

Future-Proofing Skills – Skills mismatch and skills devaluation among young adults in Portugal

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Executive summary

Based on an in-depth analysis of data from the International Adult Skills Assessment Programme (PIAAC), and combining this analysis with qualitative empirical insights, the project “Future-Proofing Skills – Skills mismatch and skills devaluation among young adults in Portugal” studied the relationships between age, proficiency levels and the use of skills with the aim of identifying and characterising factors that (dis)favor the acquisition, maintenance and development of essential cognitive skills throughout the adult life cycle. The study examined the conditions, contexts and types of use associated with the different levels of proficiency observed, with a particular focus on identifying factors that favour and hinder proficiency and on identifying social groups in situations of greater disadvantage; it also sought to quantify some of the impacts in terms of labour market integration, employability and other economic and social outcomes, of the differentiated possession and use of those skills. The project also included the identification and analysis of examples of leading international policies, programmes and practices aimed at addressing the causes and effects of misalignments and the ways in which adults’ skills become obsolete, with the aim of supporting the formulation of recommendations for the design, in Portugal, of more effective public policies in this field.

Recommendations

- Design of programmes to promote the development and use of essential cognitive skills (notably literacy and numeracy), integrated into the daily professional and non-professional lives of adults;
- Funding and development of public, open and free digital platforms that enable the autonomous and incremental training of these skills, especially in domestic contexts;
- Creation of specific funds to support non-formal education activities across the country, targeting different audiences;
- Support for the development of micro-credentialing and skills auditing systems within employing organisations;
- Encouraging the design of specific programmes for accelerated technical and professional reskilling, as well as the promotion of digital skills (to address the challenges posed by AI);
- Promotion of active outreach strategies, targeting, in particular, socially disadvantaged groups;
- Promotion of programmes for re-entry into academic pathways or continuing education programmes closely linked to the professional practice of adults.

Target audience

Ministry of Education and Science; Institute for Employment and Vocational Training (IEFP); public administration bodies in the field of adult education and training; Municipalities, Inter-municipal Communities and Metropolitan Areas; training providers and stakeholders in the education and training system; coordinators, training managers and trainers; employer organisations and their representatives; trade unions and professional organisations; associations and other bodies promoting non-formal education..



Introduction and Problem Statement

The data resulting from the 2nd Cycle of the Programme for the International Assessment of Adult Competencies (PIAAC), a large-scale longitudinal study promoted by the Organisation for Economic Co-operation and Development (OECD) in 31 countries, including Portugal, provide valuable insights into the levels and uses of the skills possessed by adult in these countries.

In the case of Portugal, a key finding emerging from the results of this international study on literacy, numeracy and adaptive problem-solving skills is that younger adults (i.e. those aged between 16 and 24) are those who demonstrate the highest levels of proficiency. Indeed, in a context that is rather unfavourable for Portugal – the country's average proficiency levels in the three domains assessed are significantly lower than the OECD averages – it is young adults who demonstrate the highest proficiency, reaching levels significantly higher than the national average. In Portugal, the adult population scores, on average, on a scale of 0 to 500 points, 235 points in literacy, 238 points in numeracy and 233 points in adaptive problem-solving; whereas young adults (aged 16-24) score, on average, 258 points in literacy, 257 points in numeracy and 252 points in adaptive problem-solving (OECD, 2024a).

The proficiency gaps in favour of young people suggest a trend consistent with that indicated by the results of assessments carried out in schools (notably through PISA), providing useful information on the evolution of the quality of the education system in Portugal. Indeed, the skill gaps between older and younger adults may, in theory, reflect effects associated with ageing and the cognitive decline often linked to it, but they will inevitably reflect above all the differences – also favouring younger adults – in the quantity and quality of education and training across the different generations (OECD, 2024a; Figure 1).

An equally relevant finding in the Portuguese case, which represents a discrepancy not only with the typical pattern revealed by most OECD countries in the second wave of PIAAC, but also with the identical trend observed in most countries that participated in the first cycle of the study (in which Portugal was not represented), concerns the decline in skills observed immediately after the age of 24

(OECD, 2013; 2024a). Whilst, on average across the OECD, proficiency levels are maintained beyond the 16-24 age group – with several countries seeing adults reach a 'peak' in proficiency in the 25–34 age group, followed only then by a gradual decline in skills – in the case of Portugal, there is a decline in skills immediately after the age of 24, which signifies the very early emergence in our country of a divergent trend compared to the typical situation in other OECD countries regarding the extent and maintenance of cognitive and metacognitive skills considered essential for social and economic participation suited to the challenges of today's societies (OECD, 2013, 2024a). The fact that Portugal did not complete its participation in the first cycle of PIAAC – thus lacking data suitable for longitudinal analysis – prevents a more in-depth consideration of this issue in the Portuguese context. Nevertheless, the research with data coming from the first cycle of this OECD study offered this project a set of perspectives and working hypotheses, already tested across all participating countries and in specific national contexts, which suggested significant findings regarding the causes and implications of skills depreciation processes and the ways in which their progression might be slowed, mitigated or even reversed.

In particular, the Project sought to explore the presence of 'cohort effects' in the acquisition and maintenance of skills across different groups. As studies based on or supported by PIAAC data attest, beyond chronological age and the process of cognitive decline associated with ageing, there are significant differences in proficiency between groups of people born at different times that can be attributed to exposure to distinct social, cultural, technological and professional contexts and, in particular, to participation in educational contexts that vary greatly in terms of the quantity and quality of education and training received, aspects that are decisive in determining proficiency levels at younger ages and, therefore, in delaying the effects of age on the loss of cognitive skills (see, for example, Desjardins & Warnke, 2012; Barrett & Riddell, 2016, 2019).

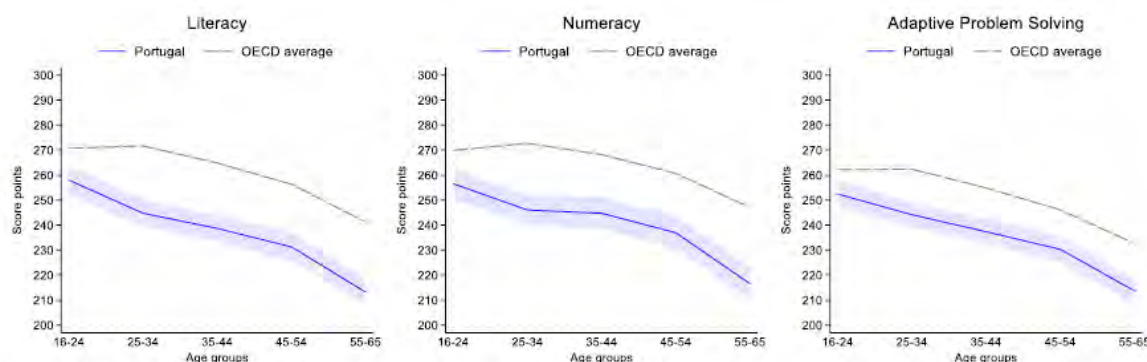
Defining this analytical framework makes it possible to explore hypotheses regarding the

implications of the recent rise in educational attainment, highlighting, in particular, its impact on younger generations and the possible improvement observed in the quality of the education and training system, as well as the potential significance of possessing a higher initial skill capital in fostering a greater capacity to adapt to changes and new demands and greater resilience in the face of skill depreciation processes. The study of this issue also allows for an assessment of the internal differentiation of cohorts in terms of proficiency, a phenomenon that may be related to the quality of education received, but also to learning that takes place both before and after formal education (see, for example, Calero, Huertas & Bara, 2019).

This latter aspect is closely linked to the fundamental tenets of the so-called ‘use theory’ (or ‘use-it-or-lose-it’ hypothesis), according to which the depreciation of skills is a function, at least in part, of their insufficient or non-existent mobilisation. Whilst it is true that the quantity and quality of initial training received is a determining factor in the level of proficiency and the potential capacity to mobilise the skills acquired throughout life and in different contexts, what the ‘use theory’ (or ‘engagement in practice’ theory) proposes is that the lack of opportunities and effective conditions for the application and development of skills can lead to their stagnation or loss (see, for example, Reder, Gauly & Lechner, 2020; Levels & van der Velden, 2023; Hanushek, Kinne, Witthöft & Woessmann, 2025).

Individuals working in unstimulating environments, for example, run the risk of losing skills, which may exacerbate the mismatch between the skills they possess and those required by a constantly evolving labour market. The depreciation of skills – due to a lack of contexts in which they can be effectively utilised both at work and outside it – may also affect adults’ opportunities for full social participation, by reducing their ability to access information and resources, their problem-solving skills, or their confidence and capacity to, for example, monitor and support their children’s education. In this project, it was possible to study this topic for the first time in the Portuguese context, identifying risk factors and protective factors regarding the preservation and development of skills among young adults. The analysis carried out has obvious social and political relevance, particularly as it enables the identification of the contexts and activities most likely to favour the maintenance and development of skills, both in the workplace and in the personal sphere. The use of PIAAC data, supplemented by other sources of information, proves decisive in this regard, since that study not only measures proficiency levels but also collects extensive data on social and professional conditions and on the use of skills at work and at home, thereby enabling the testing of hypotheses regarding the relationship between use and the respective maintenance or development of skills (for different age groups and considering different contexts, types and intensities of use).

Figure 1 – Average proficiency of adults in literacy, numeracy and adaptive problem-solving (in Portugal and the OECD, on average), by age group



Source: OCDE (2024b).

Analysis / Key Findings

The following elements stand out from the Project's results, presented with reference to the two main axes of the research.

Axis 1: Analysis of skills profiles and the extent and characteristics of (mis)alignments and skills depreciation among (young) adults in Portugal

From the vast set of results produced as part of the statistical analysis carried out within the Project using PIAAC data, highlighted here, due to their centrality and relevance, are the results of the exercises aimed at producing multiple linear regression models to assess the relations between proficiency levels, the degree of skills use, and key sociodemographic characteristics of adults residing in Portugal. The results refer to the numeracy proficiency scale, due to its robustness (and considering the significant collinearity with literacy skills). All analyses were carried out following the OECD's technical recommendations and best practices regarding the use of PIAAC data, including the use in calculations of the ten plausible values and the 52 replicate weights provided with the Survey of Adult Skills database for Portugal (see OECD, 2024c, 2025).

Initially, a multiple linear regression model was produced considering only sociodemographic variables (without including variables relating to skill use indexes). The results obtained are robust: the model explains around 40% of the variance in numeracy proficiency ($R^2 = 0.3999$). In summary, what the results primarily highlight is the relevance of one's own level of education. This is, in fact, according to the proposed model, the factor that most clearly determines proficiency: compared to those with schooling up to the 2nd Cycle of Basic Education (up to six years of schooling), individuals with higher education (fifteen or more years of schooling) score, on average, 69 points higher on the numeracy scale, a result with robust statistical significance ($p < 0.001$). Compared with those with the lowest level of education, those with upper secondary education and lower secondary education also show significant gains in proficiency (49 and 32 points more, respectively).

Parents' education also has a significant influence: having at least one parent with higher

education results in an average proficiency gain of around 16 points, compared to when parents have less than secondary education (even when controlling for the individual's own educational attainment). Still on the subject of family origins and background, it is worth noting that the parents' migration status is also a statistically significant factor, with average gains in numeracy proficiency of approximately 16 and 19 points, respectively, when one or both parents were born in the country, compared to cases where both parents were born outside Portugal.

Although to a slightly lesser extent, gender also proves significant, with women showing an average disadvantage of 11 points in numeracy proficiency.

Regarding employment status, being outside the labour market implies a marginally significant decrease of 9 points; professional qualifications, in turn, prove to be quite important, with an average reduction of 13, 15 and 18 points, respectively, in the case of semi-skilled 'white-collar' occupations, semiskilled 'blue-collar' occupations and elementary occupations (compared to skilled occupations).

Finally – and this is a particularly relevant point in the context of the questions raised by this Project – having taken part in non-formal education activities in the 12 months prior to the survey represents a statistically significant average gain of around 14 points on the numeracy proficiency scale. Age, in itself, does not show statistically significant associations with proficiency levels, after controlling for the other variables, which suggests that its apparent effects actually stem from factors associated with cultural capital (both personal and inherited, measured here by educational attainment and parents' educational attainment, but also by recent educational participation in non-formal education initiatives) and socio-economic status (closely linked to employment status and the level of qualification of the occupation held).

What is observed for age also holds true for other basic sociodemographic variables, such as country of birth or language.

When the indexes referring to the use of numeracy and mathematical skills included in

the PIAAC databases – based on responses collected on this matter in the Survey of Adult Skills (use of these skills at home and at work) – are introduced into the model, the model's explanatory power improves by around 2% ($R^2=0.4175$), even taking into account the reduction in sample size.

In this model, which maintains strong robustness of results, it is found that the use of numeracy/mathematical skills in the domestic context emerges as a significant predictor of numeracy proficiency: for every additional point this index records (that is, as usage intensifies and the mathematical competence employed becomes more complex), expected numeracy proficiency increases by around 5 points. The use of calculation/mathematical skills at work is also statistically significant ($p=0.034$), but the weight of the use of these skills in this context is lower: an increase of 3.4 points in numeracy proficiency for every additional unit recorded by the usage index.

These results suggest that the hypothesis that engagement in such practices promotes proficiency is correct: according to the data obtained, the daily use of mathematical skills, particularly outside the professional environment but also within it, is associated with higher levels of proficiency. In this model, the coefficients of the sociodemographic variables used undergo minor changes, but retain the same direction and overall significance, which means that usage does not eliminate or diminishes the relevance of the social characteristics of the agents; rather, results demonstrate that daily engagement in activities that promote the use of skills explains an (additional) part of the variation in proficiency.

Despite occasional fluctuations in the coefficients between the two models, the substantive conclusions of the analysis are statistically robust: educational attainment, professional qualifications, the educational attainment of parents, gender and participation in non-formal education are relevant factors in determining numeracy proficiency; and taking into account indexes of skills use in this domain explains a further portion of the variance, even when those variables are controlled for, thus appearing to confirm the hypothesis of a positive and statistically significant association between the use of numeracy skills and the level of proficiency demonstrated.

Axis 2: Characterisation of school-to-work transition trajectories and experiences, and identification of trends in labour market demand for skills

The development of a qualitative research initiative aimed at characterising school-to-work transition pathways and experiences and identifying trends in skills demand by labour markets – was conducted within this research project through the organisation of a focus group with representatives from major employers and leading education and training institutions across five sectors that are major employers of young adults. This exercise yielded the following key ideas of a general and cross-cutting nature:

1) Regarding the *current context of rapid economic and social change*: a prevalence of a reactive/remedial approach, to the detriment of a proactive and forward-looking approach in identifying necessary and future skills; the persistence of strategic ambiguities and weaknesses in organisations' mechanisms for diagnosing and anticipating training needs; a notable disconnect between current legislation and regulatory frameworks (particularly regarding the organisation, coordination, development and management of training) and the ongoing processes of societal, economic and technological transformation; difficulty in understanding and addressing the multiple and highly significant effects, particularly in terms of necessary skills, of the changes introduced in various sectors by digitalisation and, more recently, by AI; the persistence of traditional and conventional divisions and forms of coordination between the education and training system and the productive system.

2) Regarding the *(mis)alignments between the skills required by labour markets and the skills possessed by young adults* leaving the initial education and training system: the relevance of changes in young people's attitudes towards work and employment (and their understanding and consideration in initial and continuing training strategies, both within and outside organisations); the need to re-examine and reconfigure training models and teaching-learning processes, with a focus on active methodologies, greater personalisation and closer alignment with real-world work contexts; the growing importance of developing general and transversal skills (socio-emotional skills, soft skills, etc.), both in addition to and beyond

the development of technical skills; the persistent impact of the attractiveness of external labour markets on the retention of the workforce and of advanced and specialized skills; the significant impact, in more recent times, of the presence of an immigrant workforce, which supports the recruitment needs of the sectors with the highest employment but contributes to the reproduction of a model of organisation and development of activities that is less skilled and less conducive to skill development.

3) Regarding the *valuing of qualifications and skills and the development of participation in lifelong education and training*: perception of a growing mismatch between qualifications produced by the education and training system and those required by the country's productive system (in the sense of apparent

overqualification); evidence of mismatches between the expectations created through participation in initial training processes and the reality encountered upon entering the labour market; the importance of ensuring more flexible and customisable methods and formats for developing individual lifelong learning pathways; the prevalence of an instrumental approach to seeking out and participating in training activities; the persistence, in most employing organisations, of a focus on formal qualifications ('titles') to the detriment of the assessment and recognition of demonstrated competences (the continued importance of the 'face value' of academic qualifications in workforce recruitment and in career progression); the existence of tensions between investment in continuing training and the recognition of training efforts within many organisations.

Table 1 – Information referring to the multiple linear regression models produced within the Project (without use indexes)

Variable	Category	Coefficient	Stand. Error	p-value
Age	20-24	-13,66	14,04	0,335
	25-29	-1,61	14,27	0,911
	30-34	6,58	14,33	0,648
	35-39	3,78	14,41	0,794
	40-44	1,92	14,75	0,897
	45-49	-2,98	13,82	0,830
	50-54	5,95	15,14	0,696
	55-59	-4,88	14,57	0,739
	60-65	-5,06	15,91	0,752
Gender	Female	-10,63	2,11	<0,001
Country of birth	Other	-8,49	6,06	0,168
Language	Native	-1,57	5,96	0,793
Parents' migrant status	One foreign-born parent	15,54	6,93	0,030
	Both native parents	19,07	6,16	0,003
Parents' Educational level	Secondary	5,51	3,02	0,073
	Tertiary	15,77	3,46	<0,001
Educational level	3.º CEB	32,00	6,27	<0,001
	Secondary	49,47	5,36	<0,001
	Tertiary	68,80	5,91	<0,001
Professional status	Unemployed	7,92	6,15	0,204
	Inactive	-8,71	4,39	0,053
Professional qualification	Semi-skilled (<i>white collar</i>)	-13,26	3,19	<0,001
	Semi-skilled (<i>blue collar</i>)	-14,90	4,88	0,003
	Elementary	-17,73	5,56	0,003
Participation in (formal) AET	Yes	-5,67	5,29	0,289
Participation in non-formal AET	Yes	13,80	3,39	<0,001

Source: Own elaboration (2026).

Table 2 – Information referring to the multiple linear regression models produced within the Project (with use indexes)

Variable	Category	Coefficient	Stand. Error	p-value
Variables included in Table 1 were kept, showing small changes in coefficients (due to sample size reduction)				
Use of numeracy/math skills at home	N/a (continuous variable)	5,03	1,72	0,005
Use of numeracy/math skills at home	N/a (continuous variable)	3,38	1,55	0,034

Source: Own elaboration (2026).

Policy Options and Recommendations

The benchmarking exercise of international policies and programmes, which was additionally included in the Project's methodology and resulted in a detailed study of 12 benchmark programmes/initiatives implemented in four European Union countries with adult populations characterised by high levels of qualifications and proficiency, enabled the identification of certain assumptions and principles that should be taken into account when defining and establishing sound and effective policies in this field:

1) *Democratisation of access* – reducing inequalities and lowering barriers to participation (economic, employment-related, personal and family-related, cultural, linguistic): promoting outreach, mobilisation and participation (particularly among groups underrepresented in lifelong learning processes); promotion of a culture of lifelong learning; inclusion and equity in contexts of diversity and vulnerability; territorial and community proximity (decentralisation, outreach, connection to local contexts).

2) *Robustness and sustainability over time* – ensuring the continuity and maturation of initiatives and guaranteeing the necessary political and financial support: continued political support, underpinned by commitments involving the various social partners; continued public funding and coordination with social policies and support measures; free provision and/or significant support for participants; a holistic approach to education and adult learning processes.

3) *Active and close coordination and management* – ensuring central coordination and support, with accountability of institutions and stakeholders and proximity to territories and adults: integration into broad and

diversified national strategies and the dissemination of clear and realistic general standards and guidelines; cross-sectoral coordination at different levels, involving employment policies, education and training policies, and social policies; coordination between educational pathways and integrated systems for certification and the promotion of educational and professional progression; networking with multiple stakeholders, aiming to establish local learning ecosystems; active involvement of employers and ongoing alignment with the specific labour market realities of the context.

4) *Pedagogical innovation and continuous improvement based on evidence* – promoting pedagogical flexibility and differentiation and ensuring the incorporation of scientific knowledge into the design and development of interventions: organisational and pedagogical flexibility, diversification of modes and formats, and alignment of processes with the demands of working life; promotion of contextualised, practical and meaningful learning, oriented towards real life and work, with curricula and practices adapted to the changing realities of these contexts; pedagogical personalization and adaptation (from learner-centred teaching to pedagogical differentiation); pedagogical mediation, guidance and continuous support (lifelong learning as a relational dynamic); rigorous, diverse and continuous training of trainers, carried out in conjunction with research in this field.

With regard to policy options and concrete recommendations for the Portuguese context, the following stand out:

1) The importance of activation through use and the encouragement of *engagement in everyday practices at home and at work*

The statistical analyses carried out – and, in particular, the proposed multiple linear regression models – demonstrate that characteristics relating to cultural capital and the socio-professional status of adults are the most significant predictors of proficiency.

However, these analyses also reveal that participation in non-formal education, on the one hand, and the daily use of skills, both at home and in the workplace, on the other, contribute significantly to the expansion/maintenance of proficiency levels.

In this regard, the following aspects seem to be of great importance:

- A firm commitment to promoting long and successful initial educational pathways, as well as reinforcing the importance placed on formal education and the attainment of academic qualifications by relatively young adults who may not have achieved these during their initial schooling;
- The promotion of programmes designed to develop essential cognitive skills (notably literacy and numeracy) integrated into the daily professional and non-professional lives of adults of all age groups, based on an approach geared towards the challenges of contemporary life;
- The funding and development of public, open and free digital platforms that enable the autonomous and incremental training of these skills, especially in domestic settings;
- The creation of specific incentives and funds to support non-formal education activities spread across the country and catering to diverse audiences also represents a potentially effective way of mitigating skills depreciation.

2) The importance of *reconfiguring training ecosystems*

In the current context of rapid economic, technological, social and cultural change, employers tend to react reactively or remedially to the effects of digitalisation and the impact of AI, whilst suffering from the loss of skilled staff to other sectors and maintaining a credentialist approach, valuing 'qualifications' over demonstrated skills. At the same time, significant regulatory gaps appear to persist, limiting the scope for renewing models,

curricula and organisational forms of initial and continuing training.

Thus:

- Support for the development of microcredential and skills audit systems within employers' organisations will underpin processes for recognising and valuing the skills demonstrated by workers, which may boost their motivation and promote fairness in internal promotion processes;
 - The design of specific programmes for accelerated technical and professional retraining, as well as for the promotion of digital skills, should be encouraged across different sectors of economic activity, promoting ways to anticipate, assess and dynamically address the potentially disruptive impacts of AI;
 - In addition to strengthening the focus on promoting socio-emotional and transversal skills within formal and non-formal education settings, there is a need for a general transition to active teaching and learning methodologies based on personalised and differentiated pedagogy and a closer alignment with real-life and work contexts, alongside increased investment in the training of trainers and training managers.
- 3) The value of *network governance* in expanding the reach of initiatives and promoting equity

The statistical modelling exercise carried out by the Project identified social groups with significant disadvantages in terms of proficiency: in addition to adults with low academic qualifications, individuals in low-skilled occupations, descendants of families with migrant background and/or low educational attainment, and women (particularly in numeracy skills).

- Robust public policies are typically national in scope but decentralised, with broad thematic and programmatic coverage and sustained political and financial support: the State acts as the central coordinator, funder and regulator of local learning ecosystems that promote active outreach strategies, targeting, in particular, social groups in situations of relative disadvantage;

- Promoting equity also means designing programmes for re-entry into academic

pathways or continuing education programmes that are closely linked to the frameworks of professional and/ e practice and feature flexible arrangements, ensuring that adults in precarious situations or with demanding worklife balances can feel genuinely motivated to participate in different forms of the education and training system;

- Public programmes are designed in direct response to the needs of institutional

stakeholders within territories (municipalities, local associations, businesses, adults), following a flexible approach that promotes cross-sectoral dialogue, enabling them to be tailored to local realities, as well as based in high quality standards that build upon continuous monitoring and adjustment.

Conclusion

The results of this Project highlight that the depreciation of adults' essential skills is not inevitable. In fact, it can be mitigated or even reversed if conditions are created that allow for the combination of a solid initial education, capable of fostering high levels of proficiency at an early age, with opportunities for the acquisition, development and mobilisation of skills throughout life. To this end, the education

and training system must be strengthened, notably through the establishment of a broad social and political commitment that gives adult education and training the centrality and relevance demanded by the challenges of today's societies.

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