilots asks participants to describe their experience, evaluate the quality and usability of the content and provide concrete examples of application of the skills.

The protocol explicitly invites participants to report perceived improvements in personal, social or digital skills and to articulate examples of transfer into everyday life or professional contexts.

This approach is in line with the project's broader emphasis on participatory assessment and narrative evidence of transformation in adult learners.

Methods

Design: Multi-Country Progressive Pilot Cycles

As part of WP4, the partnership implemented three pilot cycles of experimentation in Italy, Romania and Poland in the period 2024–2025 as a progressive validation pathway. At each cycle, partner teams recruited adult learners via local networks, provided platform credentials, supported onboarding and facilitated self-



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completion of modules and quizzes. Progress through cycles supported iterative improvements and a gradual increase in the heterogeneity of participant profiles, including cohorts with stakeholder roles in educational and socio-formative settings.

Participants and recruitment

Recruitment followed a hands-on approach consistent with adult education delivery: participants were recruited via partner networks and included adult volunteers of different ages, professional backgrounds and varying familiarity with online learning. The three experimentation sessions involved a total of 314 adults in the three partner countries, exceeding the project threshold of 300 participants. The overall distribution by country is: Italy 318, Romania 58, Poland 118.

This article reports the overall results of the validation process and highlights illustrative quantitative models and qualitative themes drawn from national evidence.

Subject of the experimentation

The object evaluated is the INTRA e-learning course structured in three modules:

1. Stress and Emotional Management
2. Personal Development and Motivation
3. Time Management

Each module integrates content, micro-exercises/insights and a final quiz; The platform records progress, completions, attempts and results of the quizzes, making the use observable along the entire route.

Procedure

In all test sessions, the procedure followed a consistent sequence:

1. Participants received credentials and instructions.
2. Participants completed the three modules independently, at their own pace.
3. Participants completed an end-of-module quiz after each module.
4. After completing the entire course, participants participated in qualitative interviews or focus groups guided by the shared assessment format.

Data sources and measurements

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An intentional triangulation was adopted, divided into three “packages” of evidence:

1. **Platform evidence (monitoring and progress):** registrations, active users, progress by module, completions, usage logics over time.
2. **Learning evidence (quiz):** scores per module, distribution of results, attempts (when available) and quiz repetition practices.
3. **Interpretative (qualitative) evidence:** interviews/focus groups and structured comments on a shared format, to make the experience, perceived usefulness and transferability readable.

The qualitative collection is based on a common guide between partners, which can be used both in interviews and in focus groups, with an approximate duration of **30–45 minutes** and a structure by themes (general experience, quality of materials, usability, skills development, suggestions). Citations are returned in a reworked and anonymised form, in line with responsible data management.

Quantitative data (learning analysis)

- Platform tracking: progress, completion status, attempts, quiz results.
- Quiz scores expressed as a percentage of correct answers (typically 100% or 87.5% due to the 8-item structure).

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Qualitative data

- post-training interviews or focus groups (30–45 minutes), recorded as detailed notes for later thematic analysis.
- Interview Protocol Sections: General Experience; quality of training materials; usability of the platform; impact on skills development; suggestions; Intention to recommend.

Analysis approach

Given the purpose oriented to the validation of the model, the analysis followed a mixed method logic:

- Quantitative data was analysed descriptively to identify continuity of engagement (completion rates), pace patterns (where available) and distribution of quiz scores across modules.
- The qualitative evidence was analysed thematically using the shared protocol as an analytical framework, with attention to recurring themes and illustrative examples of skills transfer and development.



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Results

Quantitative results: tracking (progress and completion)

The first indicator, also the densest on an operational level, is the completion of the entire path. Of the total 314 beneficiaries, 310 completed all three modules and activities envisaged: an overall completion rate of 98.7% (310/314).

The reading by country highlights three consistent dynamics:

- Italy:
 - Session 1: 16 out of 18 completions.
 - Session 2: 60 completions out of 62 (2 participants with two modules out of three, with reasons related to time management and agenda discontinuity).
 - Session 3: Full Completion (58/58).
- Romania: full completion in all sessions (18/18; 20/20; 20/20), with fruition described as distributed in several short sessions, consistent with flexible adult learning.
- Poland: Full completion in all sessions (28/28; 30/30; 60/60). The Joint Report also links the 60/60 of session 3 to the good accessibility of the path on a more heterogeneous group with a higher average age (52 years).

A second quantitative level, often very revealing when working with adults, concerns the style of fruition. Typical practices emerge in the reports: “interlocking” study, micro-sessions in the evening and on the weekend, selective returns on content before the quiz. Where reported, the average time per module is placed on an order of magnitude compatible with full agendas: in Italy (session 1) between 35 and 55 minutes; in Romania between about 40 and 50 minutes, with slight variations between sessions.

Quantitative results: end-of-module quiz

The second quantitative axis concerns the module closing quizzes, designed both as reinforcement and as a comprehension test, with tracking of results and attempts on the platform.

- Italy: in session 1 a picture of maximum scores for the quizzes for all participants is reported, with the interesting methodological note that some users arrive at the quiz after a partial consultation of the materials, reporting a high level of perceived accessibility. In sessions 2 and 3 the quizzes are



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completed regularly; In session, 3 different participants repeat the quiz to improve the score, with results considered satisfactory and passed.

- Romania: Session 2 has maximum and homogeneous scores (100% for all). Session 1 records 100% in the first two modules and an average of 87.5% in the third (time management), read as the most challenging module in terms of application. Session 3 confirms high performance: 100% in modules 1 and 3 and, in module 2, a deployment with 19 participants at 100% and 1 participant at 87.5%.
- Poland: session 2 offers a particularly useful detail also for statistical reading, because it explains the structure of the quiz (8 questions) and two recurring scores ($8/8=100\%$; $7/8=87.5\%$). By module:
 - Module 1: 93.3% to 100% and 6.7% to 87.5% (mean 99.2%)
 - Module 2: 83.3% at 100% and 16.7% at 87.5% (mean 97.9%)
 - Module 3: 90.0% at 100% and 10.0% at 87.5% (mean 98.8%)

In session 1 a share of maximum scores per module emerges that is lower in time management than in the other modules and this convergence between sources reinforces the idea of module 3 as an area that produces a wider variability. Session 3, out of 60 participants, returns a “more varied and very positive” profile: prevalence of 100%, a share limited to 87.5% and a very small share around 75%, while maintaining solid overcoming and understanding, with a variability that the report links to the greater heterogeneity of the group and different study styles.

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Quantitative Summary

Combining tracking and quizzes, the quantitative framework describes three properties that matter a lot in adult education:

1. High continuity along the entire route (98.7% overall completion).
2. “Adult” and sustainable use, with distributed study and times per module compatible with complex routines.
3. High performance on quizzes with information variability: very frequent maximum scores, time management often more “challenging”, more heterogeneous cohorts with slightly larger and still positive distributions.

This numerical base naturally prepares the following parts of the article, where the qualitative reading and the analysis of the impact on skills make “explainable” what the numbers already show: a model used to the full, understood with solidity and experienced as useful in everyday adulthood.

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Qualitative results: usability, content value and skills development

The qualitative evaluation component of the model was constructed as an “downstream” interpretative reading of the platform data. The partners used a shared interview/focus group evaluation format with explicit prompts on experience, usability and perceived skills development. The format could be administered both individually and in small groups, in person or online, with an approximate duration of 30-45 minutes and a collection based on detailed notes, then summarized in the national reports of the project partners.

The methodological element that is worth emphasizing is the **common grid** that organizes the evaluation conversation along constant dimensions, directly related to the INTRA model: (1) quality of materials, (2) usability of the platform, (3) perceived usefulness and transferability, (4) impact on skills, (5) operational suggestions for improvement. This structure makes the evidence comparable between countries and sessions, leaving room for examples and nuances specific to the different targets.

Starting from this basis, the qualitative evidence converges in a stable way on four thematic nuclei, which offer interpretative depth to the completion data and the results of the quizzes.

Theme 1: Clarity and perceived quality of teaching materials

In multiple contexts, participants describe materials as clear, uncluttered and useful, with an internal structure perceived as “solid” and geared toward what is really needed in adult life. In the Polish case (session 2), the report highlights that stakeholders from education and the social sector have explicitly valued the quality, clarity and logical structure of content, as well as the presence of tools that facilitate an immediate shift from idea to action.

In the same direction, session 3 in Poland confirms a perception of accessibility “without simplification”, with appreciations on the practicality of content and respect for the adult experience.

The point for validation is relevant: instructional design supports understanding and relevance across profiles and maintains a recognizable quality even as the sample becomes more heterogeneous.

Theme 2: Usability and intuitive navigation

The usability dimension emerges continuously as an enabling factor for participation. The reports describe a platform perceived as intuitive and user-friendly, capable of supporting regular completion of modules even in groups with different levels of digital confidence. Ease of navigation is often associated with a tidy experience and smooth use.



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This qualitative line dialogues well with the evaluation architecture of WP4: the use of Moodle as an LMS makes progress and activities traceable, while the user experience determines the ability of participants to “stay inside” the path without friction.

Theme 3: The Value of Self-Paced Learning

The self-managed rhythm is one of the most frequently cited points and takes on an almost structural function: it allows the path to be inserted into everyday life, with distributed study, micro-sessions and selective filming of content. In the national reports of Italy and Poland, the possibility of adapting the pace to one’s needs is reported as a lever for engagement and completion; The selected quotes confirm the perception of autonomy and sustainability.

Romania gives a similar reading, describing a fruition distributed over several short sessions and an autonomous organization of time, with a realistic balance between study and personal/professional commitments.

The partners emphasize this element as a distinctive feature of the model: freedom of rhythm, the possibility of resuming, returning to content and, when useful, repeating quizzes as a form of consolidation.

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Theme 4: Perceived Acquisition of Skills and Transfer into Practice

The qualitative format invites participants to describe perceived improvements and bring examples of application. Here a typical trait of adult education emerges: skills are expressed in small, replicable changes, inserted into routines.

All stakeholders report benefits on four axes that are very consistent with the modules: work organization and priorities, coping strategies and stress regulation, clearer approaches to goal-setting and self-awareness, autonomy in online learning.

By many, the path is described as effective and appreciated, with assessments that follow the same direction as completion data and quiz scores.

Refinement suggestions: light enrichment rather than structural changes



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An interesting element, in terms of validation, concerns the quality of the final observations: the proposals tend to focus on light enrichments, useful for making the experience even more fluid and attractive, while keeping the architecture of the model intact.

The recurring operational indications are organized in four very practical directions: (a) visual enrichments and micro-multimedia (infographics, diagrams, optional short videos), (b) micro-decomposition of denser activities with intermediate checkpoints and expected outputs, (c) short onboarding and continuity of initial support, (d) preservation of freedom of rhythm as a “signature” of the model.

Beneficiaries recommend optional short videos, more visual variety, more contextualized examples (especially for school and socio-educational scenarios) and final “takeaway” summaries for quick review.

Overall, these proposals function as indicators of prototype maturity: when users shift their focus to incremental improvements, it means that they already perceive the core as stable and usable and imagine evolution as refinement.

Discussion

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Why the INTRA model “holds together” as a skills development system

Evidence from the trial suggests that INTRA works effectively because it integrates four elements into a coherent learning ecosystem:

1. A modular path aligned with the needs of adults. Stress management, motivation and time management form a chain of skills that reflects the real challenges of adults and supports practical transfer.
2. Self-paced delivery with visible progress. Monitoring the platform and progress strengthens self-direction and continuity.
3. Valuation as consolidation. Short quizzes (8 items) provide immediate verification and feedback, while maintaining low friction for adult users.
4. Guide-oriented assessment and reflection. The shared interview protocol invites students to articulate experience and transfer, producing qualitative evidence that complements behavioural data.

The strongest aspect, from the point of view of pedagogical validity, is the alignment between objectives, structure and indicators: the modules work on skills highly relevant to adult life (stress, motivation, time), the



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quizzes close the modules as synthesis and consolidation, the tracking observes the trajectory of use, the interviews restore meaning and transferability.

This evidence supports two forms of “validity” relevant to capacity building models: operational validity (the model works smoothly in real-world settings) and pedagogical validity (learning design and assessment aligned with competence objectives).

Transferability: conditions of adoption suggested by the WP4 tests

When looking at transferability, the evidence from the trial offers very concrete operational indications. Three conditions emerge as particularly favorable:

- Short onboarding and light facilitation. Poland Stage II explicitly describes an initial phase of instruction and support, followed by the autonomous use of the module and the final collection of feedback.
- Optional media enrichment. Recurring tips focus on videos and infographics as additions that increase engagement without changing the structure.
- Adaptation of use cases. Stakeholder cohorts (education and socio-training sector) highlight the value of context-specific examples; This indicates that localized scenarios can further increase perceived relevance while preserving the core structure.

These conditions support a replicable implementation logic: start with a target group and a module, provide a brief orientation, then scale.

Interpretation of the “very high performance” pattern

In several national reports, quiz results show strong concentration at maximum scores. From a validation perspective, this pattern can be interpreted as an indicator of:

- Good alignment between clarity of content and quiz issues,
- Strong accessibility of assessment design,
- high consistency in the teaching sequence.

In stakeholder cohorts, high scores also suggest that professional familiarity with the topics can support performance, as evidenced in Romania’s Phase 3, where the group included some professionals already proficient on the topics covered.

In future research, this scheme could be explored via pre/post measures or item-level analyses to better differentiate learning gains between basic proficiency levels; however, within the scope of WP4 of the current



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project, the model supports the claim that the model is accessible and effective as a competence-oriented pathway.

Limitations and future research

The validation design emphasizes real-life feasibility and practical evidence generation through monitoring and guided qualitative assessment. This creates a solid evidence base for adoption and transferability. Future studies may add:

- pre/post competence measures and longer follow-up to assess the persistence of behavioural change,
- analysis of item-level quizzes between modules and cohorts,
- comparative studies on different facilitation intensities (self-paced vs. light counseling support only).

These directions are well aligned with the ability of the INTRA model to generate structured evidence within the platform environment and to support systematic iterations.

Conclusion

This article documents the mixed-methods validation of the INTRA modular e-learning model for the development of adult competences in three European contexts. The evidence from the experimentation shows a solid convergence between platform-based indicators (high completion and good performance on the quiz) and qualitative outcomes (clear content, intuitive usability, high value of self-paced learning and perceived gains in competence with practical transfer).

Overall, the results position INTRA as a mature and transferable model for adult education providers seeking skills development pathways with immediate relevance to daily life and work. The integrated design of the model — platform structure, modular learning content, consolidation quizzes and guide-oriented assessment — offers a replicable approach for lifelong learning contexts across Europe.