International Journal of Lifelong Education

ISSN: 0260-1370 (Print) 1464-519X (Online) Journal homepage: www.tandfonline.com/journals/tled20

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**To cite this article:** Jan Kalenda & Ellen Boeren (2025) Revisiting the triadic classification of learning activities: rethinking their measurement, International Journal of Lifelong Education, 44:3, 257-272, DOI: 10.1080/02601370.2025.2489506

**To link to this article:** https://doi.org/10.1080/02601370.2025.2489506

INTERNATIONAL JOURNAL OF LIFELONG EDUCATION
2025, VOL. 44, NO. 3, 257–272
https://doi.org/10.1080/02601370.2025.2489506



# Revisiting the triadic classification of learning activities: rethinking their measurement

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**ABSTRACT**

International organisations have measured adult learning participation since the 1990s, using surveys like the Adult Education Survey (AES) and the Programme for the International Assessment of Adult Competencies (PIAAC). These surveys employ a 'triadic' classification of learning activities – formal (FAE), non-formal (NFE) and informal learning (IFL) – to compare participation rates. However, historical and conceptual advancements have highlighted that these categories often overlap, challenging their validity and reliability. Despite this, the triadic classification remains in use, raising concerns about the accuracy of participation data. This article critically examines the continued use of the triadic classification, arguing for a conceptual shift to better reflect the contemporary learning landscape. We review the evolution of the triadic conceptualisation, particularly within the EC's Classification of Learning Activities (CLA), and critique its practical application in the recent AES (2022) survey. Based on our critique, we propose two alternative scenarios: (1) treating learning categories as fuzzy, overlapping concepts, and (2) conceptualising learning activities along a continuum of formality/informality. We conclude by discussing the implications of these scenarios for future data collection and measurement practices, advocating for instruments that adapt to the evolving digital and blended learning landscapes accelerated by the pandemic.

**ARTICLE HISTORY**
Received 2 September 2024
Accepted 30 March 2025

**KEYWORDS**
Adult education and learning activities; participation; international comparative surveys

## 1. Introduction

International organisations such as the European Commission (EC) and the Organisation for Economic Co-operation and Development (OECD) have been collecting data on adults' participation in adult learning activities since the 1990s. As measuring the extent to which adults engage in activities to acquire new skills for personal, economic and societal benefits is deemed crucial, these surveys have become key resources of empirical evidence on patterns of adult education participation at both national and international levels.

Besides the EC's general Labour Force Survey (LFS), which measures participation in adult learning activities among many other characteristics of the labour force, two specialised survey programmes directly target adult education and training. These are the EC's Adult Education Survey (AES) and the Programme for the International Assessment of Adult Competencies

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This article was originally published with errors, which have now been corrected in the online version. Please see Correction (http://dx.doi.org/10.1080/02601370.2025.2507485)

(PIAAC) from the OECD. Beyond that, the EC also conducts the Continuing Vocational Training Survey (CVTS), which is distinct from the AES and the PIAAC as it collects data from companies, not individual adults. Both the AES and the PIAAC use questionnaires structured to compare participation in adult learning based on the 'triadic' classification of formal (FAE), non-formal (NFE) and informal learning (IFL). While the AES includes explicit questions on all three types of adult learning (AES, 2022), the PIAAC focuses explicitly on FAE and NFE. Participation in IFL could be deduced indirectly with the PIAAC data based on questionnaire items measuring skills used at work, such as learning from colleagues or learning by doing (PIAAC, 2022).

The use of the 'triadic' classification of adult learning activities goes back many years and will be discussed in detail below. NFE was deemed important as a separate concept to underline the need to 'deformalise' education and to acknowledge learning that takes place outside the walls of formal school systems (Faure et al., 1972). Later, concepts of NFE and IFL have been further developed in detail by authors like Philip H. Coombs (1974, 1985) and Alan Rogers (2014).

Subsequent conceptual advancements and reviews of the 'triadic' classification (see, e.g. Billett, 2002; Colley et al., 2003; Eraut, 2004) have led to critiques and nuances in the definitions of FAE, NFE and IFL. Despite some variation in the interpretation of what consists as FAE, NFE and IFL, scholars conclude that these three *categories should not be considered 'exclusive', 'distinct'*, or *'discrete'*. In reality, the boundaries between them tend to be blurred or overlap. Some authors (e.g. Baert, 2018; Segers et al., 2018; Stern & Sommerlad, 1999; Rogers, 2014), therefore, argue that it is necessary to shift thinking from 'categories' to representing a 'learning continuum'.

Despite significant critique of the 'triadic' classification, organisations like the EC and the OECD continue to use the distinction between FAE, NFE and IFL to measure participation in adult learning in their survey programmes. This raises questions about the validity and reliability of the participation data and suggests that the statistics obtained by these surveys may be partially contaminated, and that actual learning activities could be misclassified. This is problematic if we want to work towards a culture of evidence-based policymaking to achieve social and economic progress and stability.

Conceptual reviews of the 'triadic' classification have not been so frequent in recent years and have not yet led to the development of potential alternative approaches to newly operationalise and measure participation in adult learning and education for use in large-scale international surveys. Although some authors (Desjardins, 2011; Field et al., 2016, 2019; Rubenson, 2018, 2019) have historically advocated for a more nuanced measurement of participation, we still lack alternative approaches to international comparative research beyond the traditional naturalistic paradigm that relies on binary variables. Therefore, the core aim of this paper is to outline such scenarios. We argue for a 'conceptual revisit' of the 'triadic' classification and discuss the implications for measurement, advocating for data collection instruments that adapt to visible changes in contemporary society that have further blurred the boundaries between FAE, NFE and IFL categories. As part of the special issue *s*, this article focuses exclusively on the operationalisation of the 'triadic' classification within the context of its empirical measurement in large-scale surveys rather than its application in current policy-making.This topic is addressed by another paper (Babayiğit et al., 2025) in this special issue.

The article is structured as follows: The subsequent section begins by reviewing the initial debate concerning the 'triadic' conceptualisation within the field of adult education, including current socio-technological changes that transform the nature of adult learning activities. The following section focuses on the EC's operationalisation of adult learning activities, using the Classification of Learning Activities (CLA, 2006, 2016), which has become the dominant framework for measuring learning activities in international comparative surveys. Following this, we discuss the practical implementation of this operationalisation within the measures used by the latest wave of the AES from 2022. This will then be used as a case for critique of the implementation of the 'triadic' classification for measurement of participation in adult learning and education.

Based on our critique of both the operationalisation and empirical measurement of learning activities, we propose *two alternative scenarios for re-operationalising* adult learning activities within

participation research, grounded in theoretical insights on the measurement of participation in learning activities: (1) focusing on the *overlap of learning categories* and conceptualising these categories as fuzzy categories, which enables research to preserve idea of three types of learning categories partially, and (2) utilising a *learning continuum*, i.e. measuring the level of formality/informality of learning activity, which would eventually lead to abandonment of triadic division of learning categories. Finally, we outline the main conclusions and offer suggestions for future conceptual debates and measurement improvements, for example, those that go beyond traditional survey research.

## 2. Previous conceptual debates on the triadic classification

Debates on distinctions between FAE, NFE and IFL recognise that the acquisition of knowledge and skills does not only take place within schools and this led to the formulation of distinct vocabulary to classify learning activities. It is claimed that the first use of the term 'non-formal' was stated in a post-second World War UNESCO report (Colley et al., 2003). The ongoing learning needs of adults to carry out their work requires additional training, often organised as part of people's jobs, outside the formal schooling system. Similarly, Faure et al. (1972) recognised the need to 'deformalise' learning and acknowledge that learning can take place in a wide variety of settings. Meanwhile, Coombs (1974, 1985) further developed the concept of NFE and argued that it tends to be organised to facilitate the tailored learning needs of specific target groups in an organised setting, although outside of the formalised school structure. Typically, NFE does not lead to officially recognised qualifications.

Throughout the years, scholars have studied and debated the usefulness of the triadic classification. Billett (2002) has been critical of the use of the term IFL when referring to the acquisition of skills at work. Given that workplaces tend to be structured and organised settings anyway, he encourages us to avoid labelling learning at the workplace as informal. Eraut (2004) also criticised the term 'informal' and discussed non-formal learning as something that is a pragmatic way to learn something new that is relevant for one's professional or personal life, organised outside the formal school context. Rogers (2014) asked for a reconceptualisation of NFE. He critiques the notion that 'formal is normal' and tends to be perceived as superior to other forms of learning. He used the term 'participatory education' to discuss learning activities that are contextualised towards the needs of the learners who are in control of their own learning process and who work towards the fulfilment of their own needs and intentions. This is thus different from formal education, which is organised in such a way that participants can work towards the completion of qualification routes. Rogers argued that learning does not sit within the boundaries of a well-defined triadic classification but tends to be situated on a continuum ranging from formal to informal or from decontextualised to contextualised settings. The idea of a 'continuous learning continuum' was also presented by Stern and Sommerlad (1999). They distinguished between 10 categories in between the two ends of 'formal' and 'informal' learning. The closest form of informal learning is unintentional and often a by-product of other life experiences. The authors state that at times, the adults might not even register that they have learned something new. This is in line with debates in the literature that say that much of what we learn is incidental (Turner, 2021). At the other end of the continuum, Stern and Sommerlad (1999) define formal education as organised learning activities that lead to a qualification. This continuum provides a nuanced reflection on the longstanding debate on whether IFL should be conceptualised as something that is intentional or unintentional. Hodkinson and Hodkinson (2001) undertook a deep investigation about the concept of IFL within the workplace and argued that while intentional learning tends to be planned and targeted towards a specific learning goal, unintentional learning happens through socialisation with colleagues and through learning by carrying out one's job tasks.

While various scholars have emphasised their own nuances within their debates on the triadic classification, there seems to be an agreement on its limitations and the need to refine these terms,

both for conceptual and analytical purposes. The peak of literature about these debates around the year 2000 remain relevant in today's context, especially in light of recent socio-technological changes. Suggested solutions mainly relate to (1) the acknowledgement of fuzzy boundaries between FAE, NFE and IFL and (2) the measurement of learning activities through a sliding scale instead of using a categorical approach.

### 2.1. Socio-technological changes and the growing overlap

Some of the key issues related to classifying all learning activities into one of the triadic categories have been exacerbated by socio-technological changes over the last two decades, which have transformed how adults acquire their skills (Chadha, 2017).

*The digital environment has evolved beyond a simple repository of information* (Web 1.0), where users engage with content through reading, listening, watching, or downloading learning materials – typical IFL practice. According to numerous scholars (e.g. Pangrazio et al., 2022; Poell et al., 2019; van Dijck & Poell, 2018), digital platforms such as LinkedIn, Coursera, Facebook and Spotify are transforming the way learning is curated and facilitated. These platforms personalise (select and organise) learning content, contributing to that Web 2.0 represents more organisational and institutional infrastructure similar to some features of NFE. Two pivotal mechanisms of platformization drive this transformation. Firstly, 'datafication' compiles vast datasets on user demographics, locations, timing and behaviour, which are then used to enhance the services and products linked to these platforms (Poell et al., 2019). Secondly, 'selection' governs user interaction by offering predetermined choices in both interface and content. Algorithms curate the content displayed to users, while interface source codes dictate possible user actions.

Furthermore, the *boundary between FAE and NFE has been increasingly problematic*. As governments have implemented more policy tools focused on the flexibility of learning pathways within FAE, including the recognition of prior learning (both NFE and IFL) and micro-credentials (OECD, 2021; Singh & Duvekot, 2013), the overlap between FAE and other types of learning activities has emerged. The CLA's assumption that *learning activities are 'static'* and cannot transition from one type to another is troublesome. For instance, IFL on acquiring basic knowledge about French cuisine through web browsing can easily evolve into targeted viewing of educational programmes on learning platforms from top French chefs (NFE), participating in a MOOC about the history of French cuisine provided by a university, and eventually earning micro-credits after signing up for a formal class on the subject (FAE). In this example, the learning activity over 2–3 months could overlap all three categories.

Finally, the notions of *institutional framework and location of learning have become a bigger issue* in delineating NFE and FAE from IFL. The rapid evolution of online learning in the adult learning space and the development of remote work following the COVID-19 pandemic have caused participation in learning activities to become less fixed to a particular place or a single provider (Herteis & Billett, 2023). These activities could occur across physical and online spaces, in various contexts and provided by various providers (Evans, 2023). In this regard, digital transformation has led to participation in learning activities that have been becoming increasingly decentralised and flexible, making it harder to categorise learning activities based solely on location or provider. This shift demands a more fluid and adaptable framework for classifying learning activities that can accommodate the changing nature of where and how learning occurs.

### 2.2. Triadic conceptualisation and research on participation

As already discussed above, the ongoing use of the triadic classification in survey programmes like the PIAAC and the AES is thus not in line with the intellectual consensus reached in the scholarly community. Furthermore, it faces challenges stemming from social changes that continually

reshape the characteristics of learning activities and their areas of overlap. This raises significant questions about the reliability and validity of the current statistical knowledge base on participation in adult learning activities.

According to Alexander (1982), all scientific debates occur along a continuum that runs from the metaphysical to the empirical environment. This continuum includes all components of science, such as general presuppositions, theoretical models, classifications, correlations, methodological assumptions and data from observations.

While the initial conceptual debates about the 'triadic' classification primarily focused on the general presuppositions, models and concepts regarding adult learning activities, the 'left' part of the scientific continuum, our focus is more on its 'right' part, closer to its empirical pole. We concentrate not only on the definitions and concepts of FAE, NFE and IFL but also on the operationalisation and methodological assumptions of adult learning activities used for empirical measurement within international surveys. With the exception of Rubenson (2019), this type of critique has not been *systematically* developed. His work examined the correspondence between the conceptualisation of learning activities and the items used for their measurement within the PIAAC 2012 and the AES 2011 surveys. Although he found that the AES explicitly included items to cover all three categories (FAE, NFE and IFL), whereas the PIAAC covered only NFE and FAE, his article primarily discussed the structuring of composite indices to broaden insights on lifelong learning in distinct countries instead of delving deeper into the formulation of survey questions to better align operationalisation and measurement with the conceptualisation of adult learning activities.

Our aim is to fill this gap in the literature. By building on the conceptual debates presented above, we seek to connect to some general presuppositions, theoretical models and concepts introduced in the 2000s that were not systematically utilised in the development of definitions, classifications and operationalisation of learning activities. This will be undertaken in two steps, each answering a distinct research question:

(1) To what extent do AES questionnaire items to measure participation map onto Eurostat's own conceptual framework to classify participation as FAE, NFE and IFL?
(2) What do alternative approaches to the measurement of participation in adult education and learning look like when underpinned by theoretically driven suggestions?

## 3. The EU conceptualisation: the Eurostat classification of learning activities

Following the Lisbon Summit in 2000, the EU introduced lifelong learning as a central social and economic investment strategy, considering it essential for transitioning towards knowledge-based societies (Holford & Milana, 2023). Concurrently, this initiative prompted a re-examination of what constitutes adult education and learning activities, particularly regarding defining and operationalising these activities for international comparative measurement. According to many scholars (Elfert & Ydesen, 2023; Evans, 2023), such a classification was necessary to establish an international field of adult education – i.e. standardising national adult learning systems to be measurable and comparable across uniform categories, as well as making them governable and amenable to data-based policy interventions (Elfert & Rubenson, 2023; Field et al., 2016, 2019).

Mainly, in response to the emerging complexities of adult learning and education beyond the school classroom and the expanding array of activities that facilitate skill formation and knowledge acquisition, Eurostat established its initial operationalisation of learning activities in 2006 with the release of the first *Classification of Learning Activities* – CLA (CLA, 2006). This classification emerged from a Eurostat project initiated in 2002, with contributions from the UNESCO Institute for Statistics and the International Labour Organisation. It was partly inspired by an earlier OECD initiative from the 1990s, which aimed to develop measures for adult literacy and education, culminating in the first international comparative survey on adult education participation – the IALS (Elfert & Ydesen, 2023).

Contrary to conceptual debates on the problematic use of the triadic classification, the CLA introduced the operationalisation of not only FAE but also NFE and IFL. Together, these three categories were intended to encompass the spectrum of phenomena recognised as learning activities – that is, all events that constitute measurable adult education and learning in which adults may participate. A subsequent, though largely superficial, revision of the Classification was made a decade later (CLA, 2016). The revised version introduced minor changes to align with UNESCO's International Standard Classification of Education (ISCED) from 2011 (UNESCO, 2012), focusing on the specification of various levels of FAE. However, the core delineation of the ontological properties of the three categories of learning remained almost the same as in 2006.

The foundational principle of the CLA was to encompass all forms of learning opportunities and educational pathways, *aiming to provide well-defined categories that excluded one another*. A key criterion for this delineation was the '*purposefulness/intentionality*' of learning activities (CLA, 2006 pp. 8 –9; CLA, 2016, pp. 9–10). Hence, the classification prioritised learning that is intentional, regardless of whether it involves acquiring skills, values, knowledge or behaviours. Consequently, all habitual, unintentional, accidental and tacit learning was deliberately excluded from this conceptual as well as analytical framework. As a result, this principle distinction formed what could be called a core of a strong scientific research programme in Imre Lakatos's (1978) sense within the field of adult education participation – i.e. outlined *what is* and *what is not* the main object of inquiry, inclusion and exclusion criteria.

Adult learning and education activities, therefore, were defined as 'any activity of an individual *organised to* improve his/her knowledge, skills, and competencies' (CLA, 2006, p. 9; 2016, p. 10; highlighted by authors). This definition underscores that the organisational aspect of learning activities is planned or structured with aims before the learning process begins.

Within the established conceptual framework of intentional and organised learning, the proposed classification delineates three primary categories: FAE, NFE and IFL, as stated in the guiding principle: '(. . .) it should be possible to classify all learning activities into one of these three broad categories' (CLA, 2006, p. 13; 2016, p. 14). These categories are described in greater detail in Table 1.

Table 2. presents the list of key constitutive features – ontological properties – of these three types of learning activities according to CLA, outlining their structural differences and the contexts within which they occur.

The delineation between the three types of adult education and learning hinges on two fundamental distinctions that structure the landscape of learning activities. The first distinction concerns the demarcation between IFL and NFE, primarily based on the *institutionalisation (A3) and organisation (A2) of the learning activity*. Learning is considered institutionalised when it is designed by an entity responsible for establishing essential aspects such as the teaching/learning methods, schedule and the location of the learning activities. These providers structure educational settings deliberately crafted for educational purposes, facilitating structured interactions such as student–teacher relationships and instructional settings (CLA, 2006, 2016). The second critical

**Table 1.** Education and learning activities in CLA framework.

| | |
|---|---|
| FAE | This category encompasses institutionalised learning activities that are part of structured hierarchical programmes. These programmes are characterised by a chronological succession of educational levels and grades, specific admission requirements, formal registration and recognition by the relevant national education authorities or their equivalents. Their completion is acknowledged through the attainment of qualifications at the ISCED level. |
| NFE | This includes institutionalised learning activities that also consist of structured hierarchical programmes but are not recognised by the relevant national education or equivalent authorities. This category covers a range of educational practices such as various courses, including seminars/workshops, private tuition, private lessons and guided on-the-job training. Although they are often much shorter than FAE, they are still systematically organised. NFE could have both job-related and non-job-related learning goals. |
| IFL | These activities are non-institutionalised and comprise a less structured set of single learning activities that can occur in various settings, including within the family, among friends, or at work. Common forms of IFL include coaching, informal tuition, both guided and non-guided visits, self-directed learning, learning groups and practice. |

Source: Adapted from (CLA, 2006, p. 13; 2016, pp. 14–15)

Table 2. Attributes of education and learning activities.

| Criterion | FAE | NFE | IFL |
|---|---|---|---|
| A1. Intention to learn | X | X | X |
| A2. Organisation | X | X | |
| A3. Institutional framework and location | X | X | |
| A4. Hierarchy level-grade structure ("ladder") | X | | |
| A5. Admission requirements | X | | |
| A6. Registration requirements | X | (X) | |
| A7. Teaching/learning methods (predetermined/not flexible) | X | X | (X) |
| A8. Duration of at least one semester (minimum of 30 ECTS) | X | | |
| A9. Recognition of the programme by the relevant national education or equivalent authorities | X | | |

Source: Adapted from (CLA, 2016, p. 16).

boundary lies between FAE and NFE. A programme falls under the category of FAE only if it is *recognised by the relevant national education authorities or their equivalents (A9)* – most frequently by a particular Ministry of Education or state accreditation body. This formal recognition not only validates the programme's educational structure but also integrates it within the broader regulated educational system. In other words, it lends state consecration to educational outcomes, which often follow a *hierarchical 'ladder' structure* (A4) in which levels of education build on each other. Furthermore, since 2016, it must have a *minimal duration of 30 ECTS, which equals one semester of study* (A8) (CLA, 2016).

In this form, the CLA has served as the conceptual basis for the AES since 2007 and other EU data collection efforts, such as the LFS and the CVTS. The LFS, in particular, was – and still is – directly utilised for governance purposes, as the main indicators of the Lisbon Strategy focus on the participation levels of adults aged 25–64 years in FAE and NFE. Since 2022, the reference period for participation has changed from 4 weeks to 12 months, although the measurement of participation remains founded in the triadic classification, referring to the FAE and NFE components only.

## 4. CLA and its measurement within the AES

To address the first research question (RQ1), we analysed the AES (2022) questionnaire and systematically mapped its questions to the nine attributes (A1–A9) outlined by the CLA (2016) for distinguishing FAE, NFE and IFL, as discussed earlier.

Respondents of the AES are asked questions to collect data on participation in a range of education and training activities. The international codebook's section 1.4 on Participation in Education and Training hosts subsection 1.4.1 Formal Education and 1.4.2 Non-formal Education and Training. Section 1.4 is followed by Section 1.5 on Obstacles and then goes over in Section 1.6 on Informal Learning. The collection of information on IFL is thus not part of the Participation section. This is in line with European benchmarking, which is done for FAE and NFE and training only (see above).

Table 3. Attributes of learning activities as found in the AES (2022) questionnaire.

| Criterion | FAE | NFE | IFL |
|---|---|---|---|
| A1. Intention to learn | (X) | (X) | X |
| A2. Organisation | X | X | (X) |
| A3. Institutional framework and location | X | X | (X) |
| A4. Hierarchy level-grade structure ("ladder") | X | | |
| A5. Admission requirements | | | |
| A6. Registration requirements | | | |
| A7. Teaching/learning methods (predetermined/not flexible) | X | X | (X) |
| A8. Duration of at least one semester (minimum of 30 ECTS) | | | |
| A9. Recognition of the programme by the relevant national education or equivalent authorities | X | (X) | |

We have scrutinised each section of the questionnaire. Table 3 indicates information in accordance with the ontological properties for each of the three learning activities.

The core question for FAE was designed as follows: *During the last 12 months, that is since <<month, year>> have you participated (as a student or apprentice) in formal education or training (<any of the following formal education or training programmes>)?* The AES manual stipulates that participation in FAE should only be registered in case the adult actively engages with the learning activity. Registration only does not count towards participation as it needs to be a conscious and intentional act. The AES thus aims to target intentional learning (A1). However, items on 'reasons for participation', that follow-on from the participation question, contain an option for respondents to indicate that they were 'obliged' to participate. For those who tick this option, it might indicate that their learning is in fact not that intentional.

Several follow-up questions for participants collect information on whether learning takes place during working hours and whether delivery takes place online or in person. There is thus a clear indication that the learning activity is organised (A2) and sits within an institutional framework and location (A3). Participants are also asked to indicate the field of study and ISCED level of the course. This information relates to the ontological property of FAE being constructed as a hierarchical ladder (A4). The AES manual is specific on the need for FAE to be credential-based, which is in line with the CLA. Questions about teaching and learning methods in the AES (2022) are sparse although there are questions on the use of online learning environments to share teaching materials or to facilitate interactions with course tutors and fellow learners (A7). Information about participation in FAE does not contain explicit information on admission (A5) or registration (A6) requirements. However, non-participants can indicate whether they lacked the prerequisites to enrol. While this provides us with some information on admission requirements, it is insufficient to know whether participants needed to comply with certain admission or registration requirements to start the learning activity. While the AES (2022) manual clearly indicates that the FAE intervention needs to be at least the equivalent of one Semester 30 ECTS (A8) to qualify for participation, it is hard to judge how accurate this information truly is. The variable FEDNBHOURS contains information on the total number of instruction hours in the last 12 months.

NFE refers to '*Activities in which the respondent participated during the last 12 months with the intention to improve knowledge or skills in any area (including hobbies) either during leisure time or working time*'. The AES (2022) collects information about four types of NFE: '*(1) courses at the workplace or in your free time, (2) workshops or seminars at the workplace or in your free time, (3) guided on-the-job training, i.e. planned periods of training, instruction or practical experience, using normal tools of work, either at the immediate place of work or in a work-situation, with the presence of a tutor, private lessons with the aid of a teacher or tutor for whom this is a paid activity*'. The intentionality (A1) of the learning activity is clearly spelled out in the formulation of the question. However, as with participation in FAE, participants have the option to indicate that their participation was not voluntary but *'required by the employer or prospective employer or by law'*. For example, in some countries, adults on job-seeker allowances might be asked by the Public Employment Service to participate in training if they want to keep their social and financial support during employment. The subsection on NFE hosts additional information on who initiated the participation in training. Here, it is possible that respondents indicate that they were obliged by their employer, prospective employer or the Public Employment Service. This variable thus contains additional clues on whether learning is truly intentional from the point of view of the participant.

While NFE typically sits outside the official qualification structures, the AES (2022) contains information on whether participation leads to a certificate (A9). However, there is no further information to validate whether potential certification sits within nationally recognised qualification structures. This is different from FAE, where information is collected on the relevant ISCED level. Like the previous subsection on FAE, the questionnaire contains items on whether learning activities took place during or outside working hours and whether instruction took place online or in person. This provides us with information on the organisational (A2) and locational (A3)

components of the learning activities. Data on admission (A5) and registration (A6) requirements are also not present, although adults can again indicate that not meeting the 'prerequisites' prevented them from undertaking a learning activity.

The section on IFL collects information on five different learning activities: *(1) Learning from a family member, a friend or a colleague, (2) Learning by using printed material (books, professional magazines, etc.), (3) Learning by using electronic devices (online or offline), (4) Learning by guided tours in museums, historical or natural or industrial sites, (5) Learning by visiting learning centres (including libraries)*. The instruction for the five learning activities reads as follows: *'During the past 12 months, have you deliberately tried to learn anything on a particular topic or area, or are you currently doing it'*. From the formulation of this question, it is clear from the wording that AES conceptualises informal learning as something that is intentional (A1), in line with the CLA. Some of the activities hint towards learning that is organised (A2) or takes place in institutional settings (A3), especially the option on guided tours. In some cases, this might be carried out through predetermined learning methods (A7).

### 4.1. Critique of the AES (2022) operationalisation

Our mapping indicated that there are some inconsistencies between the triadic classification of learning activities as stipulated in CLA (2016) and how these have been operationalised within the AES (2022). First, the assumption that the AES captures intentional learning activities (A1) is not watertight, given that participants can reveal that they were in fact obliged to participate. While being obliged does not necessarily mean that there is no learning intention at all, but it needs to be treated with caution and optimally measured differently. The AES (2022) also has limited data on admission (A5) and registration (A6) criteria. While 'not meeting the prerequisites' is listed as an obstacle for non-participation, we do not get to see learners' enrolment process into the learning activities. Although we can match adults' highest ISCED level to their current participation characteristics, this is not a sufficiently valid measurement for these ontological properties. It is also difficult to do a reality check on whether formal courses were equivalent to 30 ECTS (A8). While there is some information on timing and instruction hours, again, it needs to be interpreted with caution. With regards to NFE, the AES (2022) collects data on certification (A9). In line with the ontological properties of NFE, it is unclear whether a potential certificate has any recognised value among educational or equivalent authorities. This might be the case or not. As already discussed above, learners' journeys can move between categories. Adults who engage with NFE or IFL might take part in assessment and validation procedures later to formalise their newly learned knowledge and skills. This information is also lacking in the AES. In line with the CLA's conceptualisation, IFL in the AES is defined as intentional (A1). However, some of the activities, for example, guided tours in a museum, also indicate that learning could potentially take place in an organised setting (A2) at an institutional location (A3). It might also be the case that the pedagogical format (A7) of such tours is in fact already predetermined at the start.

## 5. Two theoretically informed alternative scenarios

Based on our previous critique of the CLA's conceptualisation and operationalisation in the AES (2022), we argue that all three categories of learning possess overlapping attributes. As noted at the end of Section 2, this overlap has increased due to socio-technological changes affecting adult learning and education provision since the 2000s, including digitalisation, restructuring of work-place practices, and the implementation of new policy tools, such as recognition of prior learning and micro-credentials, focused on the flexibilization of FAE but also the 'formalisation' of typical NFE pathways. Our analysis of the AES (2022) operationalisation of learning activities (see Section 3) supports this argument. *The items included in the questionnaire fail to capture all key constitutive features of learning activities, making it difficult to classify them unproblematically under*

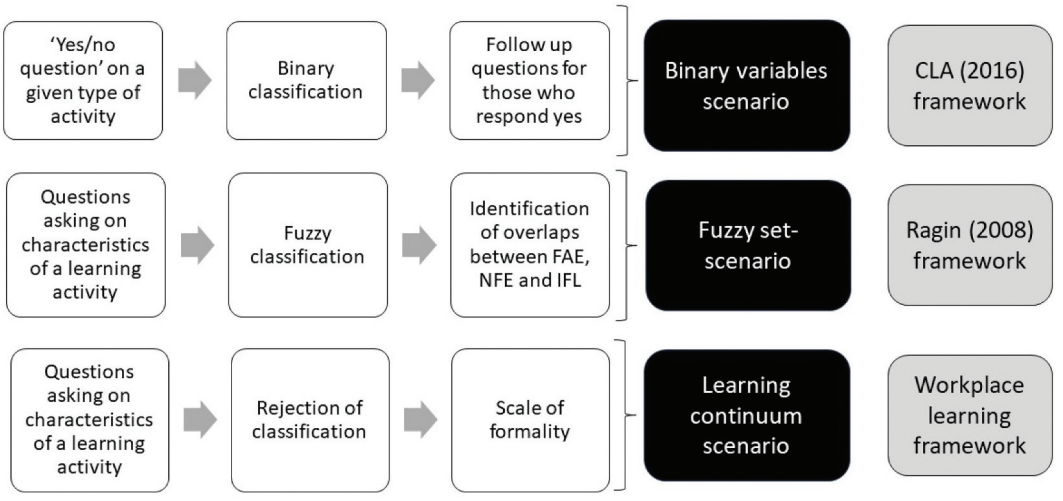


Figure 1. Difference in operationalisation of learning activities between the current approach and alternative scenarios.

*one of the proposed types*. Additionally, the questionnaire commentary in the Eurostat User Manual (AES Manual, 2023) acknowledges the potential ambiguity of these three categories.

To improve measurement quality, we propose two potential alternative scenarios that offer new strategies for operationalising and measuring these concepts, aligning with critiques from the initial conceptual debate on the 'triadic' classification (see Figure 1) offered earlier on in this paper. The first scenario acknowledges the overlap of learning categories, conceptualising them as fuzzy, and tries to find a better approach towards categorisation. We apply the problem of fuzziness in measuring adult learning to theoretical developments in the area of fuzzy-set methodology formulated by Charles Ragin. The second scenario utilises a continuum of a formal and informal learning environment in line with critique offered by Rogers (2014) and Stern and Sommerlad (1999), arguing for measuring the scale of formality of the learning activity, in which participants engage, and as an outcome leads to abandonment of categorical thinking about learning activities. A schematic representation of the current and two alternative approaches can be found in Figure 1.

### 5.1. Fuzzy set approach to the overlap of FAE, NFE and IFL

Drawing on the CLA's (2016) conceptualisation of learning activities as a foundational theoretical framework – while recognising their non-binary nature and inherent overlap in line with previous critique offered by – among others – Colley et al. (2003), Desjardins (2011), Evans (2023)—we propose a novel scenario for their *re-operationalisation*. This approach builds on the work of Charles Ragin (2000, 2008, 2023), who pioneered the use of fuzzy-set methodology and analytical induction to address ambiguous social phenomena. Although this approach was originally developed for qualitative comparative research, it has also been successfully utilised for redesigning quantitative research on inequality (Ragin, 2023; Ragin & Fiss, 2017). We will use it to propose a new measurement design for learning activities.

Based on their attributes (A1–A9), defined by CLA (e.g. key features such as the degree of external organisation, uniformity of learning location, or registration requirements – see Tables 2 and 4), learning activities could exhibit varying degrees of membership in FAE, NFE and IFL. To determine the degree of membership (or overlap), the first analytical step involves defining the relevant set in relation to the research question – in this case, participation in various adult learning activities. The next step is to delineate the key constitutive properties of membership within the set of interest. For our analysis, these are the primary features characterising specific learning activities,

Table 4. Attributes for identifying membership in learning activities.

| Set I. Overlap between FAE and NFE | | Set II. Overlap between NFE and IFL | | Set III. Overlap between intentional IFL and non-intentional IFL | |
|---|---|---|---|---|---|
| Attribute of learning activity | Degree of membership | Attribute of learning activity | Degree of membership | Attribute of learning activity | Degree of membership |
| A4. Hierarchy level-grade structure ("ladder") | 1–0 | A2. Organisation | 1–0 | A1. Intention to learn | 1–0 |
| A5. Admission requirements | 1–0 | A3. Institutional framework and location | 1–0 | | |
| A6. Registration requirements | 1–0 | A7. Teaching/learning methods (predetermined/not flexible) | 1–0 | | |
| A8. Duration of at least one semester (minimum of 30 ECTS) | 1–0 | | | | |
| A9. Recognition of the programme by the relevant national education or equivalent authorities | 1–0 | | | | |

such as the nine ontological properties identified by the CLA. Subsequently, membership scores for each constitutive characteristic in each set of learning activities are assigned, ranging from 0.0 (non-membership) to 1.0 (full-membership), with scores between 0.0 and 1.0 indicating partial membership.

These scores are based on what Ragin (2008, 2023) calls the *calibration method*, which involves determining the criteria for assigning fuzzy membership scores. The calibration process translates raw data from questionnaire items into meaningful fuzzy scores that reflect the degree of membership in the set (in our case, membership within one of the three adult learning activities). Based on these scores, a *truth table* can be constructed listing all possible combinations (in our case, combination and recombination of various features of adult learning activities where FAE, NFE and IFL overlap). Based on empirical data could be then constructed empirically observed fuzzy categories (our fuzzy adult learning activities).

In more detail, we argue that we should construct overall rates of participation not based on questions that measure particular types of learning activities (FAE, NFE, IFL) by asking directly about participation in such an activity in a binary 'yes/no' way, as for example, the AES used to – e.g. whether a respondent participated in the last 12 months in NFE in the form of a workshop, seminar, training course, guided-on-the-job training or private lesson (see Figure 1). Instead, we should enhance measurement by asking respondents about attributes of this learning activity at first. If we follow the attributes stated by the CLA (2016), this means we would operationalise and measure nine key characteristics (see Table 2) of the learning activities in which respondents engaged and asked respondents about them.

Based on these variables, and following the principles of fuzzy-set logic (Ragin, 2008, 2023), we can determine the degree of membership corresponding to FAE, NFE and IFL (see Figure 1). In Table 4, we propose the basic logic of this endeavour by reorganising the CLA's attributes of learning activities into *three sets* based on characteristics where FAE, NFE and IFL could overlap. The first set includes characteristics of overlap between FAE and NFE. By calculating the degree of membership within these attributes, we can determine the extent to which an activity is FAE versus NFE. A similar logic is applied to the three attributes that distinguish between NFE and IFL (see Set II. in Table 4), allowing us to assess how much a specific activity is NFE versus IFL. Finally, the last set (Set III.) is used for measuring fuzzy boundaries between the intention to learn and inclusion in learning activities, and non-intentional learning activities. In the theoretical scenario, if respondents

score 1.0 for all nine items, they participate in 100% FAE; if they score 0.0, they participate in non-intentional IFL activity that is out of the scope of the CLA.

Based on this approach to operationalisation, it is possible to design specific questions and related variants of answers that enable the measurement of these nine attributes and then perform a 'calibration analysis', which converts raw data values for every item to a scale ranging from 0.0 to 1.0. During calibration analysis, for example, the degree of external organisation of a learning activity, which covers overlap between NFE and IFL (see Table 3), could be measured within the questionnaire by four types of answers: (a) fully organised by an external provider (e.g. an educational organisation, employer, civic organisation), (b) partially organised by an external provider (e.g. part of the training is provided by an educational company, employer or civic organisation, and part is realised by the adult without any mentoring or leading), (c) self-realised learning activity within an organised framework (e.g. within an online platform like Coursera, LinkedIn) and (d) self-realised learning activity without any pre-structured environment (e.g. intentional reading from a book at home).

These variables are then converted to scale values ranging from 0.0 to 1.0. This procedure, according to Ragin (2008, 2023), should be guided not by mathematical linearity but by theoretical sensitivity (substantial or case knowledge) and is thus built on a theoretical understanding of the meaning of various answers. For example, response "(a)" could be classified as 1.0 (full membership within the category of NFE), response "(b)" as 0.5 (ambiguous membership within the category of NFE), response "(c)" as 0.3 (somewhat outside membership of NFE, i.e. mostly IFL) and response "(d)" as 0.0 (non-membership in the category of NFE, i.e. IFL).[1]

Finally, based on empirical data, we could construct what Ragin (2000, 2008) calls 'truth tables' – a set of possible combinations and re-combinations of various degrees of membership within learning activities based on its measured properties. This procedure eliminates empirically non-existent combinations of types of learning activities, leaving only those with an empirical referent. For these, we can calculate participation rates, encompassing not only the classical trio of FAE, NFE and IFL but also various mixed types between FAE and NFE, NFE and IFL that correspond better to the actual empirical landscape of adult learning and education.

Such an analytical approach would not result in the abandonment of 'pure' forms of traditional learning activities. Instead, it would add nuance to how these activities are measured, enabling a clearer assessment of the extent to which they overlap.

### 5.2. Learning continuum approach

The second alternative scenario draws from the initial debate on the triadic conceptualisation and extensive empirical research in workplace learning that abandoned the 'triadic' model in favour of a relational understanding of learning activity, where this activity is always situated along a continuum, with formal settings at one pole and informal settings at the other (Billett, 2002; Rogers, 2014). Following this critique, many authors (Billett, 2002; Baert, 2018, Rogers, 2014; Segers et al., 2018; Stern & Sommerlad, 1999) began to conceptualise and measure within the field of workplace learning activities as encompassing various levels of institutionalisation and organisation, instead of being categorised under one of the exclusive types of learning activities.

Building on this argument, there is no need to categorise learning activities into types such as FAE, NFE and IFL. Instead, the learning environment should be assessed through a 'sliding scale of formality' (Baert, 2018, p. 159) encompassing various dimensions. To illustrate this strategy for operationalising learning activities, we employed the theoretical framework developed by Segers et al. (2018), which draws on informal learning theories, including Eraut's (2004), which has been discussed in Section 2 above. Within this framework, the continuum of the learning environment can be conceptualised across five key features, each exhibiting varying degrees of formality:

Table 5. Hypothetical example of comparative analysis based on the scale of formality.

| The level of formality | Country X | Country Y | Country Z |
|---|---|---|---|
| Percentage of participants of lifelong learning with a very low level of formality (average score 1.0–2.0 on a 5-point Likert scale) | 25 | 20 | 10 |
| Percentage of participants of lifelong learning with a low to medium level of formality (average score 2.1–3.0 on a 5-point Likert scale) | 15 | 10 | 15 |
| Percentage of participants of lifelong learning with a medium to a high level of formality (average score 3.1–4.0 on a 5-point Likert scale) | 5 | 5 | 15 |
| Percentage of participants of lifelong learning with a very high level of formality (4.1–5.0 on a 5-point Likert scale) | 5 | 15 | 10 |

(1) a high degree of structure vs. a low degree of structure of learning activity,
(2) external validation vs. no external validation of learning activity,
(3) classroom setting vs. natural setting of learning activity,
(4) trainer-controlled vs. learner-controlled,
(5) external stimulus vs. internal stimulus.

The closer the characteristics of a learning environment are to a high degree of structure, external validation, classroom setting, trainer control and external stimulus, the closer they are to highly formal learning activity. Conversely, the more they exhibit the opposite attributes, the closer they are to informal learning.

The operationalisation strategy in such a scenario would be to measure learning activity through the relative grade of formality (see Figure 1). For this purpose, key attributes of the learning environment – such as those introduced by Segers et al. (2018) or alternatively some of ontological properties introduced by CLA discussed through the paper – could be measured by questionnaire items using a traditional Likert scale (e.g. 1–5 or 1–10 scale) that followed the logic of continuum, where 1 equals the lowest level of formality, while 5 or 10 the highest level of formality. Based on these items, we could calculate both (1) the level of formality within various features of the learning activity (e.g. degree of trainer control) and (2) the overall level of formality of a particular adult education and learning activity, in which adult participated, as an average of the items used for measuring all features of the activity. In the next step, we could calculate the participation levels within these empirical categories – i.e. how many adults participate in learning activities with a low- or high-level formality, based on particular intervals on a Likert scale. On the one hand, this strategy would surpass the traditional triadic division and enable us to compare countries based on the overall level of formality of learning activities.

A hypothetical analysis of participation rates across different countries is presented in Table 5. This example illustrates that while all three countries exhibit a similar overall participation rate of 50%, there is significant variation in the level of formality. These differences result in distinctly unique models of lifelong learning within each country. These rates for a level of formality could be constructed based on a normal distribution of data or advanced cluster analysis.

## 6. Conclusion

Our critique of the current use of the 'triadic' model in the field of adult learning and education for international comparative research on participation highlights that scientific work on the 'left' side of Alexander's (1982) scientific continuum requires more effort. Concepts as featured within CLA have become increasingly problematic due to recent socio-technological changes. Our mapping of the nine CLA attributes (A1–A9) against survey questions in AES (2022) showed that the operationalisation of CLA has been inconsistent. This is our answer to Research Question 1.

To address the risk of data contamination (Gray, 2018) and the reification (Beck, 2002; Bourdieu & Wacquant, 1992) of the triadic conceptualisation and to seriously tackle the challenge of

measuring participation in adult education and learning activities, we proposed two alternative theory-driven scenarios to traditional binary-variables oriented approach to measurement of participation to enhance the repertoire of inquiry strategies within the field of comparative adult education research. Developing and presenting potential solutions to the current measurement limitations was the focus of Research Question 2.

The first alternative scenario, influenced by Ragin's theoretical insights, suggested adopting a fuzzy-set approach to address the overlap between learning categories. This involves recognising that learning activities can possess varying degrees of membership in the FAE, NFE and IFL categories. By utilising the analytical steps of the fuzzy-set approach, we can measure 'in-between' adult learning activities that are characterised by mixed membership in FAE and NFE or NFE and IFL.

The second scenario advocates for a shift from categorising learning activities to measuring their degree of formality, underpinned by theoretical development and measurement applications within the literature on workplace learning. This continuum approach reflects the relational nature of learning activities, capturing the varying levels of institutionalisation and organisation. By focusing on the degree of formality/informality, we can better understand the diverse learning experiences of adults in contemporary settings.

To critically evaluate both proposed scenarios, it is essential to acknowledge their potential limitations. Regarding the fuzzy-set solution, the extent of empirical overlap between the three categories remains uncertain, as does the degree to which this innovation would improve measurement. To ascertain the potential of this approach to enhance measurement capabilities, carefully designed survey experiments should be conducted. These experiments would allow us to compare findings derived from a traditional binary variable-oriented framework with those obtained using a fuzzy-set framework.

The 'learning continuum' solution presents a different challenge: it risks disconnecting empirical research from its direct alignment with established concepts widely used in adult education policy-making, such as the formal education system. Given that large-scale surveys were initially introduced to standardise national adult learning systems (Elfert & Rubenson, 2023), making them measurable and comparable across uniform (binary) categories, this disconnection could prove significant.

However, our proposed solutions, driven by scientific rather than policy-making imperatives, do not seek to reinforce such uniformity. Instead, they aim to introduce greater complexity and heterogeneity – objectives that align more closely with the overarching goals of scientific exploration and innovation, and that are expected to be a closer fit with real-world situations. Improving our understanding on these issues calls for more survey experiments in the field to validate these proposed scenarios and test the validity and reliability of these operationalisation strategies. Additionally, enhancing data infrastructures that can track administrative data and provide more 'real-life' insights into adult learning trajectories is essential too. This is crucial to combine sample-based survey data with information of what is happening on the ground.

## Note

1. Alternatively, some proponents of cluster analysis and inductive-oriented research in social science (Uprichard, 2009) propose constructing types based solely on these variables at this step. By using a type of cluster analysis, such as multiple correspondence analysis, it is possible to develop N-clusters solution that represents empirically observed learning categories, including various combinations and re-combinations of their key constitutive features.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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