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Artificial Intelligence as an assistant to develop a competency-based curriculum in continuing education

Inteligencia Artificial como asistente para desarrollar un currículum de educación continua basado en competencias

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Abstract

In this article, an exploratory study is presented, evaluating the curricular alignment of a competency-based continuing education program generated through an artificial intelligence tool. A rubric for assessing the curricular coherence of the program was developed, and the content validity of the instrument was established through the judgment of 13 experts in the curricular field. Specific instructions were generated to be used in the artificial intelligence tool for the development of the competency-based program. These instructions resulted in the draft of an online education program with a duration of 120 hours. Subsequently, the collaboration of 13 experts in the field was sought to use the previously created rubric to assess the curricular coherence of the program. According to the results, the use of artificial intelligence does not replace the curriculum design process for a program; however, it can be a valuable tool to make the design process much more efficient.

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Keywords: artificial intelligence; constructive alignment; curriculum design; continuing education

Resumen

En este artículo se presenta un estudio exploratorio que evalúa la alineación constructiva de un programa de educación continua basado en competencias, generado mediante herramientas de inteligencia artificial. Para evaluar la coherencia curricular del programa se construyó una rúbrica, cuya validez de contenido se realizó mediante juicio de expertos y expertas curriculares. Se generaron "prompts" específicos para ser utilizados en la herramienta de inteligencia artificial para el desarrollo del programa basado en competencias. Estos "prompts" resultaron en un borrador de un programa de educación en línea con una duración de 120 horas. Posteriormente, se buscó la colaboración de 13 expertos y expertas en el área de la educación en línea para evaluar la coherencia curricular del programa generado. Según los resultados, el uso de inteligencia artificial no reemplaza el proceso de diseño curricular de un programa; sin embargo, puede ser una herramienta útil para hacer que el proceso de diseño sea mucho más eficiente.

Palabras clave: Inteligencia artificial; alineación constructiva; diseño curricular; educación continua

Introduction

In recent years, it has become common to read or hear headlines about the rise of artificial intelligence (AI) in education (Bates et al., 2020). The collective image of AI leads us to think of it as a supercomputer, a robot with adaptive behaviour or a chatbot that answers all our questions. AI is gaining the attention of both the general and scientific communities, since, beyond the collective imagination, it has established itself as an enabling tool with vast potential to optimise processes and promote the effectiveness and efficiency of many educational activities (Bearman et al., 2023).

Given the growing interest in the use of AI-based tools for educational purposes (Chen et al., 2020), there is a clear need to understand and address these technologies in a way that is inherent to our educational work. AI tools have been used in higher education for a variety of purposes, such as assessment (Al Braiki et al., 2020; González-Calatayud et al., 2021), academic performance prediction (Ouyang et al., 2022), tutoring systems (Zawacki-Richter et al., 2019), among others (Crompton and Burke, 2023). This has generated a debate on how these digital tools can impact the teaching and learning process, considering possible negative consequences (Lund and Wang, 2023; Tsai et al., 2023). Despite all the challenges present in the integration of these tools in the educational context, their use can also present multiple advantages. In this sense, the area of curriculum design is a field that has not yet been sufficiently explored in this context.

Curriculum design is understood as a dimension of the curriculum that allows us to create training programmes, giving direction to didactic, methodological and evaluative aspects (Silvestre and Salgado, 2005). In any curriculum design process, it is

essential to have a clear understanding of the educational model, as this will allow us to align educational training with the realities to be addressed (Sarmiento and Tovar, 2007). This article will address the curriculum design of educational proposals under a competency-based educational model (Chappell et al., 2020). This model allows higher education institutions to establish programmes focused on the development of knowledge, skills and attitudes that respond to the changing needs of the social, economic and labour environment of the contemporary world (Villa Sánchez, 2020). Given the above, there is a clear need to propose curricular integration or alignment processes in order to design programmes consistent with the development of competences, promoting better integration of students into the labour market (Rodríguez and Pérez, 2024).

In higher education, the curriculum design of training programmes is usually carried out by faculty members with the support of curriculum designers, who are specially trained for this task (Huizinga et al., 2014; McKimm, 2007). However, curriculum design is highly challenging, as it involves properly integrating disciplinary content, subject-specific didactics and the pedagogical elements of the programme. The integration and coherence of the different elements of the curriculum is referred to as curriculum alignment, which refers to the consistency of the different components that make up the curriculum, such as learning outcomes, methodology and assessment of learning (Hrivnak, 2019; Kandlbinder, 2014). Achieving a proper curriculum alignment between these elements is a demanding task, often requiring the involvement of an external expert in the process (Grant, 2018; Van Nuland et al., 2020;). This is because, in order to ensure the cohesion and internal consistency of a training programme, a methodological pathway is required that establishes communication and coordination of the elements that make up the ecosystem of the teaching and learning process. In this way, all the components of the curriculum form an interconnected system that enables deep learning and achievement of the stated competences.

In the light of the above, it is imperative to mention that, in higher education institutions (HEIs), this problem becomes more relevant, as the professionals involved in the process do not always possess pedagogical expertise, and therefore the construction of a coherent curriculum is extremely demanding (Alfauzan and Tarchouna, 2017). This is even more complex for HEIs offering training programmes in the context of continuing or lifelong education (Aspin and S Chapman, 2000; Eynon and Malmberg, 2021). These programmes are often shorter than undergraduate or postgraduate programmes, and have the characteristic that they must respond quickly to the needs of the environment (Laal et al., 2014; Laal and Salamati, 2012). In this sense, HEIs offering such programmes need to be constantly adapting to the changing environment by creating programmes that enable them to update the competences that adults require in the labour and professional field. Rapidly developing a curriculum that ensures the quality and coherence of such programmes is therefore a necessary and relevant task.

This article discusses the use of an AI-based digital tool to create a continuing education programme using a set of *prompts* that can be replicated by any faculty member, without necessarily possessing pedagogical-curricular expertise. The constructed programme is developed under a competency-based model (Kulik et al.,

2020; Voorhees, 2001) and is therefore composed of four key elements: competencies, learning outcomes, learning assessment and teaching methodologies. The series of *prompts* used in this article are systematised by applying a step-by-step curriculum and instructional design model that ensures curriculum alignment (Cisternas-San Martín et al., 2024). Based on the above, the following research question arises: what is the degree of curriculum alignment of a continuing education training programme generated through AI-based tools?

General Objectives

Evaluate the curricular alignment of a continuing education programme built with AI tools.

Specific objectives

1. Identify the criteria for evaluating the curricular alignment of a continuing education programme.
2. To construct an instrument to measure the curricular alignment of a continuing education programme.
3. Validate the instrument through the judgement of experts in curriculum design.
4. Obtain evaluation indicators for each evaluation criterion of the curricular alignment of the continuing education programme generated with AI-based tools.

Method

Participants

In this research there were two stages of participation: the validation of an analytical rubric and the evaluation of a training programme. First, an analytical rubric was constructed to evaluate a continuing education programme. This instrument was validated by 13 expert judges in curriculum design, selected for their training and previous experience in education, particularly in curriculum and evaluation. All of them hold master's or doctoral degrees and work in higher education. In a second stage, the previously validated rubric was used to evaluate a programme built by an artificial intelligence tool. The programme evaluation process was carried out by 13 other judges who were experts in the programme's subject matter, which corresponded to higher education and online education.

Instruments

For the first stage of the study, i.e. for the validation of the analytical rubric, a checklist was sent to the 13 curriculum specialists. In this checklist, the experts were asked to classify each criterion presented in the analytical rubric as necessary or unnecessary to be included. In addition, the checklist included a section for observations or comments on each criterion of the rubric presented to assess curriculum alignment.

After validation, an analytical rubric consisting of seven criteria was developed to assess the curricular alignment of a continuing education programme: (1) Relevance of content, (2) Alignment of competencies with the target audience, (3) Alignment between learning outcomes and competencies, (4) Quality of learning outcomes, (5) Alignment between teaching strategies and learning outcomes, (6) Alignment between learning outcomes and assessment, and (7) Alignment between teaching strategies and assessment. Each criterion has three levels of performance: initial, intermediate or advanced. An example of the criteria is shown in Table 1.

Table 1

Example of criteria and performance levels of the analytical rubric for the evaluation of the continuing education programme.

Criterion	Initial (1 point)	Intermediate (2 points)	Advanced (3 points)
Alignment between learning outcomes and competences	The set of learning outcomes does not lead to the achievement of the competences. That is, the learning outcomes are not aligned with the competences.	The set of learning outcomes allows the competences to be partially achieved. That is, the learning outcomes are not fully aligned to the competences.	The set of learning outcomes enables the competences to be achieved. That is, the learning outcomes are aligned to the competences.

Procedure

Phase 1: Construction of the instrument for assessing competency-based curricular alignment

First, a document search was carried out to identify the criteria necessary to assess curriculum alignment in a competency-based programme. This was done using the academic search engines Scopus and Web of Science, using as keywords: "Curriculum Alignment" and "Higher Education". Finally, seven criteria were identified: (1) relevance of content, (2) alignment of competences with the target audience, (3) alignment between learning outcomes and competences, (4) quality of learning outcomes, (5) alignment between teaching strategies and learning outcomes, (6)

alignment between learning outcomes and assessment, and (7) alignment between teaching strategies and assessment.

There are various curriculum approaches, based on different principles and philosophical conceptions (Osorio, 2014). However, the selection of content is an issue that has been permanently present in the discussion on curriculum development (Vera et al., 1999). On the other hand, from the competence-based approach, there is also a discussion on what the criteria should be for selecting the competences to be developed (Diaz, 2003). Despite the above, there is a consensus that it is the learners who should be at the centre of these decisions (Jiménez, 2008). Both of the aforementioned dimensions of competence-based curriculum development are reflected in criteria (1) and (2) of the proposed rubric. Criteria (3) to (7) were selected according to the Constructive Alignment (CA) approach (Biggs and Tang, 2007). This model is composed of two pillars: alignment and the constructivist paradigm (Rodriguez and Perez, 2024). Alignment proposes processes of cohesion and coherence between learning outcomes, teaching and learning activities, and assessment methods (Wang et al., 2013). For its part, constructivism is proposed as the pedagogical philosophy of alignment, suggesting that the coherence between the aforementioned elements promotes deep learning in people who participate in training programmes designed based on this model (Carlino, 2021).

For Biggs (1999, 2014), the teaching and learning process is an ecosystem in which all the parts that make it up are related to each other, establishing a conceptual model that proposes the delimitation of what is taught, how it is taught and what is assessed (Carlino, 2021). This means that all the curricular components of a training programme are key for students to be able to acquire the necessary competences required in the workplace.

The questions outlined above are embodied in three central elements of curriculum design: learning outcomes, teaching and learning activities, and means of assessment. Biggs (1999, 2014) argues for the need to ensure internal cohesion and consistency between these pillars, fully aware that if one of them is changed, the other elements of curriculum design must be adjusted. This CA approach can be illustrated as presented in Figure 1. Thus, under the CA approach, we proceeded to construct an analytical rubric, which was subsequently validated as indicated in Phase 2.

Figure 1. Triangle of the constructive alignment (CA) approach.

Phase 2: Validation of the criteria by expert judgement

In the process of validating the rubric, 13 experts in curriculum design were invited to participate in the process. The invitation was sent by email with the instructions and the evaluation instrument. Individuals were asked to rate each criterion as *necessary* or *unnecessary*. In addition, in order to obtain detailed feedback on the constructed instrument, comments were requested on each proposed criterion.

Phase 3: Creating a prompt to create a programme

To create the programme with the Artificial Intelligence (AI) tool, the RGC induction technique was used in ChatGPT-3.5 version 3 August 2023 (Firat, 2023). This technique involves providing in each command the role, relevance, purpose, context and constraints of what is requested. To develop and systematise the input, an iterative instruction development framework was used, where in each iteration the output given by the AI tool was analysed. The process was repeated until the expected result was obtained.

The systematisation of the indications for curriculum design is based on the backward design model (Wiggins and McTighe, 2005). Under this model, first, the set of ARs that students should achieve is designed. In a second stage, the assessment process should be such that the level of attainment achieved by the students can be measured. Finally, the teaching and learning methodologies must be defined. This model was integrated with the competence-based approach, incorporating a preliminary step in which the set of competences is constructed. A step was also added to verify the coherence between learning outcomes and competences. A summary of the step-by-step curriculum design model is shown in Figure 2 (Cisternas-San Martín et al., 2024).

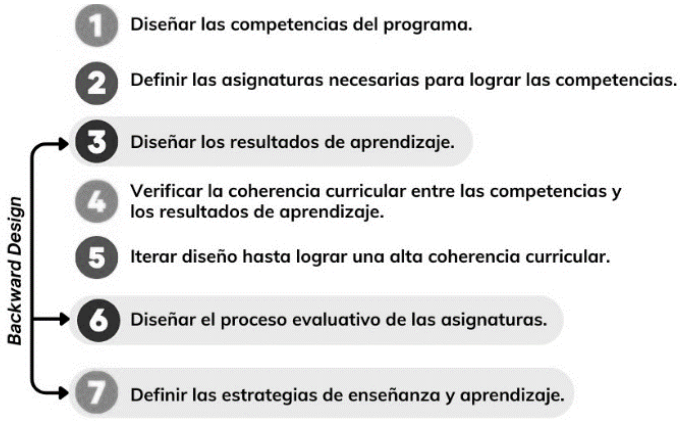

Figure 2. Step-by-step curriculum design model.

Based on the steps illustrated in Figure 2, a series of *prompts* were developed to ensure constructive alignment of the training programme:

Start

1. You are an expert in [curriculum design]. The objective is to build a programme of [X hrs] with [Y] subjects under a competency-based model. The subject of the programme is [subject].
2. First, write [Z] competences for the programme with the structure of [verb + object + condition]. The competences should be global, integrated and applied.
3. Based on the [Z] competences given above, divide all content into [Y] subjects and give me the name of each subject.
4. Given [Y] subjects, give me a set of learning outcomes with the structure of [verb + content + condition or context] for each subject. All learning outcomes should lead to the achievement of the [Z] competences of the programme.

From i=1 to Y

5. Regarding [Subject i], create an assessment process to measure all learning outcomes.
6. Regarding [Subject i], it proposes the teaching strategies that should be used with students in order for them to achieve all learning outcomes.
7. Regarding [Subject i], it proposes the teaching strategies that should be used with students in order for them to achieve all learning outcomes.
8. For [Subject i], give me a list of the content that needs to be covered in the subject in order to cover all the learning outcomes.

End

Table 2 provides the details of the three variables that are involved in the *prompts*.

Table 2

Variables for the creation of a continuing education programme.

Variable	Meaning
X	Number of hours of the programme
Y	Number of subjects in the programme
Z	Number of programme competencies

With this procedure, a continuing education programme on the topic of Online Teaching for Higher Education was created with a duration of 120 hours, 4 subjects and 5 competences.

Phase 4: Evaluation of the programme with the analytical rubric by experts

Once the training programme was created through the *prompts* presented in Phase 3 of this research, it was sent to 13 expert judges who were selected based on their experience in online learning, instructional design, higher education and curriculum design. They were invited to participate via an email that included the instructions and the previously validated rubric. Each criterion had three levels of performance: beginner, intermediate or advanced.

The detailed rubric used to evaluate the programme, including expert comments, is available in Appendix A.

Data analysis

For the validation of the rubric constructed for the evaluation of the programme, content validity was calculated using the content validity coefficient (CVR), obtained with the formula:

$$CVR = \frac{ne - \frac{N}{2}}{\frac{N}{2}},$$

Where "*ne*" is the total number of people who indicated that a criterion was "*necessary*", while N is the total number of judges. If the CVR value is less than zero, the

criterion should be removed from the instrument while, if the CVR value is greater than zero, the criterion should be kept (Lawshe 1975; Polit et al., 2007).

The comments and suggestions given by the experts were systematically classified, through coding and identification of themes or patterns (Hsieh and Shannon, 2005), in order to incorporate them in the improvement stage of the instrument.

For the analysis of the evaluation of the programme's CA, the group of experts was asked to evaluate through the rubric, assigning 1 point to the Initial level, 2 points to the Intermediate level and 3 points to the Expert level. For the analysis of each element, the mean and standard deviation were calculated.

Results

Validation of rubric

Based on the evaluation by expert judges, the CVR (see Phase 2 in Methods) was calculated for each criterion. The results are shown in Table 3.

Table 3

Results of the validation process of an Analytical Rubric for the curricular evaluation of continuing education programmes.

N	Criterion	CVR	Decision	Comments
1	Content relevance	1	Maintain	There are minor observations regarding the subjectivity of what can be considered as up-to-date content.
2	Alignment of competencies with the target audience.	1	Maintain	There are minor suggestions on grammatical aspects.
3	Alignment between learning outcomes and competences.	1	Maintain	There are minor suggestions on grammatical aspects.
4	Quality of learning outcomes.	1	Maintain	There are minor suggestions on grammatical aspects.
5	Alignment between teaching and learning methodologies and learning outcomes.	1	Maintain	There are minor suggestions on grammatical aspects at the different performance levels of the assessment.
6	Alignment between learning outcomes and assessment.	1	Maintain	There are minor suggestions on grammatical aspects at the different performance levels of the assessment.
7	Alignment between teaching and learning methodologies and assessment.	0.7	Maintain	There are minor suggestions on grammatical aspects. Two people suggest removing this criterion.

As can be seen in table 3, in criteria one to six there was total agreement among the experts to keep them. Regarding criterion seven, only two people suggested eliminating it. This criterion is related to the alignment of assessment with teaching methodologies. The reason for rejection was that this criterion is closely related to criteria five and six, because ARs cannot be considered as a separate element of the curriculum and are intrinsically related to the assessment process. Therefore, if the teaching methodologies are aligned with the learning outcomes, so are the assessments. However, we decided to keep this criterion, as it is a fundamental element of the QA approach.

On the other hand, most of the comments and suggestions for improvement of the instrument had to do with the way the different levels were described, so minor grammatical adjustments were made to the instrument according to the experts' comments.

Continuing education programme

Using the indications described in the Procedure section (Phase 3), a programme entitled "Online Teaching for Higher Education" was constructed using the AI tool Chat GPT.

Programme Evaluation

Once the programme was constructed (see previous section), it was sent to the experts by email together with the instructions and the evaluation instrument. The results of the evaluation are shown in Table 4.

Table 4

Results of the evaluation of the programme generated by an AI tool.

Subject	Criterion	Media	Standard deviation	Comments
Competency-based model	Relevance of content	2.5	0.5	Some experts mentioned that some content needs to be updated or made more specific. That is, models or theories of learning and teaching should be made explicit in the programme.
	Alignment of competences with the target audience	2.5	0.5	The programme lacks a detailed description of the student admission profile.
	Alignment between learning outcomes and competences	2.5	0.5	Most of the comments related to the fact that some learning outcomes had a weak structure; experts did not mention problems related to alignment.

Fundamentals of e-learning	Quality of learning outcomes	2.4	0.5	Some experts mentioned that some learning outcomes were not structured as they should be.
	Alignment between teaching methodologies and learning outcomes	2.5	0.5	Some experts selected an intermediate level by referring explicitly to the construction of learning outcomes. Therefore, they did not analyse the alignment between methodologies and learning outcomes. Some experts mentioned that teaching and learning strategies should be more detailed.
	Alignment between learning outcomes and evaluation	2.5	0.5	Five experts mentioned that some assessments were not consistent with one or two specific learning outcomes, as they were assessing a lower or higher cognitive level. However, it was mentioned that most assessments were aligned with the learning outcomes.
	Alignment between teaching methodologies and evaluation	2.8	0.4	There were comments regarding the time the evaluation would take. In general, it was mentioned that the evaluation is consistent with the proposed methodologies.
Effective online course design	Quality of learning outcomes	2.3	0.5	This was the subject with the lowest level of quality in terms of learning outcomes. Most of the comments were related to its construction and the selection of the verb representing the cognitive level.
	Alignment between teaching methodologies and learning outcomes	2.6	0.5	Some experts selected an intermediate level referring explicitly to the construction of learning outcomes. Experts said that this was an impediment to adequately assessing methodologies.
	Alignment between learning outcomes and evaluation	2.7	0.5	In general, the experts indicated that the assessment was aligned with the learning outcomes.
	Alignment between teaching methodologies and evaluation	2.7	0.5	In general, experts indicate that assessment is aligned with instructional methods.
Facilita	Quality of learning outcomes	2.7	0.5	Up to this point, we found that the comments were in the same direction as

	Alignment between teaching methodologies and learning outcomes	2.6	0.5	in the previously assessed subjects, with only minor variations in the number of experts selecting an intermediate or advanced level.
	Aligning learning outcomes and assessment	2.6	0.5	
	Alignment between teaching methodologies and evaluation	2.7	0.5	
Evaluation and improvement in e-learning	Quality of learning outcomes	2.5	0.5	Up to this point, we found that the comments were in the same direction as in the previously assessed subjects, with only minor variations in the number of experts selecting an intermediate or advanced level.
	Alignment between teaching methodologies and learning outcomes	2.5	0.5	
	Alignment between learning outcomes and evaluation	2.4	0.5	
	Alignment between teaching methodologies and evaluation	2.5	0.5	

Conclusions and Discussion

The instrument for assessing the programme generated was well rated, especially on the criteria of alignment between learning outcomes and competences (2.5 points). Therefore, no major changes were made to the original rubric (see Phase 1 and 2 of the procedure). The most prominent comments focused on the criterion on the alignment between teaching strategies and ARs. However, it was decided to keep this criterion, as this is a crucial element for the Constructive Alignment approach (Biggs and Tang, 2007). Under the model used, these elements are interconnected: the ARs direct the design towards what we expect our students to achieve in class, and the teaching strategies prompt us to ask what the students will do to achieve the ARs and what the teacher will do to support them (Carlino, 2021).

From the assessment by the experts (see Phase 4 of the Procedural Section), it was found that there was an adequate alignment between the ARs and the competences of the programme generated by the AI tool (2.5 points, see Table 4). This is a relevant result, since achieving this coherence requires specific knowledge of curriculum design, which is particularly challenging for HEI faculty with non-pedagogical

disciplinary expertise (Wiggins and McTighe, 2005). This suggests that, with the right cues and the support of artificial intelligence, an expert in curriculum design could collaborate closely with any faculty member in the construction of a set of competences that includes all disciplinary aspects of an educational programme. To do this effectively, it is essential that the person with the disciplinary expertise of the programme is clear about the objective of the programme, and that this is adequately indicated in the set of *prompts* that are entered into the AI tool. Generally, the number of competencies is related to the topics to be addressed in the programme. Therefore, the level of technical detail you wish to consider in the competencies should be clearly indicated in the prompts for the IA tool.

The findings of the study are consistent with those of Biggs and Tang (2007), who also highlight the importance of constructive alignment in curriculum design. These authors emphasise that coherence between learning outcomes, competences and teaching strategies are essential for effective curriculum design. Recent studies such as those by Rodriguez and Perez (2024) underline the need for human supervision to ensure the quality and relevance of the curriculum, which is also evident in our results. When building competences, it is also important to consider a specific taxonomy (Ullah et al., 2020). For this reason, the taxonomy and the educational model under which one wishes to work should be explicitly indicated in the *prompts* to be entered into the AI tool. In addition, it could be indicated to exclude certain cognitive levels, or to specifically consider the levels to be addressed in the programme. Here, it is essential that the curriculum expert explains the cognitive levels to the disciplinary expert, so that the latter is aware of the implications of his or her selection in terms of assessment and teaching strategies (Ainsworth, 2010). These considerations, regarding the educational model or the cognitive levels to be worked on, are also valid for the construction of the ARs for each of the subjects. According to the people who evaluated the AI-generated programme, this was one of the weakest elements in the programme. This may have been because no taxonomy was explicitly stated for the construction of the ARs. As a result, some verbs were used that experts found unsuitable. For example, it was mentioned that verbs such as "develop" and "understand" should not be used because they are subjective in nature and therefore difficult to assess. Therefore, in order to get the most out of AI tools, it is essential to have the support of a well-trained curriculum expert who can consider all the technical particularities of each institution's educational model.

Although the assessment process constructed by the IA tool was well rated, there was a lack of specificity with regard to the assessment instrument and how it should be applied. For this reason, it is suggested to consider asking the IA tool to be more specific in certain descriptions. To illustrate, a curriculum expert might require specific questions to be used for the proposed teaching and learning strategies. For example, a question could be requested for an online discussion considering a specific learning outcome. Again, this should be done in collaboration with a disciplinary expert; on the one hand, the curriculum expert should ensure that the questions are appropriate to measure specific cognitive levels, while on the other hand, the disciplinary expert should ensure the technical and disciplinary quality of the questions. Ideally, HEI faculty members should be pedagogically trained so that they can construct a coherent (or aligned) assessment process. However, faculty training is an institutional challenge

(Fernández Díaz et al., 2010; Robinson and Hope, 2013). As a result, AI could be used to overcome this challenge, as it allows supporting pedagogical processes that are demanding and demanding for the academic staff.

In summary, the results suggest that, although artificial intelligence can support curriculum construction, full automation is not yet feasible due to the need for expert supervision in specific aspects of curriculum design, as indicated by the scores for alignment between methodologies and assessment (2.8 points). Thus, the use of artificial intelligence does not replace the work that institutions must do to ensure the quality of the curriculum. However, the use of artificial intelligence tools, such as Chat GPT, can boost the creation of new programmes, reducing the time academics need to invest in this process, thus promoting a quick response to the needs and requirements of the environment.

It is important to mention that the methodological path proposed by Biggs assumes that the internal cohesion between the key elements of curriculum design favours deep and long-term learning (Carlino, 2021). This means that any training programme requires the formulation of clear objectives, beyond a list of contents, which implies linking the design with what continuing education students require. However, one of the main limitations of the constructive alignment model is that it has been used for a variety of purposes, which John Biggs himself calls "educational management" (Biggs and Tang, 2007). Indeed, for some the model can be used from an output or outcome perspective, and for others from the perspective of improving teaching and learning processes.

In this sense, Biggs' (1999, 2014) constructive alignment presupposes a constructivist way of teaching, so that the whole process of curriculum design is established as the navigational chart for the teacher in the classroom. If we prioritise the alignment process over the constructivist perspective of the model, we run the risk of unbalancing the model, taking away the value of construction and deep learning for students. Thus, it is important to consider that the models used, the step-by-step model and the constructive alignment model, and the Artificial Intelligence tool, support the teaching and learning processes, and that, although they facilitate their design, their use should be aimed at improving them.

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Appendix A.

		PERFORMANCE LEVELS		
	CRITERIA	**Initial (1 point)**	**Intermediate (2 points)**	**Advanced (3 points)**
PROGRAMME	**Updating the contents**	The contents are not updated according to the progress of disciplinary knowledge.	There are contents that are not updated in accordance with the progress of disciplinary knowledge or that do not address all the fundamental subjects for the development of the academic programme.	The contents proposed for the programme are up to date and address the fundamental issues for the development of the academic programme.
	Linking competences to the target audience	The competences are not aligned with the professional activities of the programme's target audience and do not meet the training needs related to the subject.	Some competences are not fully aligned with the professional work of the programme's target audience or do not respond to the training needs related to the subject matter.	The competences are aligned with the professional activities of the programme's target audience and respond to their training needs related to the subject matter.
	Coherence between learning outcomes and competences	There are competences that are not achievable with the proposed learning outcomes.	Some of the competences are partially achieved from the learning outcomes considered.	The total of all learning outcomes enables the achievement of the programme competences.
SUBJECT	**Quality of the proposed learning outcomes**	Learning outcomes are not measurable and are not linked to a cognitive level associated with a taxonomy.	Some learning outcomes are not measurable or are linked to more than one cognitive level associated with a taxonomy.	The learning outcomes proposed in the subject are measurable and linked to a single cognitive level associated with a taxonomy.

	Coherence between teaching methodologies and learning outcomes	The learning outcomes of the subject cannot be achieved with the proposed teaching methodologies.	There are some learning outcomes that cannot be achieved through the teaching methodologies considered in the subject.	The proposed teaching methodologies allow the achievement of all the learning outcomes of the subject.
	Coherence between learning outcomes and assessment	The proposed learning outcomes cannot be measured through the assessment process of the subject.	There are some learning outcomes that are not measured in the proposed evaluation process.	The proposed assessment process allows the achievement of the set of learning outcomes to be determined.
	Coherence between teaching methodologies and evaluation	The evaluation instances require learning that cannot be achieved through the proposed methodologies.	There are some instances of assessment that require learning that cannot be achieved through the proposed methodologies.	The teaching methodologies of the subjects make it possible to generate the necessary learning to face the proposed assessment instances.