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AI-assisted review of teaching competencies for the comprehensive training of healthcare professionals in Ecuador

Revisión asistida por IA de las competencias docentes para la formación integral de profesionales de la salud en Ecuador

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ABSTRACT

There is academic consensus that the curriculum should be taught by competencies. However, the teaching profile for teaching these competencies according to the different professional areas remains to be defined. So, what should the ideal university teaching profile be in the field of health sciences in Ecuador? And what competencies should they have regarding the substantive functions of university teaching? Consequently, we sought to outline an ideal teaching profile for university teaching in health sciences in Ecuador and list the minimum competencies necessary to fulfill their functions. A systematic review of academic search engines was conducted regarding the competency-based teaching profile for teaching in health sciences, and the concept was developed using AI © OpenAI . As a result of the review, a minimum of 83 competencies were found for the proposed teaching profile, of which 22 correspond to research, 28 to teaching, 15 to outreach, and 18 to management. None of these competencies could be assigned as specific to the health field. A profile is proposed with an emphasis on competencies inherent to biopsychosocial and bioethical aspects, as well as skills derived from professional practice. Finally, the work with OpenIA did reveal specific competencies linked to both bioethical aspects and specific professional practice and legal frameworks for Ecuador.

Keywords:
"Teaching Profile"; "Competencies"; "University"; "Substantive Functions"; "Health Sciences"; "Ecuador"

RESUMEN

Existe consenso académico respecto a que el currículum debe ser impartido por competencias. Pero, queda pendiente el perfil docente destinado a impartirlas según las distintas áreas profesionales. Entonces ¿Cuál debería ser el perfil docente ideal universitario en el campo de ciencias de la salud en Ecuador? Y ¿Qué competencias debería tener en torno a las funciones sustantivas de la docencia universitaria? Consecuentemente, buscamos esbozar un perfil docente ideal para la docencia universitaria en ciencias de la salud en Ecuador y enumerar las competencias mínimas necesarias para cumplir sus funciones. Se realizó una revisión sistemática en los buscadores académicos en torno al perfil docente por competencias para la enseñanza en ciencias de la salud y se trabajó el concepto con la inteligencia artificial ©OpenAI. Como resultado de la revisión se encontró un mínimo de 83 competencias para el perfil docente planteado, de las cuales 22 corresponden a investigación, 28 a docencia, 15 a extensión y 18 a gestión. Ninguna de ellas se pudo asignar como específica del área de la salud. Se propone, un perfil con énfasis en competencias inherentes a los aspectos biopsicosociales, bioéticos y habilidades resultantes del ejercicio profesional. Finalmente, el trabajo con OpenIA sí evidenció competencias específicas vinculadas tanto a los aspectos bioéticos, como del ejercicio profesional específico y legal para Ecuador.

Palabras clave:
"Perfil docente"; "Competencias"; "Universidad"; "Funciones sustantivas"; "Ciencias de la salud"; "Ecuador"

INTRODUCTION

Conceptually, the term competencies, in the educational context, is not univocal and has received countless definitions and meanings according to different authors and schools of thought (Meirieu, 1991; Tobón, 2005; Tunning, 2007; García, 2008; Clavijo Cáceres, 2018; OECD, 2019; Incháustegui, 2019; UNESCO 2022). However, one of the most widely accepted meanings is the one indicated by UNESCO (2022):

> the development of complex capabilities that enable students to think and act in diverse areas […]. It consists of the acquisition of knowledge through action, the result of a solid foundation of culture that can be put into practice and used to explain what is happening (Cecilia Braslavsky).

In this sense, UNESCO in 1994 (Delors, 1994) grouped the competencies and continues to do so in 4 main groups or dimensions that it called "fundamental pillars of education". These are: "Learning to know" referring to disciplinary competencies; "learning to do"; although inseparable from the first, this pillar contains the competencies inherent to professional practice or the practical component of theory; "learning to be" or the development and consolidation of human values, intelligence, sensitivity, aesthetic sense, individual responsibility, spirituality, among others; and finally "learning to live together" or "knowing how to live together" which, like the previous one, includes fundamental values for harmonious coexistence in society (Delors, 1994). More recently, UNESCO (Sobe, 2021), based on lessons learned during the COVID19 pandemic, proposed a reworking of the four pillars in a strategy called “Commons” presented by David Bollier of The Next System Project as "at once a paradigm, a discourse, an ethic, and a set of social practices."

The idea behind the new proposal is that the new pillars constitute an engine of social transformation aimed at a more just, equitable, tolerant, and empathetic society (Sobe 2021). Consequently, the new pillars are now "learning to study, question, and co-construct together," where, from a constructivist approach, while teaching how to think and reason correctly, we think of doing so as part of a collective and for its benefit; "learning to mobilize collectively," where Delors' (1994) "doing" is approached, as the previous case, in a social or collective way; "Learning to live in a common world," a pillar that promotes values such as tolerance, empathy, and altruism in order to avoid many of the problems that arose during the COVID-19 pandemic; and finally, "Learning to care and nurture," aimed at motivating, promoting, and developing skills in self-knowledge and personal care (mental and physical) consistent with the values of altruism, tolerance, and empathy. Up to this time, these new pillars have not been implemented in scientific articles linked to university teaching competencies.

For UNESCO (2022), all education should be focused on competencies, since "the choice of competency as the organizing principle of the curriculum is a way of bringing real life into the classroom." This means that competency-based education best responds to the reality of society in the digital age and current context of globalization. In recent years, the UN, alerted by the reluctance of many universities in different countries to incorporate competency-based curricula, decided in 2014 to make July 15 the "International Youth Skills Day." In addition, and given that the youth unemployment rate is three times that of other ages, the UN (2018) considers it essential to concentrate efforts on competency-based education as the most direct and effective way to prepare young people for the future.

Similarly, Sustainable Development Goal 4 states: “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” (UN 2018), which implicitly includes the development of competencies as a means to achieve this. Latin America, heir to the Franco-Napoleonic academic model and current trend, and with few exceptions, has maintained considerable resilience in accepting the competency-based curriculum (Oppenheimer, 2010). This has been reflected and evidenced in research and development indicators (UNDP, 2020; Schneegans et al., 2022). Therefore, although there is currently a consensus around the importance of adopting the competency-based

curriculum in Latin America, there is still considerable resistance to it (Casanova et al., 2019; García et al., 2020; Richard and Contreras, 2021; Schneegans et al., 2022).

Some Latin American universities claim its implementation, but in practice this is not reflected according to the indicators studied (Oppenheimer, 2010; Casanova et al., 2019). This situation became evident, in many cases exacerbated, during the COVID19 pandemic where, because the implementation of such curriculum implies not only changing it formally, but also or above all, requires a teaching profile coherent with the competencies that are desired to be developed (Delors et al., 1996; UNESCO, 1999; Richard and Contreras, 2021a; 2021b). As some researchers point out (Popkewitz, 1995; Macías et al., 2017; Richard, 2018; Richard and Contreras, 2021b; Richard et al., 2021), it is regrettable that in university education it is thought that only a professional degree is enough to teach.

Obviously, this does not mean, in any way, that a university professor may lack training in their discipline, but neither does it imply omitting and/or minimizing pedagogical training, since without it it is impossible to successfully carry out the curriculum (Diaz Barriga, 2006; Ángel Macías et al., 2017; Richard, 2018; Richard, 2021). Additionally, professionals who teach in the health area in general carry out empirical teaching work, which is supported or based on their own constructions, their experience or models learned from their own teachers.

As Ángel-Macías et al. rightly state: “This situation reveals the forgetfulness that university teaching is another profession” (2017). It involves a high risk and social responsibility due to the intricate fabric of the substantive university functions and its emerging competencies; that, like the medical profession itself, teaching includes students as human beings in an intricate relationship of biopsychosocial variables (Richard, 2018). Several authors (Popkewitz, 1995; Macías et al., 2017; Richard and Contreras, 2021b; Richard et al., 2021) agree in affirming that an authentic university professor is one who generates knowledge from their thematic area of research and pedagogy in academia.

This necessarily implies becoming a critic of their practice and producing knowledge from it, with the clear purpose of promoting social, pedagogical and scientific growth and improvement by applying the skills developed in these fields. In other words, they use the knowledge generated and assimilated as lyrics and music of their songs in their teaching, the profile of the singer-songwriter (Richard and Contreras, 2021b). Therefore, those teachers who do not comply with the aforementioned criteria and limit themselves to applying public policies generated by others should simply be considered “technicians” (Popkewitz, 1995; Macías et al., 2017), or in other words, the profile of the “karaoke” teacher who replicates what is produced by genuine teachers (Richard and Contreras, 2021b; Richard et al., 2021).

During the pandemic and the associated virtual environment, the lack of competent and credible teachers, that is, of "songwriters," became more evident than ever before. In this sense, the most obvious and manifest symptom and sign was the absence of students from the virtual in-person classes convened by such teachers in most cases; while in other cases, where attendance was imposed or mandatory, apathy, silence, and turned-off cameras among students could be seen as a response to teaching profiles lacking in appeal and/or credibility (Ramallo, 2020; Elgueta , 2020). In this context, the competency paradox was exacerbated: "No teacher can develop in students the competencies that the teacher themselves does not possess" (Richard et al., 2021).

Therefore, in order to regain credibility and social and academic trust, academia (authorities, graduates, teachers, and students) was forced, with a critical attitude and thinking, to return to reformist and post-reformist principles and capitalize on credible and integral human talent in a context of competencies (Casanova et al., 2019; Richard and Contreras, 2021; Richard et al., 2021). On the other hand, and no less important, it must be considered that the main substantive functions of the university (teaching, research, outreach, and management) have competencies intrinsic to their function and, as in the previous case, the lack of many of them has also been evidenced in many

universities in Latin America (Oppenheimer, 2010). Among them, those that stand out in most of the bibliography are those inherent to the substantive pillar of the research (Braslavsky and Acosta, 2018; Dáher et al., 2018; Richard et al., 2021; Schneegans et al., 2021; Paz and Estrada, 2022; Vallejo López et al., 2022) more than any other.

In the case of health sciences, as indicated by different authors, the teaching profile, in addition to the competencies inherent to university teaching and its substantive functions, should have others, based on the fact that health sciences involve high-risk professions and social responsibility (Sutton et al., 2019; Acosta and Quiles, 2021; Vallejo López et al., 2022). On the other hand, and no less important as UNESCO indicated in 2023, during the recent emergence of AI (AI), especially the so-called ChatGPT3, higher education, far from remaining on the sidelines of its development, must necessarily develop the appropriate competencies for its use in teaching, research, and outreach (Sabzalieva, 2023).

Based on the succinct overview presented above, the questions arise: What should be the ideal university teaching profile in the field of health sciences in Ecuador? What competencies should they have regarding the substantive functions that characterize university teaching? What would be the answer to these questions from an AI? Therefore, the objectives are: To outline an ideal teaching profile for university teaching in health sciences in Ecuador based on traditional bibliographic analysis and compared with what is postulated from the GPT3 AI, which will allow for the successful implementation of the competency-based curriculum and succinctly list the competencies that teachers should possess to fulfill their roles in the substantive functions of research, teaching, outreach, and management.

METHOD

This research is a qualitative, descriptive, and reflective systematic review (Eguia, 2014), the purpose was to provide a proactive view of the teaching profile in health sciences by competencies in Latin American higher education, but especially for Ecuador. To this end, a bibliographic review was conducted using the search engines Google Scholar, Scielo, Latindex, and Scopus without specifying date ranges and in both Spanish and English. The inclusion criteria were "higher education competencies," "teaching competencies," "health teaching competencies," "health sciences teaching competencies," and their respective translations into English. After a quick reading of titles and abstracts, those research projects that referred exclusively to university teaching competencies in Latin America in general and Ecuador in particular, and those specific to health sciences, were selected. In this work, we consider for the analysis the competencies according to the traditional UNESCO classification of dimensions (Delors, 1994) to the detriment of the more current one (Sobe, 2021) because the latter does not yet appear in the analyzed bibliography. Likewise, many competencies appear conceptually posed in different ways, but they maintain the same essence of content in different works, which is why, in these cases, it was decided to unify them in order to avoid unnecessary repetition of similar concepts. Due to this, we are literally immersed in the era of AI and its application in both the field of higher education and research and health sciences (Ocaña Fernández et al., 2019; Ávila Tomás et al., 2021); subsequently, and after analyzing the results obtained in the present review, it was decided to contrast them by working with the globally open access AI © Open AI API ChatGPT3.

For this, the option called PlayGround was used, which allows creating prototypes or projects of solutions based on GPT3 (Generative Pre-Trained Transformed) specifically for works involving the neural network in scientific works in written form, among others. In our case, the following direct written questions were formulated as inclusion criteria in the main Playground window where the GPT3 engine acts: "Competencies that a university professor in health sciences must possess" and more specifically "Competencies that a university professor in health sciences in Ecuador (DUCS) must possess" in order to corroborate the virtues that it is claimed to possess as an assistant in scientific research topics.

The neural network adjustment variables used were the following: The "Da Vinci-003" model

used, as it is the most complete and advanced of the four pre-existing ones (Da Vinci, Curie, Babbage and Ada). The Temperature option was used by default at 0.7 degrees. This option controls the randomness of the generated text, where a value of 0 makes the GPT3 engine deterministic, always generating the same output for a given text input. The maximum value for this parameter is 1, at which the GPT3 engine takes the greatest number of risks and uses the greatest creativity, but at the cost of making the most mistakes as well. The TopP parameter was left at its default value of 1. This parameter is also linked to the previous one and therefore to the randomness of responses.

Finally, regarding the variable Maximun Length Token, a parameter referring to the number of words the answer can contain; for each direct question, two answers were requested, each containing the default value: 250 tokens or words and 2,500 tokens. This was done with the express purpose of having the standard response content that GPT3 provides, but also the most developed one possible. In this sense, setting the second value of this parameter to 2,500 tokens proved to be "relaxing" for the questions asked; given that in no case did the AI's responses exceed 1,000 words or tokens.

RESULTS AND DISCUSSION

From the review and analysis of the cited bibliography, two substantial aspects were found to consider from these studies. First, it is evident that many competencies stated as part of the university profile in general overlap among the different substantive functions of university work considered here (research, teaching, outreach or social interaction, and management), which is understandable given that they cannot be considered as watertight compartments without any relationship between them. On the contrary, they all converge in a logical circle that supports the academic function and essence (Richard and Contreras, 2021a; 2021b). Likewise, most of the competencies include two or more of the dimensions considered (Delors, 1994). The latter is logical since, if analyzed epistemologically, many of them require prior knowledge (knowing) for their application (doing) and often an ethical or moral criterion (being) and social (living together). Thus, in this review, we found a total of 86 competency groups: 23 groups for the substantive function of research (26%, Fig. 1), 29 for teaching (34%, Fig. 1), 16 for outreach (18%, Fig. 1), and 18 for university management (22%, Fig. 1) (Tables 1 to 4).

As it can be seen, most of them are agreed upon by the different authors consulted, but the aforementioned overlap of many of them in the different substantive functions is also evident. This is understandable given that many teaching, research, and outreach tasks require management competencies to materialize, for example. At the same time, and as some authors indicate, research provides the "words and music" of the singer-songwriter in teaching, among others (Richard and Contreras, 2021b; Richard et al., 2021). Most of the competency groups focus on the substantive function of teaching (n=29), which would show a tendency to highlight these competencies, traditionally left aside or limited to just one: Teaching classes (Clavijo Cáceres, 2018).

Similarly, we find numerous (n=23) that arise from the substantive function of research, another relegated, postponed, ignored function in Latin American academia and to date not even well understood in its academic, social, economic and cultural context (Oppenheimer, 2010; Ruiz Ramírez, 2010; Rivera García et al., 2017; Clavijo and Cáceres, 2018; Rivera García Paipay et al., 2020; Richard and Contreras, 2021b; Schneegans et al., 2021; Vallejo López et al., 2022). On the other hand, for the 1918 Reform, outreach consisted of "reporting to the society that sustains us," and the function of outreach was none other than to share, in colloquial terms, with the society that sustains us the solutions found to its problems through research (Richard and Contreras, 2021b).

Unfortunately, in recent decades, the function of outreach has been distorted or reinterpreted in different ways, but the truth is that, for these reasons, academia has been losing the concept of a social and cultural "reference institution," a political contestant, etc., in favor of the concept of an institution that "factory" professionals (Oppenheimer, 2010; Richard and Contreras, 2021b); hence; the importance of rescuing its epistemic essence but above all implementing the

competencies of those substantive functions. A trend that, at least on paper, where 15 groups of competencies appear, seems to be resuming the leading role that it should always have had regarding their important social function.

Finally, the competencies inherent to management, a function traditionally relegated to authorities and administrative staff, appear in large numbers (n=18, Fig. 1) and are widely linked to the other substantive functions, something understandable and, above all, justifiable today. Indeed, the teacher, in their character or profile as a "songwriter," must also be a manager in the broadest sense of the term, transversalizing this competence to the rest of the substantive functions, since the teacher must be able to manage interdisciplinary work groups in research, inter- and intra-chair work, in curricular, institutional, inter-institutional work, etc. (Mas Torello, 2011; 2012; Maldonado, 2016; Clavijo Cáceres, 2018).

Regarding the specific competencies of the health sciences, the articles that refer to them include competencies common to other or all areas of knowledge (Ángel Macías et al., 2016; Sutton et al., 2019; Zaldivar Acosta, 2021; Vallejo López et al., 2022). That is, it is not perceived that any of the competencies could be exclusively applicable to the health sciences. In any case, it could be thought that some competencies inherent to "knowing how to be," such as the development of ethical and moral values, should be applied more emphatically in these careers. However, this has not been observed explicitly or emphatically either. Likewise, some authors limit themselves to dividing teaching competencies only into the categories of "general" and "specific" without affiliation with the substantive functions of the academy and for the specific ones they only indicate that they are those of the exercise of the profession without explaining them (Tuning, 2007; Clavijo Cáceres, 2018, Ramírez Morán et al., 2022).

In this sense, Freidson (1985) refers and indicates that in the definition of a profession it is necessary to consider, among other variables, skills and adequate handling of disciplinary knowledge and the way of applying them, as well as the potential to develop legally and legitimately recognized organizations, and especially the ability to regulate their professional practice in a context regulated by ethical principles. Therefore, the profession from this perspective should consider the analysis and permanent development of its practical application. This undoubtedly includes the exercise of critically debating the external and internal conditions that one wishes to achieve (Freidson, 1985; Ángel-Macías, 2017). For Popkewitz (1995), among others (Acosta and Quiles, 2021; Bordieu , 2003; Richard, 2004; 2018; Richard and Contreras, 2021b), a genuine university professor is, as previously mentioned, one capable of producing new and innovative knowledge from his or her academic practice of pedagogical research ("Singer-songwriter", Richard and Contreras, 2021b).

This implies that in addition to generating new knowledge, he or she must become a critic of his or her own practice in order to promote its growth and continuous improvement in order to achieve a social impact. Consequently, the current university teaching profile in the health area, at least in Ecuador, would not meet the aforementioned and described ideal profile of an academic researcher, and in general, teachers are limited to carrying out an improvised teaching practice based on the belief that disciplinary training is sufficient to teach a subject (Tenti-Fanfani, 2003; Oppenheimer, 2010; Richard and Contreras, 2021; Richard et al. 2021; Vallejo López et al., 2022). The truth is that implementing a competency-based curriculum will require a general profile that brings together the competencies detailed here (Tables 1 to 4 and Fig. 1). Consequently, and taking the precepts of Freidson (1985) we propose that the competencies required for the teaching profile in medical education and health sciences in general, based on the social responsibility inherent to that profession, should be differentiated from the rest in the greater emphasis on those inherent to knowing how to be, the biopsychosocial principles, the set of values and ethical and deontological code of health sciences and the skills acquired from the professional practice of their career.

In fact, the above coincides with what the AI © Open AI API proposed when comparing what it considers general competencies for university

professors and those it considers for a DUCS (Table 5a). Note in the first case that the AI, on the one hand, was able to synthesize the general competencies in such a way that the 10 suggested competencies essentially include practically all of those analyzed here from different authors and for the different substantive functions. The AI then reduced the competencies for the DUCS to 7, but further expanded the concept. However, as in the analysis conducted here of the bibliography consulted, the AI was unable to list competencies strictly specific to teaching in health sciences (See Table 5b). Surprisingly, when the AI specified that it indicate the university teaching competencies in health sciences for Ecuador, it indicated a total of 15 competencies. Most of them, in one way or another, conceptually overlap with the previous ones and those reviewed here.

However, the competencies suggested by AI 10 to 15 (Table 5c) and especially 11 to 15 (Table 5c) are not only not included in the previous AI analyses, but they were also not found in the analyzed literature, where many competencies mentioned as "specific" to the health area are not in fact. In this case, especially 11 to 15, they can undoubtedly be designated as specific competencies of the health sciences teaching profile and pertinently applicable to the Ecuadorian context. These include specific competencies linked to both bioethical aspects (knowing, being, living together), as well as specific professional practice (knowing, doing, living together) and legal aspects (knowing, doing, being, living together).

In the case of competency 11 (Table 5c), the AI specifies that it must have the capacity to develop and evaluate health promotion programs because health promotion programs are an important part of supporting community well-being. These programs help improve lifestyles, reduce the risk of disease, and promote mental health. These programs also help improve the community's quality of life by providing information on risk factors for disease and promoting the adoption of healthy habits. The role of a university professor in this part is critical, as they can help educate students about health prevention and promotion and evaluate the effects of health promotion programs. This would help improve the community's quality of life and prevent disease.

In the case of competency 12 (Table 5c), the AI indicates that teachers should be aware of current legislation and regulations in the health field in order to prepare their students for the future, so they can work safely and meet established quality standards. They should also teach their students about the guidelines established by health authorities and how they should be followed. This would help students understand the importance of following the standards established by law and the legal requirements that must be met to provide quality health services. This information would also help students prepare for their professional practice and prepare for potential legal situations that may arise in their careers.

nowledge of current legislation and regulations would help teachers ensure that students are aware of changes and developments in the health field. Knowledge of this information would also allow teachers to help their students better understand the regulatory processes, standards, and laws in force in the health field, thereby contributing to their preparation for their future professional careers. No less important, especially in the Ecuadorian context, is competency 15 (Table 5), which the IA identifies as specific to the DUCS, which is the need to have knowledge of the culture and traditions of the community in which they teach in order to promote the local population well-being. Knowledge of the community's culture and traditions would allow teachers to better understand the health problems of the local population and address them appropriately. Furthermore, it would allow teachers to tailor their teaching to local needs and achieve better interaction with the community. Finally, knowledge of culture and traditions can inspire new research approaches and innovative solutions to community health problems.

Similarly, in relation to competency 13 (Table 5c), AI indicates that the DUCS profile should have knowledge of professional ethics in the health field because students need an understanding of ethical principles in the health field in order to perform their work appropriately and responsibly.

Bioethical principles refer to the way health professionals should behave in the practice of their profession, taking into account patient's rights and well-being of life. Thus, university health sciences teachers must be aware of professional ethics and bioethics in the health field in order to provide their students with an understanding of the ethical and bioethical principles that govern them.

Interestingly, AI does not mention or propose as a competence, the use and application of AI in higher education or as part of teaching competences despite UNESCO's (2023) recommendations in this regard.

All of the above paints a picture of increasing complexity as both academia and its teachers become objects, subjects, and problems of study. This complexity, studied in depth, shows that the teaching profession, viewed from a competency perspective, is far from being as simple as it is presented in many contexts or from a reductionist perspective limited to believing that it is simply a matter of sharing what is known.

CONCLUSIONS

The ideal profile regarding the substantive functions of the university and that characterize university teaching in general terms will be one that ideally can also fulfill the 83 groups of competencies indicated and summarized in this review. We consider these to be far from all of them. In this sense, it is evident that the social, political, cultural, and economic context of a region or area of knowledge will influence and bias the relative importance of many of them. In specific articles on teaching in health sciences, the competencies indicated for that area did not show specific competencies that could be justified or substantiated as such when compared with those listed in articles on teaching competencies in general.

However, in some cases, a bias was noted in the "knowing how to be" dimension, emphasizing issues of bioethics and values in general. We therefore consider that the competency-based teaching profile in health sciences would be one that fulfills the competencies indicated here, complemented by those that place special emphasis on the bioethical and biopsychosocial aspects that characterize it. We must add to these, those inherent to the professional practice of health sciences (especially those related to health promotion and disease prevention), knowledge of the legal context of the profession, and knowledge of local culture and traditions related to the health field. The use of AI proved to be a pertinent complement to the review work conducted here.

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